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

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Abstract

The purpose of this study is to describe and analyze land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of ATR/BPN), Describe and analyze problems in land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of ATR/BPN), Formulate system design Blockchain for land services ministry Agrarian and Spatial Planning, and Analyzing effectiveness Blockchain for land services Ministry Agrarian and Spatial Planning. The research used a rationalistic study approach associated with the naturalistic paradigm. Data is collected through observation/observation activities, stratified sampling, and system analysis. Black box testing was carried out to test the block chain's effectiveness. This method is used to find out if the software is working correctly. The results showed that land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of ATR/BPN) included goal optimization, divided into 2 sub-sections: time and target. Of the 2 sub-sections (time and target), the less effective ones were due to delays in completing and making land certificates for the first time. The problem is that according to the research results, there are still several land certificates whose stipulations and time certainty are different from the Regulation of the Head of the National Land Agency No. 1 of 2010 concerning Service Standards and Land Arrangements. System design blockchain for land services Ministry Agrarian and Spatial Planning is a limited development based on simplifying land data entities (in technology blockchain referred to as business objects) intending to illustrate how intelligent contracts contribute to each stage of a data transaction. The blockchain system is considered to have a high-security value, one of which is when it is applied in a digital land certificate security system.

Keywords: Blockchain, Land, Design

INTRODUCTION

Blockchain is a technology that originates from the idea of digital data that can be safely stored and transmitted without the risk of hacking or manipulation due to its decentralized nature (Huckle et al., 2016). Technology Blockchain refers to a fully distributed crypto-graphical system for capturing and storing consistent, immutable, and linear event logs of transactions between networks (nodes). Blockchain allows transaction records to be managed without a server or central authority (Ameway, 2022). This technology is considered to change the business processes of a company. Suppose previously, each transaction recording was only managed and recorded in one company, with technology blockchain. In that case, the recording of each transaction is published on all internet networks and accessible to the public. No one

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can delete the transaction records when the transaction has been recorded in the global ledger (technological network blockchain) (Romano & Schmidt, 2017).

Transactions using technology blockchain characteristic peer to peer. So, data (in the form of messages, money, or important information) can be transferred from one user to another without the help of a third party to process it (Nakamoto, 2008). With blockchain, users no longer need to depend on one server because all transactions are duplicated throughout the network to avoid fraud due to modified data, server down, or hacked accounts (Ouadah et al., 2017).

Technology-enabled government blockchain records all kinds of agreements or transactions, so someone cannot commit acts of corruption. Not a single computer is capable of changing the transactions that have been recorded inside the blockchain so that "smart contracts" that use this technology can show precisely and in detail where transactions are going (Huckle et al., 2016; Hacioglu, 2019; Sladic et al., 2021). All transactions and financial records from government agencies will be recorded automatically. Blockchain was built using several existing technologies (Nakamoto, 2008). The leading technology that builds blockchain is asymmetric key encryption, fungi hash and hash chain, and peer-to-peer network (Nakamoto, 2008; Wright et al., 2015; Romano & Schmid, 2017).

The first aspect of the blockchain design system in the land sector is transaction security. Technology Blockchain can assist the government in maintaining the data security of electronic land certificates (el-certificates). In the past, certificates were printed on special paper, making them different and difficult to imitate. The government holds one document, and the owner holds another. With this method, there is a lot of data falsification, so the government needs to finalize data collection on physical certificates before switching to digital (Lany et al., 2019).

The problem currently rife is the land mafia's existence, namely cases of land crimes in several areas. In East Java, there was a case of forging 40 fake certificates, which were then used as collateral for loans with tens of millions of rupiah each. The land certificate must be checked because the mortgage deed is not required. However, when I was about to apply for credit for the second time, I checked it, and it turned out that These lands were proven fake because the names printed on their certificate needed to match the name in the land book (Harsono, 2017).

Therefore, we need an effective system to overcome this land conflict. Blockchain is assumed to secure the integrity of the transaction by relying on the fact that the majority of the participating systems' blockchain existing entity will recognize the transaction as an "authentic" existence. Only on this assumption can two parties who do not know each other agree that the transaction is "correct" and reliable without official confirmation from an intermediary or a central authority (Barbieri & Gassen, 2017). Governments use blockchain technology for certificate programs electronically. With this technology, everyone can monitor land documentation changes. Blockchain is a digital data storage system consisting of many servers (multi-server). With this technology, data created by one server can be replicated and verified by another server (Susanti & Fajar, 2018).

