

DESIGN OF BLOCKCHAIN SYSTEM FOR LAND SERVICES ADMINISTRATION AT MINISTRY OF AGRARIAN AND SPATIAL PLANNING/NATIONAL LAND AGENCY

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Abstract: The objective of this study was to analyze the effectiveness of Blockchain for land services at the Ministry of Agrarian Affairs and Spatial Planning. The study was conducted using a rationalistic approach combined with a naturalistic paradigm. Data were collected through observation, stratified sampling, and systems analysis. A black box test was conducted to test the effectiveness of blockchain usage. This method was used to determine if the software was working properly. As a result, it was found that the Ministry of Agriculture and Spatial Planning/National Land Agency (Ministry of ATR/BPN) land service included target optimization divided into two subsections: time and target. Of the two subsections (time and goals), delays in the completion of land certificates and initial preparation of land certificates were found to be less effective. The problem was that there were still some land certificates for which terms and timeliness certainty were inconsistent with the Land Agency Commissioner's Decree No. 1 of 2010 on Service Standards and Land Regulations. The design of the Blockchain system for land services of the Ministry of Agrarian Affairs and Spatial Planning was developed in a limited manner based on the simplification of land data entities (in blockchain technology referred to as business objects) with the aim of illustrating how smart contracts contributed to each stage of data transactions. Thus, the Blockchain system was considered to have a high security value, especially when applied in the digital land certificate security system.

Keywords: black box test, blockchain technology, land certificates, land services

Abstrak: Tujuan penelitian ini adalah menganalisis efektivitas Blockchain untuk layanan pertanahan di Kementerian Agraria dan Tata Ruang. Penelitian ini dilakukan dengan pendekatan rasionalistik dikombinasikan paradigma naturalistik. Data dikumpulkan melalui observasi, sampel bertingkat, dan analisis sistem. Uji blackbox dilakukan untuk menguji efektivitas blockchain. Metode ini untuk menentukan apakah perangkat lunak berfungsi dengan baik. Hasilnya layanan pertanahan di ATR/BPN mencakup optimasi target yang dibagi menjadi dua subbagian: waktu dan target. Dari dua sub-bagian (waktu dan sasaran), keterlambatan penyelesaian sertifikat tanah dan persiapan awal sertifikat tanah kurang efektif. Masalahnya, masih ada beberapa sertifikat tanah yang syarat dan kepastian ketepatan waktunya tidak sesuai dengan Peraturan Kepala BPN No. 1 Tahun 2010 tentang Standar Pelayanan dan Peraturan Pertanahan. Rancang bangun sistem Blockchain untuk pelayanan pertanahan Kementerian Agraria dan Tata Ruang adalah dikembangkan secara terbatas berdasarkan simplifikasi entitas data pertanahan (dalam teknologi blockchain disebut sebagai business objects) dengan tujuan untuk mengilustrasikan bagaimana smart contracts berkontribusi dalam setiap tahapan transaksi data, sehingga dengan demikian, sistem Blockchain dinilai memiliki nilai keamanan yang tinggi salah satunya apabila diaplikasikan dalam sistem pengamanan sertifikat tanah digital.

Kata kunci: uji blackbox, teknologi blockchain, sertifikat tanah, layanan pertanahan

Article history:

Received
12 December 2023

Revised
17 February 2024

Accepted
21 January 2024

Available online
30 April 2024

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INTRODUCTION

The rapid advancement of information technology, communication and the increasingly complex challenges of the future mark a new era called the era of the industrial revolution 4.0. The development of industrial technology 4.0 since its inception is very fast where almost all aspects of life adopt the existence of digital technology (Yuliati & Saputra, 2019). The industrial revolution directly or indirectly changes the order of the country's life. The "Making Indonesia 4.0" movement launched by Indonesian president Joko Widodo is a government commitment in entering the technological era in the 4.0 era (Nugrahanto & Zuchdi, 2019). It has real consequences and impacts on various fields of life based on meeting future needs through the use of technology, one of which is the land sector.