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The Agrarian and Land Office is expected to adopt blockchain to improve the certificate security system. Weaknesses in the form of a central database that is still controlled by an admin staff with a centralized server center with minimal security that allows data to be manipulated by a hacker can be overcome. Blockchain technology is expected to improve certificate security, authenticity, and data validity to minimize counterfeit certificates and duplicate data (Ameway & Vries, 2020).

Land services have many problems, including the size of the certificate, the physical land not matching overlapping land ownership, and many land ownership disputes. Problems can be overcome with a digitalization system. This land certificate digitization system aims to facilitate service, prevent counterfeiting, and make checking easier. The Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of Agrarian Affairs/BPN) has developed and used this technology. Blockchain for certificate programs electronically. With this technology, everyone can monitor land documentation changes. Blockchain is a digital data storage system consisting of many servers (multi-server). With this technology, data created by one server can be replicated and verified by other servers.

The novelty in this study is the limited human resources and the lack of proper handling of various land registration transactions, hence the potential for crimes and conflicts such as litigation, fraud, and property disputes over land ownership. Therefore, it is necessary to form a special section that handles land registration correctly, one of which is to build a digital system. The main objectives of digital land registers are to computerize all land records, including mutations, increase transparency in land registration systems, digitize maps and surveys, update all settlement records, minimize the scope of land disputes, facilitate faster transactions, and provide clear land ownership certificates, which can be monitored easily by government officials.

Due to the lack of transparency and secure land registration, there have been many property fraud cases, such as counterfeiting and credit fraud on land. Therefore, we need a system registry to record land transactions efficiently and resist fraud. Design Blockchain will record the identity of the land and all elements involved as assets and transactions made through smart contracts. As a transparency of the land administration process, blockchain can record the land registration process by improving several things.

Openness, through decentralized broadcasting of transactions to all integrated stakeholders, every decision or action is known to everyone, and no action can be hidden. Thus, even though there are different stages of the land registration process involving different stakeholders, each stakeholder will know at each stage, as well as what, how, and when work is done on transactions that allow transparency.

Availability and access to land information. Information asymmetry hinders the accessibility of credible land data, breeds ignorance, and allows fraud that, ultimately, some stakeholders are unaware of the "other" events in the transaction. Decentralized broadcast of transactions and all related information across stakeholders, plus verification and validation, as well as hashing new transaction blocks to historical blocks, allows easy accessibility to all relevant

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information (both current and historical) about land ownership, parcels, and rights by all stakeholders at any time. This will help eliminate information asymmetry and challenges related to bribery and corruption.

Participatory process: Verification and validation through a consensus mechanism encourage maximum participation in the entire registration process of all stakeholders, allowing the majority of stakeholders to be part of the transaction decision-making at all times. The consensus mechanism occurs at each stage of the registration process until it is complete. Notification of process stages to all stakeholders automatically encourages active or passive participation in the process. Everyone knows every incident and can contribute accordingly and when needed. This means that stakeholders are always aware of all events and processes. This makes every stakeholder part of the transaction and registration process in a participatory sense.

Based on the description problem above, the problem in this study can be formulated as follows: How is the land service at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of Agrarian Affairs/BPN); What are the problems in land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of ATR/BPN); How to design the system blockchain for land services ministry Agrarian and Spatial Planning; and How effectiveness Blockchain for land services ministry Agrarian and Spatial Planning?

RESEARCH METHODS

This research was conducted to study the building planning system blockchain for land services Ministry Agrarian and Spatial Planning named "Land Administration Blockchain System ".Methodologically and substantively, the research used a rationalistic study approach linked to the naturalistic paradigm. By using a rationalistic study approach, the results of observations, experiences, and measurements on the character of the Land Administration Blockchain System are then carried out analytically study through related theoretical approaches following research case studies to identify and analyze data findings, discuss analysis results, draw conclusions, and determine the recommended steps.

To see the phenomena and conditions in the object of research studies in Ministry Agrarian and Spatial Planning, carried out by observation techniques to see, know, and analyze the characteristics of the research location. An accurate picture and explanation of blockchain's characteristics, potential, and implementation problems will be obtained using the naturalistic paradigm to produce an appropriate Land Administration Blockchain System strategy. Data is collected through observation/observation activities, stratified sampling, and system analysis. Black box testing was carried out to test the blockchain's effectiveness. This method is used to find out if the software is working correctly.