The implementation of public services in several service sectors including the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency is considered to still need a lot of improvement. The number of complaints and grievances from the public through print media, visual media, social media and reports to the Land Office/Regional Office and Inspectorate General is a fact of the need to improve the public services of the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Jawahir et al. 2019). There are two main aspects of land problems in Indonesia. First, regarding land service problems or what can be called aspects of systemic problems. The second one we call the "people" problem. In the system dimension, there are many weaknesses, including: the absence of a non-transparent flow of service procedure mechanisms, additional fees beyond those required, a work culture that is not yet reformist, public archive management issues, the lack of digitisation of a number of land documents, the absence of a complaints management unit, limited service facilities and infrastructure available, not fully implementing online-based services and more productive spatial management programs (Firhansyah, 2020).

In terms of Human Resources, land services are still found to be very "personalised" where the completion of one land service product is still based on the person handling the file. Even though land services are services of state institutions, the lack of measuring officers and surveyors, the lack of trained and competent complaints management officers, and the lack of

reformist leadership management and integrity (anti-corruption) are special notes to improve this institution (Firhansyah, 2020). Proper data of land management and information has an important role in realising the goals of sustainable national development. This activity is an important part of realising good governance. To overcome these problems, a breakthrough is needed by utilising technological developments, namely with Blockchain (Nofer et al. 2017).

This current research strengthens previous research that discusses the advantages of using blockchain as an administrative security system. These include researches by Negara, Pratiwi & Maylinda (2021) on the urgency of security on digital land certificates, research by Argani & Taraka (2020) on the use of blockchain technology to optimize certificate security in universities, and research by Nugraha (2022) on the use of blockchain technology in the education environment. Abroad, there is research by Bennet, Pickery & Sargent (2019) which aims to provide insight into opportunities, challenges, impacts, and future scenarios related to the application of emerging technologies.

Myeong & Jung's (2019) research examined the determinants of blockchain administration and their prioritization through analytic-hierarchy process (AHP) analysis. The priority ranking of internal factors is security, economic efficiency, and decentralization.

The difference between this research and previous research is that this research discusses the design of blockchain in the land administration system at the Ministry of ATR/BPN and the business model that covers it. The objective of this research is to describe land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN) and problems in land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN) and their solutions.

In order to solve the problems above, one of alternative solutions is the use of blockchain technology. Blockchain refers to a fully-distributed cryptographic system that captures and stores a consistent, immutable and linear event log of the transactions between networked actors (nodes). It allows for managing the records of transactions without a central server or authority (Ameyaw, 2022).

This technology was developed in order to support the era of information disruption which provides an alternative solution to the centralized technology architecture. Blockchain technology is realized with the concept of decentralization of information in data processing (Hernandez, 2017). This technology is considered to change the business process of a company. If previously every transaction record was only managed and recorded in one company, with blockchain technology, the recording of every transaction is published on all internet networks and can be accessed by the public. Once a transaction has been recorded in the global ledger (blockchain technology network), it is impossible for anyone to delete the transaction record (Romano & Schmidt, 2017).

Transactions using blockchain technology are peer to peer (Kiayias et al, 2017). With blockchain, users no longer need to rely on a single server because all transactions are duplicated throughout the network, thus avoiding various forms of fraud due to modified data, server downtime, or hacked accounts (Ouadah et al. 2017).

The first aspect of a blockchain design system in the land sector is transaction security. Blockchain technology can help the government in maintaining the security of electronic land certificate (e-certificate) data (Zhang et al. 2022). In the past, certificates were printed on special paper to make them distinct and difficult to replicate. The government held one document and the owner held another. With this method, there is a lot of data falsification, so the government needs to finalise the data collection of physical certificates before switching to digital (Lany et al. 2019).

The Agrarian and Land Office is expected to adopt blockchain in order to improve the certificate security system. Weaknesses in the form of a central database that is still controlled by an admin staff with a centralised server centre with very minimal security that allows data to be manipulated by a hacker will be overcome. The presence of blockchain technology is expected to increase certificate security, authenticity and validity of data so that fake certificates and the existence of double data will be minimised (Ameway & Vries, 2020).