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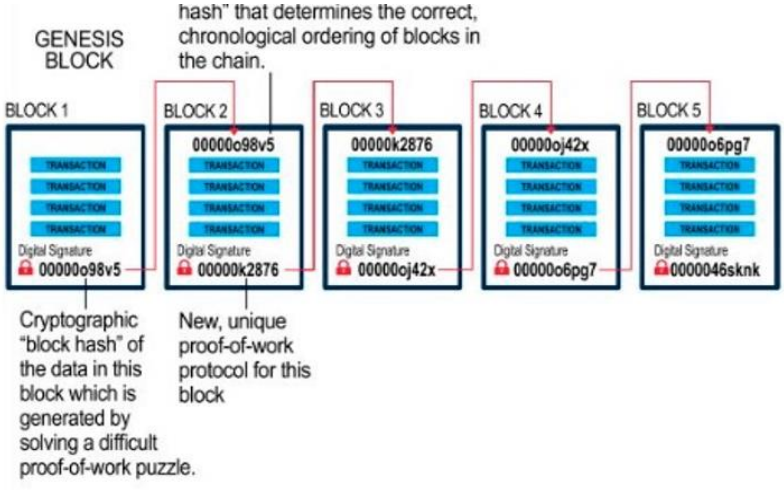
RESULTS

The land database digitization program has started the initiation of land certificates in electronic form in line with the national program "Making Indonesia 4.0," which is carrying out the development of a national digital infrastructure with the cooperation of the government, public and private sector to be able to invest in digital technology such as cloud, Data Center, Security Management, and infrastructure Broadband to accelerate digital transformation in Indonesia.

Data Security

Blockchain technology plays a vital role in land administration. Land administration includes determining, recording, and disseminating information about the relationship between humans and land (Ameyaw, 2022). The blockchain system works as follows (Ameyaw, 2022).

Figure 1: How the Blockchain System Works



(Source: Amyaw, 2022)

The first block in the blockchain is referred to as the genesis block. Each new block will be added to the end of the chain. Then, the next block will have data about the arrangement of all previous blocks to keep the chain intact. The algorithm will verify each block before it is added to the chain. Each verification method blockchain may differ depending on the consensus mechanism applied. This consensus mechanism checks that every data is correct, accurate, and safe. Once a transaction is verified, the data and thousands of other transactions will be stored in a block. This data contains the nominal transaction, digital signature, and related parties. The order in which transactions are stored is maintained, meaning that the earliest transaction will always be stored at the forefront and vice versa. Finally, after all the transactions in the block are verified, the algorithm blockchain for the hash is based on transactions in it. This new block is also given a data hash of the previous block. This is what connects the new block to the blockchain chain. Regarding data security, currently using electronic land certificate 2-Factor Authentication and the electronic signature of the user Certificate Authority by the Electronic Certification Body (BSRE). Data security is contained in a unique code/Hashcode

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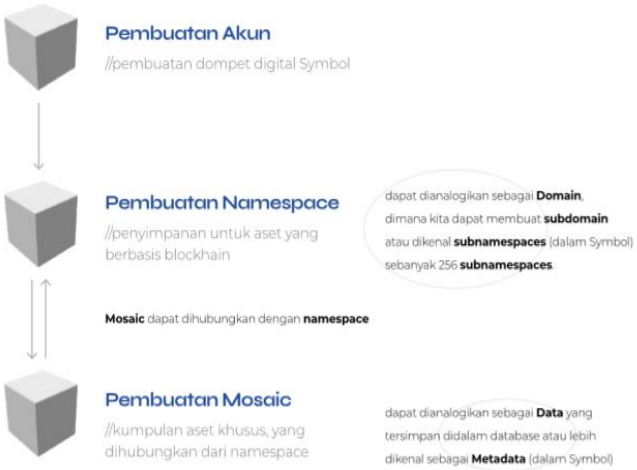
accompanied by an existing Code or a code that contains encrypted data that is used to directly access electronic document information through the system provided by the ministry.

The land administration challenges that make blockchain ideal for consideration, especially in developing countries, include A general lack of transparency and openness in land deals; Bribery and corruption practices in the provision of land services; Complexity and too many intermediaries in the accessibility of land information; Often intentionally withholds relevant land information; Unauthorized changes to the contents of land documents; Accidental loss of manually stored soil information; and Double sales of land (Ameyaw, 2022). Blockchain improves land administration in terms of Increased transparency to help reduce corrupt dealings; Eliminate data loss and manipulation; Improves the quality, accuracy, and integrity of data; Improves data security and resilience; Increase land ownership; Assists in establishing land ownership status between competing parties; and Help reduces the possibility of human error through a consensus mechanism, and also in an intelligent contract (Ameyaw, 2022). Until 2021, Ministry ATR/BPN will carry out digital transformation in public services in the spatial and land planning sector by converting public services. There are at least 4 conventional services, namely Electronic Mortgage Rights (HT-el), Land Value Zone Information (ZNT), making a Certificate of Land Registration (SKPT), and Checking Land Certificates.

Business Process Mapping

The actors involved in land services are the Applicant, Bordering land owner, Village chief (*Lurah*) / village head (*Kades*), Regional Revenue Service, Housing Agency, Spatial Planning Agency, Governor/Regent/Mayor, Tax Office, PPAT, Notary, Immigration, Forestry, Media Print/Electronics, Ministry of Foreign Affairs, Ministry of Agriculture, Plantation/Fisheries, Police, DISPERINDAG, KEMENKUMHAM, KPKNL, Banks/Financial Institutions, and BPN. Blockchain data transactions take place on the protocol symbol.

Figure 2: Transaction Data



(Source: Blockchain Implementation-BPN, 2023)

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Service procedures for changing land rights that are currently underway at the Land Office: The applicant brings the original documents needed to the land office, the applicant gives the document to the management staff at the counter at the land office, the management staff examines the completeness of the documents, the Head of PHI Subsidy Corrected documents, the Head of PHI sub-division provided documents original and certificate to Section Chief HTPT, Section Chief HTPT corrected as well as re-validating the files that have been checked at the PHI sub-section head, the Head of the Land Office re-examines the files that have been checked before by the PHI sub-section head and the HTPT sub-section head; the certificate is returned to the PHI sub-district head, the certificate that has been processed can be taken by the applicant. The flow that occurs on the internal BPN is as follows.

Figure 3: BPN Internal Data Transaction Flow

(Source: Blockchain Implementation-BPN, 2023)

The output of land services includes Property Rights Certificates, HGB Certificates, HGU Certificates, Usage Rights Certificates, Management Rights Certificates, BT Waqf, P3MB, Flats Unit Ownership Certificates, Mortgage Certificates, Technical Considerations, Technical Basis Point Information, Plots / Maps.

Blockchain-Based Land Service Modeling

Modeling is only done for some basic transactions (transfers, charges, fees) with related actors (PPAT, Bank, BPN). The data structure on the blockchain is closer to NoSQL databases, where there is no enforce relational integrity as with RDBMSs. So that later LADM v2 needs to be reduced to a NoSQL-based data structure. The content in a block is represented in JSON format. Business Objects act as data structures, and the entities within them will become execution prerequisites (triggers) in smart contracts to realize workflow automation. Subject entity refers to Party, and Persil refers to Spatial Unit in the LADM 19152 reference model.

Transaction create used for data storage business objects Land and Parcel Book) to the blockchain for the first time (initial state value is NORMAL), performed during data migration to the blockchain, or after the data has been processed at the KKP (the data is stored in the database oracle while saving to blockchain). Action Create on smart contract BPN actors carried out the Land and Persil book. Pay close attention to the core attribute (NomorHak, NIB, Owner), which will change according to the action to be executed next.

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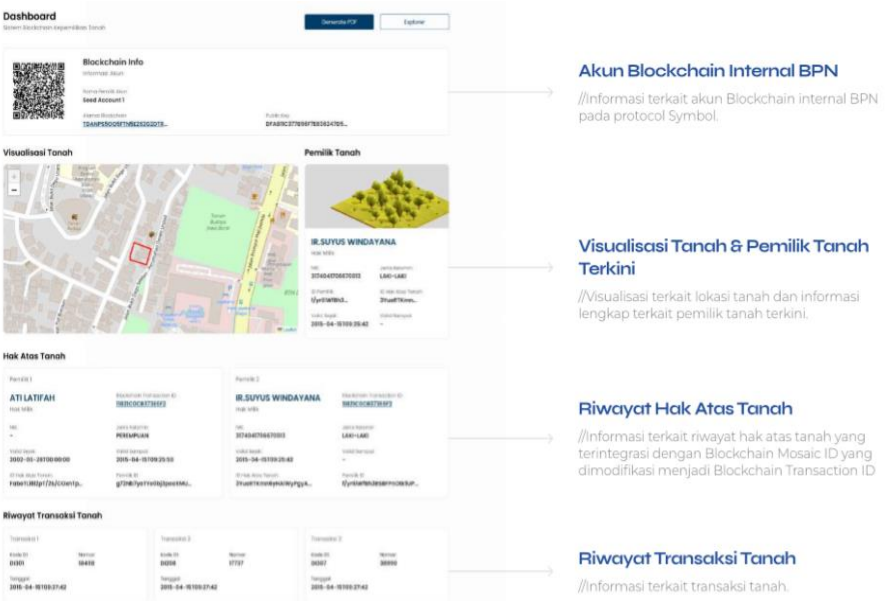
A switching transaction consists of combining the actions of two different smart contracts. First, the PPAT actor will take action to create a business object for the AJB-type Deed, then provide notification to the BPN as a signal to trigger the subsequent execution, namely the transitional action on the intelligent Book Land contract. AJB contains the switching specifications (rights number and NIB, which will be transferred to the buyer), where the transfer action will refer to the specifications in this AJB; it can be seen in the picture that the transfer action only accepts one input parameter, namely the Deed number. Transfer records can only be made with an AJB reference stored on the blockchain. At the end of this entire series of actions, the blockchain will have two Land Book entity records as a history of data changes, so there is a dashboard visualization as follows.