Based on the explanation, the objectives of this study are: To describe and analyze land services at the Ministry of Agrarian Affairs and Spatial Planning/ National Land Agency (Ministry of ATR/BPN); To

describe and analyze the problems in land services at the Ministry of Agrarian Affairs and Spatial Planning/ National Land Agency (Kementerian ATR/BPN); To formulate a Blockchain system design for land services at the Ministry of Agrarian Affairs and Spatial Planning; and To analyze the effectiveness of Blockchain for the land services of the Ministry of Agrarian Affairs and Spatial Planning.

METHODS

This research was conducted at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN) from September 2022 to April 2023. Data of this research were field notes of observation and system analysis results. The data source for this research were the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN). Data collection was carried out through observation, stratified sampling, and system analysis. Sampling in this study includes the Head Office, Regional Office and Government Office. The sampling was taken on a multistage basis starting from the BPN offices at the headquarters, the provincial and regency levels.

In observation, researchers made direct observations to find facts in the field. The instrument used by researchers is unstructured non-participant observation. The system analysis carried out is: Identity Verification, Standardization of Electronic-Based Land Services, Rules and Guarantee Mechanisms, Security Features, and Accessibility. The data were analyzed using system analysis involving identity verification, standardization of electronic-based land services, rules and guarantee mechanisms, security features and accessibility.

Blockchain is a peer-to-peer technology where the integrity of digital information is protected. Blockchain acts as a decentralized ledger of transactions through a peer-to-peer network. This ledger records every sequence of transactions from beginning to end. Each transaction is entered into a block and each block is interconnected with each other. The list of transactions is locked together and the unique marker of each block is appended to the next block, creating an immutable chain. A block usually consists of the current transaction information and the hash (unique code) of the previous block. If one of the blocks is tampered with, it will cause the hash of the block to change and make all subsequent blocks invalid.

In this study, the researcher examined the effectiveness of blockchain technology to overcome land problems that occur in Indonesia, such as multiple land certificates and overlapping data on registered land plots. The researcher expected to obtain an explanation of the root causes of multiple certificates and overlapping land data, the formulation of a solution concept for the authorities, in this case the National Land Agency, by applying blockchain technology.

According to Negara et al. (2021), blockchain technology is a technological concept to record transactions convincingly, without a third party to guarantee it, and each user can verify information related to transactions together. The way blockchain technology works is decentralized to its owners, using cryptographic descriptions and encryption. Thus, the researcher would like to analyze blockchain technology in resolving multiple certificates and overlapping land plots.

In addition, this research also described the advantages and disadvantages that will arise if blockchain technology is implemented (Firdaus, 2022; Mustofa, 2020). The researcher assumed that the sooner the Ministry of ATR/BPN agencies implement blockchain technology in their services, the problems of multiple land certificates and overlapping plot data would not occur

RESULTS

Land Services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN)

Land service standards consist of groups and types of services, service requirements, service fees, service completion time, service procedures and service result reporting consisting of actors, inputs, processes and outputs of land services (Kusmiarto et al. 2021). The actors involved in land services are: Applicant, Owner of adjacent land, Lurah/Kades, Local Revenue Office, Housing Office, Spatial Planning Office, Governor/Regent/Mayor, Tax Office, PPAT, Notary, Immigration, Forestry, Print/Electronic Media, Department of Foreign Affairs, Department of Agriculture, Plantation/Fisheries, Police, Disperindag, Ministry of Law and Human Rights, KPKNL, Banks/Financial Institutions, and BPN.