Figure 4: Dashboard Visualization



(Source: Blockchain Implementation-BPN, 2023)

Ideally, all technological capabilities of a blockchain have many members (nodes) in one network blockchain. However, the number of nodes can be customized with membership in the network's private blockchain, where the organizations incorporated are limited. Minimally, a network blockchain consists of at least 3 nodes to have the capability of crash fault-tolerant, on which the service-based blockchain will remain operational even if one of the node members fails. The consortium of organizations that are blockchain network members consists of at least the National Land Agency, the Tax Office, Regional Offices, Banks, and BSSN. Each node will store identical copies of all data stored within the blockchain. Exceptions for BSSN nodes only act as infrastructure managers Certificate Authority (CA), not as nodes that store blockchain data. BPN still carries out the identity management function. Users will access information through the nodes blockchain nearest.

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DISCUSSION

Village officials, agencies, government, and the community, play an essential role in the success of the digital land registration program. Previous research by Lin Zhou, Wenjia Zhang, Chenyu Fang, Hanyue Sun, and Jin Lin (2020), and Zhang, Fan Fan, and Sang Do Park (2019) suggested public policy processes and networking. The results of his research are that the role of the government, private sector, and stakeholders is significant in implementing policies. Meanwhile, the research by Akil, Sangkala, Sadik, and Allorante (2014) stated the results of the interaction pattern between government, private, and community actors in organizations. System multi-service, the network of actors in the complete systematic land registration accelerated program (PTSL), could be categorized based on the level of influence between the relations within it. In maximizing results, a network needs to be strengthened by initiating elements and the competence of parties with substantial human resources.

The theory of policy actors in public policy networks presented by Cobb and Elder (1972) in Kazis (2014) found that policy actors are policy communities consisting of the government, a group of the public who participate under the initiator or opinion leader with pressure from the mass media. The policy network is a relationship formed due to a coalition between government actors and the public, including the private sector. (Waarden, 1992 in Chigbu, et.al, 2021). Meanwhile, according to Howlett and Ramesh (1995) in Yuningsih & Sri Wahyuni (2018), policy networks grow in various types depending on the intensity of the relationship between actors and the combination of one of them. The types of policy networks that can emerge are Bureaucratic Networks; Clientelistic Networks; Triadic Networks; and Pluralistic Networks. When the community dominates the relationship, four types of networks will be formed, vizParticipatory Static Network; Captured Network; Corporatist Network, andIssue Network.

The existence of incorrect and problematic filing can cause problems with land administration. So the implementation of administration could be more practical. Maximizing the potential between network actor relations can provide good results for accelerating thinking in Tifikatan land. All the actors can contribute energy, thought, and action as a win-win solution. Overall, the active participation of all actors involved in land registration services is required to accelerate public services in the land sector. This is an effort to improve public services and orderly administration in the land sector.

The National Land Agency (BPN) is the only agency providing legal guarantees for land ownership rights or a field with the authority to resolve land issues. Following the Presidential Regulation of the Republic of Indonesia Number 20 of 2015 concerning the National Land Agency, BPN has the task of carrying out governmental tasks in the land sector following statutory provisions. Currently, the process of filing land certificates at the BPN office still needs to be improved because it is still done manually by recording it in a ledger after the data is recorded. The archive into A folder is then stored in a filing cabinet. It will take a relatively long time because of the large piles of files that make it difficult for office employees to find the necessary data. In addition, BPN office employees have also experienced the loss of land certificate data in the archives because the data has been stored for too long, the data has been

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worn out/damaged or bitten by small animals, so it is challenging to see the damaged data if there are people who come to ask if Whether the land certificates they have made have been completed or not, office employees have to automatically disassemble the archival data one by one that has been recorded in the ledger that has been kept. Based on this, the BPN office requires an information system that can assist employees in archiving data and make it easier for employees to find the data needed by the community. Therefore the author wants to create a web-based information system; with this system, it is hoped that it can help the BPN office, specifically office employees, in archiving data and submitting information (Muhamad et al., 2022).

Several studies have analyzed the importance of adequately archiving land data. Yani & Syafiin's research (2021) shows that archives play an essential role because they have legal/legal value that can be used in the evidentiary process in court. Electronic filing in the land sector is essential to ensure the availability of records. One type of land archive is a land certificate. Land certificates which are proof of ownership of land rights by a person are still being issued physically (on paper). This has the potential for certificate forgery and the vulnerability of certificates to damage or loss. This study provides an overview of the role of archives as legal evidence and electronic filing of land certificates to ensure the availability of records in the event of a land dispute. The method used in this study is analytical descriptive, directly describing literature data, both books, laws and regulations, and other supporting data. It is hoped that the electronic certificate archive can become legal evidence in the event of a land dispute, minimize falsification of land certificates, and guarantee the availability of records if the land certificate is damaged or lost.

Yanty's research (2020) shows that the design of a land certificate filing system was built to facilitate the work process in managing land certificate archives, especially in the field of filing at the Aceh Besar National Land Agency, which is intended to be more streamlined computerized data processing to support technical implementation in carrying out more accurate, effective and efficient processing of land certificate data. A land certificate is a tool to convey statements or information in writing from one party to another. Such information can be in the form of notifications, statements, requests, reports, objections, thoughts, questions, etc. The system design used the method of rapid Application Development (RAD), a software development process model that belongs to the incremental technique (graded). The application used for making the application is Microsoft Visual Basic.NET as the planning interface and Microsoft Office Access as DBMS. The test results of this application are that the system built has met the needs, the input data process has met the needs, and the reports produced have met the needs.

Local land office officials carry out quality control of land services. This is related to Anugra's research (2021) which researched the quality of land administration services at the Land Office of a district and the inhibiting and supporting factors for land administration services at the Land Office. The research results show the actual dimensions determined by indicators, namely facilities and infrastructure, facilities at the Land Office for the convenience of the community, and rules for officers in service. Dimensions Reliability (reliability) is determined by

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indicators, namely the preparation of officers in service, the reliability of officers in service, and the way employees rely on in-service. Dimensions Responsiveness (method of service delivery) is determined by indicators, namely the ability of officers to serve the community, the method of conveying information to the public, and the approach of officers in responding to public complaints. Dimensions Assurance (belief and trust) is determined by indicators, namely the work culture of officers in service, rules for public safety in service, and employee sanctions for violations of SOP. Dimensions Empathy (belief and trust) is determined by indicators, namely firm attitude in service, firm attitude to employees who are inconsistent with service, and officers' responses to public complaints.

Study Mudjiburrohman (2021) stated that the transformation of technological advances shifted the land registration system from a paper-based process to an electronic one. In Indonesia, information and communication technology has progressively changed market transactions and public services that were initially analog (manual) to electronic-based services. Search e-commerce (trade), e-government (government system), e-Court (judicial), e-KTP (population), e-filing, e-SPT, e-Billing (taxation), OSS: Online Single Submission (business licensing service), e-money (banking), application-money has also been carried out by startup companies, for example, Grab-Pay and Go-Pay, and Electronic Registration of Fiduciary Guarantees. These services have been implemented in the government sector and private companies as a form of efficiency, transparency, and accountability in conducting public services.

The application of digital land administration can improve the quality of land data. Mawadah's research (2021) shows that the data quality condition after the implementation of the increase, namely KW1, increased from 86.45% to 87.01%. The roles of man, material, machine, and method have been fulfilled. Data quality improvement must follow the 2019 Complete City Guidelines regarding inventorying boundaries. There are still obstacles in implementing and improving the quality of data on land parcels, namely not finding land book archives, measuring drawings, and measuring letters at the South Jakarta Land Office; there are regional divisions, and the boundaries of the ward area are still being determined. Pl plots of land have been left out of the mapping without the office administrator knowing.

Initially, electronic-based public services in the land sector were carried out through a program and Office Computerization (LOC) in 1997, then changed its name to Computerized Land Activities (KKP); this KKP also transformed, initially using KKP-Desktop, then became Geo-KKP and finally a web/KKP-Web based application. This land service continues to be improved and developed, then evolved into an electronic basis. According to Zevenbergen (2004), this transformation is because land registration and cadastral functions are regulated independently and do not work together effectively. Technological or other improvements, only fixing one or several parts as needed, then it is treated as an integrated system and studied, analyzed, and improved as a whole.