The following is the service procedure for changing land rights that is currently running at the Land Office:

- 1) The first step is for the applicant to bring the required original documents to the land office such as: Original Certificate, Last Proof of Payment of PBB (Land and Building Tax), IMB (Building Permit), Sale and Purchase Deed and Photocopy of ID Card. After that, the applicant is required to purchase and fill in the form provided.
- 2) After the file is complete, the applicant can immediately continue the next process by giving it to the managing staff at the counter that has been available at the land office.
- 3) Further processing will be continued by the management staff. The managing staff is tasked with examining the completeness of the documents. After examining the completeness, the management staff will make a SPS (Deposit Order) and will give it to the applicant to complete the administration of service payments.
- 4) If the administration has been paid, the applicant will be given a receipt by the management staff. The function of this receipt is as proof that the payment has been paid as well as proof of certificate collection.
- 5) The process continues to the PHI sub-section by correcting documents if there are deficiencies and validating them. If it is correct then the document status is changed. If HGB becomes HM and vice versa if HM becomes HGB.
- 6) After completion of validation, the PHI Sub Division will provide the original document and certificate to the Head of HTPT Section.
- 7) The Head of HTPT Section corrects and validates the documents that have been checked by the PHI Sub Section. If everything is complete and valid, the Head of HTPT Section will initial the document and continue the service process to be immediately given to the Head of the Land Office.
- 8) The Head of the Land Office is in charge of re-examining the files that have been checked previously by the PHI Sub-Section and the HTPT Section Head. After everything is considered valid, the Head of the Office can sign the certificate that has changed its status.
- 9) The certificate is then returned to the PHI sub-section to have the original stamp affixed. After completion, the certificate can be given directly to the management staff.
- 10) Certificates that have been processed can be collected by the applicant at the management

staff counter by bringing receipts as proof of administrative repayment in the previous process.

If the application file and the new document product resulting from the service flow have passed the quality control stage at all levels, then the output of the service process will be produced in which the original document (e.g. Land Book/*Surat Ukur*) is stored at the Land Office both digitally and manually, while the copy (e.g. Certificate and copy of *Surat Ukur*) is submitted to the applicant. All application requirement files will be stored at the Land Office in the form of a document that must be found and seen again at any time if there are problems with the service output. In this system, the output of the service is not a product/data that becomes the absolute truth and there is still a chance to be cancelled even though it has gone through a long quality control process. Land service outputs include Certificate of Ownership, HGB Certificate, HGU Certificate, Certificate of Right to Use, Certificate of Management Rights, BT Wakaf, P3MB, Certificate of Ownership of Flat Unit, Mortgage Certificate, Technical Considerations, Engineering Base Point Information, *Persil/Map*.

The land registration system based on regulations issued by the government, namely PP No. 24 of 1997 concerning Land Registration (PP 24/1997) aims to ensure legal certainty because thus the land registration process must be properly considered in accordance with the legislation that is a reference in the process of registering each land parcel in Indonesia is known there are several ways or processes of land registration in this case to achieve administrative order in the field of national land then to ensure legal certainty.

Problems in Land Services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Kementerian ATR/BPN) and Their Solutions

Some weaknesses of paper-based land administration is that finalisation of the transfer of ownership and encumbrance of land rights takes a long time, while transactions between parties have already taken place. Recording has to be done in the physical Land Book where a search must first be made in the filing cabinet. The parties continue with the transaction even though it takes a long time to obtain certainty over title ownership.

In the case of financing transactions (e.g. KPR), the creditor (bank) directly disburses funds to the debtor by relying on a “certificate or cover note” from the Notary/PPAT, while the process of transferring land ownership from the developer to the debtor has not been completed and the encumbrance of the mortgage has not been recorded in the Land Book because it is waiting for the process of transferring the land to the debtor’s name to be completed first. This long-time difference creates an opening for fraud that puts the public and financial institutions in a weak/disadvantaged position.

The roots of land problems that eventually become land disputes in Indonesia are caused by: (1) lack of orderly land administration in the past; (2) inequality in the structure of land tenure and ownership; (3) negative land registration publication system; (4) increasing demand for land, so that land prices cannot be controlled due to the actions of the land mafia; (5) overlapping laws and regulations, both horizontally and vertically, as well as the substance regulated; (6) there is still a lot of abandoned land; (7) notaries and land deed officials are not careful in carrying out their duties; (8) there is no implementation of the perception or interpretation of law enforcers, especially judges, of laws and regulations in the land sector; and (9) law enforcers are not yet committed to implementing laws and regulations in a consumer and consistent manner.