Electronic system security issues are an essential aspect of protecting information systems. It is important that information can only be accessed by a limited number of people and certain parties and is secured with complex cipher codes so that unauthorized (illegal) parties cannot

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access it. The fall of information to other parties can result in losses, and this information can be misused, according to Rahardjo (2005). Computer networks connected to LANs and the internet open space for security holes, meaning that the easier it is to access information, the weaker the security level. The higher the security level, the more complex (uncomfortable) it is to access information.

According to Prakasa (2020), there are various attack models on information systems hardware (hardware), software (software), operating systems, operating system services, applications, networks (communication network), databases (primary data), and users (users). Attackcyber in government agencies with several techniques, including phishing and email spamming, botnet, malware and spyware, keyloggers, social engineering, distributed denial of services, viruses, and worms (Babate et al., 2015).

The ITE Law regulates related articles of cybercrime, namely Article 30 to Article 35, which describes attacks on information systems, namely:

1. Accessing computers/electronics systems to obtain information without rights by violating/breaking through/surpassing, or breaking through security systems;
2. Perform interception and wiretapping, which may result in changing/omitting/termination of information;
3. Make changes/additions/reduce/transmit/damage/remove, move/hide, which results in the disclosure of confidential electronic information/documents;
4. Perform actions that disrupt electronic systems; and
5. Manipulate/ create/change/remove/destroy Electronic Information or Electronic Documents.

The Director General of Land Rights Determination and Registration of the Ministry of ATR/BPN (2021) stated that security certificate-he can be done by:

1. implementing ISO standards 27001, 2013) using an encryption method for all data, whether stored, transferred, or processed by the ATR/BPN system;
2. using Electronic Signature/digital signature;
3. user certificate electronics with 2FA (2 factors authentication);
4. digital data storage with an encryption model and backed up regularly in the Data Center and DRC;
5. Landowner data will conform to a personal data protection approach where only specific data can be accessed publicly.

Unlike a certificate, analog land is issued in paper printed form equipped with a hologram bearing the BPN logo. The analog form is easy to fake and duplicate, but in contrast to the electronic form, it is relatively more difficult to fake because of specific codes in its use.

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The digital signature is used to prove the authenticity of the identity of the sender of a message or the signatory of a document and to ensure the contents of the message or document are sent without changes (Suratma & Azis, 2017). A digital signature using the RSA cryptographic algorithm can guarantee the security of the documents it signs regarding integrity, authentication, and non-repudiation. Then with the cryptographic method, every data transaction between the client and server will be encrypted before being sent (Nugraha & Mahardika, 2016). Cryptography aims so that confidential information sent through a network (internet) cannot be known and used by other people or unauthorized parties (Rizaldy, 2014). Benefits of using digital signatures include: a) the authenticity of electronic documents can be verified, b) reducing the time for approval requests, and c) reducing the use of paper (Nugraha & Mahardika, 2016).

A digital signature using technology QR Code as an evaluation of the barcode. ApplicationQR Code digital signatures use a mathematical technique related to information security, data integrity, and data authentication, namely cryptography (Suratma & Azis, 2017). QR-Code can be used as a digital signature to validate digital documents' authenticity and minimize the potential for forgery (Sari & Azizah, 2020). Compared with the analog system, the electronic system is better. Indeed, no internet-based electronic system cannot be hacked to find internet security holes. In terms of storage application systems, certificate-el is better than analog systems. The benefits and advantages of using electronic systems include: 1) save storage space, for example, the storage of land books and papers, which so far require large and spacious space and will continue to increase over time, if any registration, transfer, change of land rights; 2) documents stored digitally are less likely to be lost; 3) minimize damage to documents, both naturally (opaque paper, eaten by termites) and due to natural disasters (floods, fires) when printing paper is used; 4) easy search, quickly found will save time; 5) save costs; 6) document security is more guaranteed because it uses a specific code or password, only certain people who have authorization can access it; and 7) it is easy to perform data recovery, by backing up data, compared to recovering paper documents, for example, due to fire, flood or theft, it will not be easy to recover backup data.

So, the application of blockchain technology in supporting the digitization of land services in Indonesia requires the preparation of policies and regulations, including the preparation of policy tools related to product digitization and land administration processes as well as the importance of identity management (extension of policies signature implemented digital/e-signature) to support the application of the principle of one source of truth for land data and information in the blockchain network; The regulatory framework needed to support the implementation of blockchain at each development phase includes: setting up a transparent land registration system regulated through the Land Administration Law/Land Law or Amendment PP 24/1997. In addition, it is necessary to issue a Ministerial Regulation in order to regulate land administration services with the support of blockchain technology.