To overcome the problems of the land administration system in Indonesia, the Ministry of ATR / BPN uses blockchain technology to optimize the security of land data in Indonesia. In terms of electronic land certificate data security, Blockchain technology can be a solution to potential problems that will arise in the future. Blockchain is a fixed and mutually shared ledger to facilitate the recording of asset transactions in a business network. Assets in this can be tangible or intangible such as intellectual rights, patents, copyrights, and brands. Blockchain technology is a technology used in distributed databases, then in data that has been distributed, it will be recorded and stored and shared with each member who has connected to one network (Noor, 2020).

Blockchain technology consists of several blocks that are linked to each other and in sequence so that it will be difficult to change them. This technology is also very lightweight and efficient so that any changes in the history of information or data can be known directly and instantly (Piero, 2017). Blockchain also guarantees

the openness of data and information in it because of its peer-to-peer system that makes every entity that runs the system can receive exactly the same data (Yang et al. 2018). The use of blockchain technology can help maintain the integrity of information and data. As well as helping to open access to information to entities that are given access rights to information and data. Blockchain technology refers to a fully distributed crypto-graphical system that captures, and stores a consistent, immutable, and linear log of events from transactions between network actors (nodes). Blockchain can be used to manage transaction records without a central server or authority (Ameyaw, 2022).

The challenges that occur in the use of blockchain technology include according to Presidential Regulation of the Republic of Indonesia Number 20 of 2015 concerning the National Land Agency, BPN has the task of carrying out government duties in the land sector in accordance with the provisions of laws and regulations. At this time, the process of archiving land certificates at the BPN office is still ineffective because it is still done manually, namely by recording into a ledger after the data is recorded, then archived into a folder and then stored in a filing cabinet. It will take a relatively long time, because of the large pile of files that make it difficult for office employees to find the necessary data. In addition, BPN office employees have also experienced loss of land certificate data in the archive room because the data has been stored for too long the data has been worn/damaged or bitten by small animals, it is very difficult to see the damaged data if there are people who come to ask whether the land certificate they made has been completed or not automatically office employees must unpack one by one archive data that has been recorded in the ledger that has been stored.

The digital transformation of the Ministry of Agrarian Affairs will have an impact on improving public services. The digitisation process will affect service standards, namely service time and procedures. The driving factors that gave rise to this idea are what is called technological push (technology support) and societal pull (community needs). The demands of the development of the digital era make many people want effective and efficient access to information, people expect them to be able to get information without having to wait long or go through convoluted procedures and not save time, money and energy.

Blockchain technology also supports cross-sector land administration services. The existence of a land information system that can provide information that can be used to support land management is a necessity. The decision to convert an area into sustainable plantation agriculture, for example, must be based on data on the ability and fertility of the soil in that area. Spatial planning decisions must be based on sufficient data and information on the land capability of a particular area, so that the best use and utilisation for that area can be decided. The development of a land information system must be able to model the relationship between people and land, known as RRR (Rights, Restriction, and Responsibility). The relationship between humans and land in the context of land in Indonesia is realised through the control, ownership, use and utilisation of land. The Electronic Land Book as primary land data is a single reference for all ATR/BPN partners with NIB (Field Identification Number) as the primary key. This can then realise consistency and alignment of all information derived from a land parcel. For example, with regard to land value zone (ZNT) data managed by the Tax Office. ZNT is a reference table that determines the tax of buyers and sellers. ZNT refers to the NOP (Tax Object Number), where the Tax Office manages its own NOP data without referring to the NIB data available at ATR/BPN. This condition makes it necessary for a separate validation process for the tax payments of sellers and buyers carried out by self-assessment, where the Tax Office will refer to the NOP data it has, then will issue an under/overpayment letter. There are many cases where the NOP does not refer to the correct NIB.

In terms of business, the use of blockchain technology for land administration system security is in accordance with the principles of sustainable business strategy. In research conducted by Anggraini et al. (2022), the implementation of a sustainable business strategy has a positive impact on at least one of the other areas, such as the environment. If companies fail to assume responsibility, it will lead to issues such as environmental degradation, inequality, and social injustice.

Utilisation of the Electronic Land Book that has been integrated across ATR/BPN partners will create a comprehensive land parcel information, equipped with various supporting information attributes contributed by all partners, forming integrated property information. A land parcel not only has juridical and physical

information, but is enriched with related information, such as: the status of permits (Building Construction Permit or IMB, principal permit and location permit, as well as the permit for the transfer of land function), tax status (*Pajak Bumi Bangunan* or *PBB*), the status of whether or not there is a court dispute, and so on. This information is very helpful for the public in making investment decisions, without the need to contact various separate parties, simply through the ATR / BPN website or Touch My Land apps. As for ATR/BPN, the provision of this information has the potential to be monetised as a source of new PNBP.

Peer-to-peer transactions are defined as transactions carried out by the seller and buyer directly without involving PPAT as an intermediary. The bank will be involved in the event that the buyer uses financing services. The transaction process will be very different, where the entire end-to-end process will be handled by smart contracts since there is a price agreement between the seller and the buyer. The process of bidding, negotiating until an agreement occurs is a process that is carried out off-chain (not facilitated by the blockchain) and off the system (not facilitated by the CTF). The transaction process will undergo a series of stages of initiation, billing, payment, settlement. All of these stages are organised to provide protection to the parties, as funds are only received by the seller if title ownership has passed to the buyer. For this reason, the transaction settlement scheme is not carried out directly between the seller and the buyer, but adopts the transaction settlement scheme that has been adopted by the capital market (Indonesia Stock Exchange) and e-commerce marketplace platforms (*BukaLapak*, *Tokopedia*, etc.). The implementation of peer-to-peer transactions opens

up opportunities for property marketplaces that provide ease of transactions like shopping online. This service will facilitate the development of property marketing transactions with the widest possible involvement of the marketplace platform ecosystem (for example: *Bukalapak*, *Tokopedia*, *Rumah123*, property brokers, etc.).

The marketplace platform provides a means to bring buyers and sellers together, and develop loyalty campaigns in the form of promotional programmes. ATR/BPN's main role as an asset custodian focuses on providing certainty over the transaction process and ownership of asset rights, without the need to have a team and IT infrastructure to develop and operate the marketplace. ATR/BPN potentially has a new source of PNBP revenue from transaction fees, or from concession fees that must be paid by marketplaces that win auctions for a certain period.

Blockchain technology functions like a ledger that records all transaction data in a distributed or peer to peer (P2P) system. If data is created by one peer, then other peers will replicate it. Changes in data, whether in the form of sales transactions or inheritance, are monitored in the blockchain system whose data cannot be changed and is irreversible. To create this blockchain-based land system, manual land certificate documents need to be converted first into digital code (digitized) that is compatible or in accordance with the blockchain architecture. This process is usually referred to as creating a Blockchain Compatible Platform (BCP) (Soner et al. 2021). Blockchain data transactions take place on the Symbol protocol, as shown in Figure 1.



Figure 1. Data transaction

The first stage is account creation, which is the creation of a Symbol digital wallet. Followed by the creation of Namespace, which is a blockchain-based asset storage. The creation of this Namespace can be analogized as Domain, where the applicant can create subdomains or known as sub namespaces (in Symbol) as many as 256 sub namespaces. The next stage is the creation of Mosaic, which is a collection of specialized assets, linked to the namespace. Mosaic can be analogized as data stored in a database or better known as Metadata (in Symbol). The blockchain data transaction flow takes place on the Symbol protocol (Figure 2).

Land data verification is carried out off-chain by direct integration of internal BPN data and on-chain by uploading the applicant's digital land certificate. Furthermore, blockchain data transactions take place on the protocol symbol. The following is a picture of the transaction flow that occurs in the internal BPN (Figure 3).

The applicant uploads JSON data of the land owner. Then the system performs a verification process related

to the JSON Data uploaded by the internal BPN. The system automatically synchronizes and visualizes the JSON Data with the blockchain, as well as generates a digital land certificate and automatically notarizes the certificate into the blockchain. The final result is the result of generating a digital land certificate from the JSON Land that has been uploaded. The visualization of the digital land certificate dashboard (Figure 4).

Broadly speaking, the application of this system is from the beginning of land data that has been collected by juridical and physical data then inputted by the Land Office into the blockchain with the system that has been created. Then, when the data has entered the blockchain, the system will be validated by the node. This node is a system that will validate by encryption in cryptography, so that it will generate a secret code that cannot be owned by other users. It is during this process that multiple certificates cannot be issued because the code is unique and will be rejected if there is any duplication of data. The encryption code will then appear and will be used on the electronic certificate, which will then be given to the landowner.

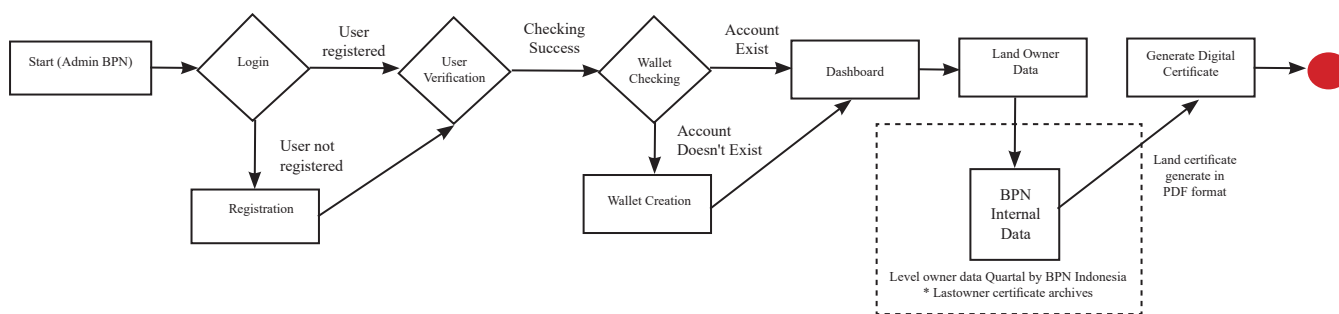


Figure 2. Flow of data verification



Figure 3. Flow of data transaction

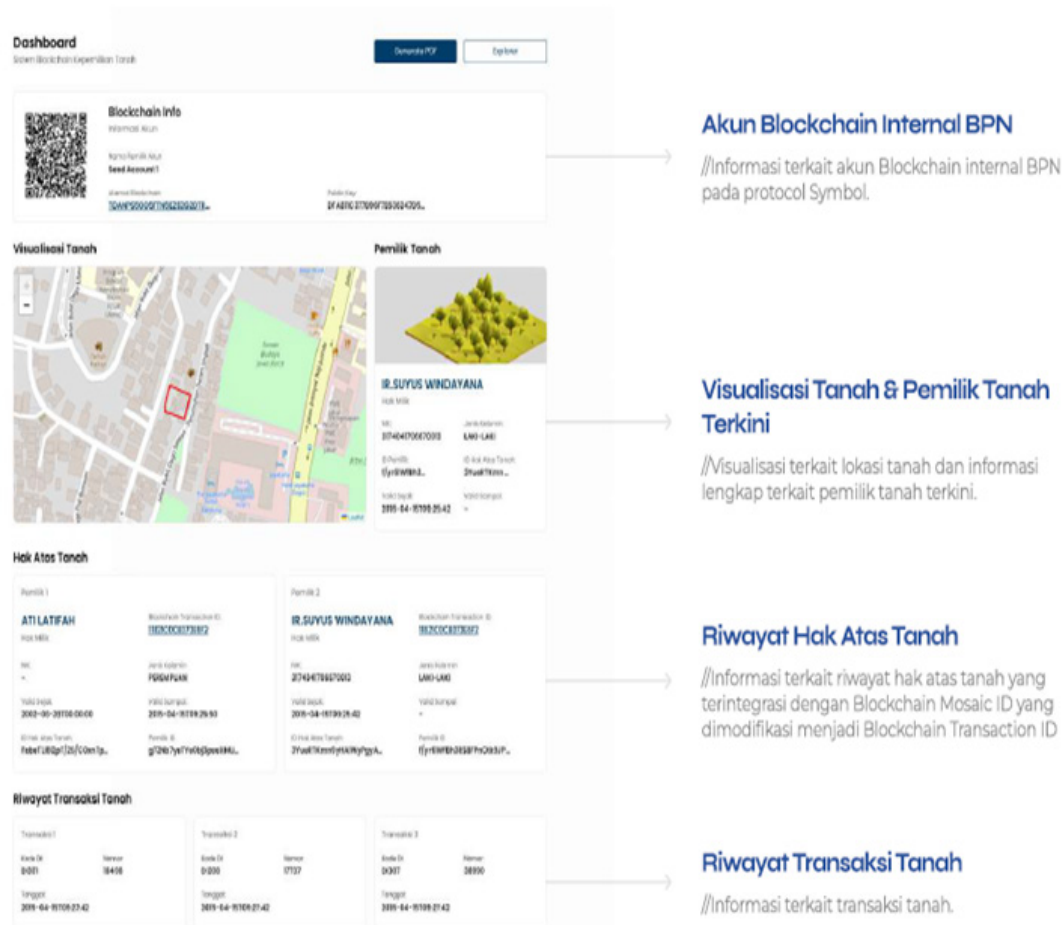


Figure 4. Dashboard Visualization

With the implementation of this electronic land book, it is hoped that legal certainty and ease of land data management can increase. The application of Electronic Signatures (TTE) and Digital Stamps has also been practiced in handling land documents. The government hopes that by 2025 all land parcels in Indonesia will be titled and the transformation of analog to electronic land certificates will run smoothly (Presidential Instruction Number 2 of 2018). Therefore if any new record such as a property transaction is added to the Blockchain it must be confirmed by the operating node. As a result, according to experts, land transactions can be done in days instead of months, with a significant reduction in transaction costs (Capiello & Gherardo, 2021). When looking at the various advantages and disadvantages of Blockchain technology with its various forms of application, which are currently quite diverse, it is generally illustrated through the research and technological developments carried out on Blockchain, which in this case cannot be denied that it has greatly influenced the balance of the technology innovation supply market. Because, the development carried out has changed consumer demand for

conventional technology. This new technology brings a very different proportion of value and eventually becomes more common as consumers are attracted to the benefits offered by Blockchain (Brownsword et al. 2017).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Land services at the Ministry of Agrarian Affairs and Spatial Planning / National Land Agency (Kementerian ATR / BPN) include goal optimisation which is divided into 2 sub-sections, namely time and goals. Of the 2 sub-sections (time and target), the less effective ones are caused by delays in the completion of land certificates and making land certificates for the first time. This happens because the number of certificate requests and human resources is not balanced. Maintenance of land registration based on the Head of the National Land Agency Regulation No. 1 of 2010 concerning Service Standards and Land Regulations.

The problem that occurs is that according to the results of the research, there are still several land certificates whose provisions and time certainty are not in accordance with the Regulation of the Head of the National Land Agency No. 1 of 2010 concerning Service Standards and Land Regulations. Systematic perspective can be said to be effective because of the Standard Operational Procedures (SOP) in Government Regulation No. 128 of 2015 concerning Types and Tariffs on Types of Non-Tax State Revenue applicable to the ministry of agrarian and spatial planning / National Land Agency (BPN) is divided into land registration financing for the first time and financing for the maintenance of land registration data can be said to be good and clear in accordance with Government Regulation No. 128 of 2015, although in financing land registration for the first time has additional costs. The Blockchain system for land services of the Ministry of Agrarian Affairs and Spatial Planning is a limited development based on the simplification of land data entities (in blockchain technology referred to as business objects) with the aim of illustrating how smart contracts contribute to each stage of data transactions.

Recommendations

The Land Office's online service application is still only for registration services, and even that is sometimes difficult because the system cannot accept all forms of applications, such as certificates that do not have a NIB. So this application should be coupled with a more sophisticated system so that both the registration application and the settlement process within the Land Office can be simplified and time-saving.

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