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CONCLUSION

Land services at the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (Ministry of ATR/BPN) include optimizing objectives divided into 2 sub-sections: time and targets. Of the 2 sub-sections (time and target), the less effective ones were due to delays in completing and making land certificates for the first time. This happens because the number of requests for certificates and HR needs to be balanced. Maintenance of land registration based on Regulation of the Head of the National Land Agency No. 1 of 2010 concerning Service Standards and Land Arrangements. The problem is that according to the research results, there are still several land certificates whose stipulations and time certainty are different from the Regulation of the Head of the National Land Agency No. 1 of 2010 concerning Service Standards and Land Arrangements. Perspective Systematics can be said to be effective because of the Standard Operational Procedure (SOP) in Government Regulation No. 128 of 2015 concerning Types and Tariffs for Types of Non-Tax State Revenues that apply to the ministry agrarian and spatial planning/ The National Land Agency (BPN) is differentiated into financing for land registration for the first time and financing for maintenance of land registration data can be said to be excellent and clear following Government Regulation No. 128 of 2015, even though in financing land registration for the first time have additional costs. Design the system Blockchain for land services Ministry Agrarian and Spatial Planning is a limited development based on simplifying land data entities (in technology, blockchain is referred to as business objects) intending to illustrate how intelligent contracts contribute to each stage of a data transaction. System Blockchain is considered to have a high-security value, one of which is when it is applied in a digital land certificate security system. However, there is legal disharmony in the application of digital land certificates. The legal basis for blockchain, which is only regulated in the financial sector, must also be developed into cybersecurity.

References

1) Ameyaw PD, Vries WD. 2020. Transparency of Land Administration and the Role of Blockchain Technology, a Four-Dimensional Framework Analysis from the Ghanaian Land Perspective. *Land 2020,* 9(491), 3-25. doi: 10.3390/land9120491.

2) Ameyaw, PD. 2022. Doctoral Research. Chair of Land Management. Technical University of Munich, Germany. 15th November, 2022.

3) Anugra 2021. *Kualitas Pelayanan Administrasi Pertanahan (ATR/BPN) di Kantor Pertanahan Kabupaten Enrekang*. Naskah Publikasi. Universitas Muhammadiyah Makassar.

4) Babate A, Musa M, Kida A, & Saidu M. 2015. State of cyber security: emerging threats landscape. *International Journal of Advanced Research in Computer Science & Technology*, 3(1), 113-119.

5) Barbieri M, Gassen D. 2017. *Blockchain – can this new technology really revolutionize the land registry system?* Paper prepared for presentation at the "2017 World Bank Conference On Land And Poverty*"* The World Bank - Washington DC, March 20 -24, 2017.

6) BPN. 2023. *Implementasi Blockchain – BPN*. Materi Presentasi.

7) Chigbu UE, Enemark S, Mabakeng MR, Du Plessis J, Mitchell D, Sait S, & Zevenbergen J. 2021. *Structured Knowledge Base and Teaching Essentials on Responsible Land Administration: Assessment of Uses and*

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/BT7VY

Users. In FIG Working Week 2021 20-25 June: Smart Surveyors for Land and Water Management-Challenges in a New Reality. International Federation of Surveyors.

8) Hacioglu U. 2019. *Blockchain Economics and Financial Market Innovation: Financial Innovations in the Digital Age.Cham*, Switzerland: Springer Nature Switzerland AG. doi: 10.1007/978-3-030-25275-5_4.

9) Harsono, B. 2017. *Hukum Agraria Indonesia, Sejarah Pembentukan Undang-Undang Pokok Agraria, Isi Dan Pelaksanaannya*. Jilid I, Edisi Revisi, Cetakan Kesebelas. Jakarta: Djambatan.

10) Huckle S, Bhattacharya R, White M, Beloff N. 2016. Internet of Things, Blockchain and Shared Economy Application. Interbational Workshop on Data Mining in IoT Systems (DaMIS 2016). *Procedia Computer Science* 98, 461-466. doi:10.1016/j.procs.2016.09.074.

11) Lany BP, Noor I, Rengu SP. 2019. Inovasi Program Pelayanan Sertifikat Tanah (Studi tentang Layanan rakyat Sertifikat Tanah (LARASITA) pada Kantor Pertanahan Kabupaten Trenggalek). *urnal Administrasi Publik (JAP)*, 3 (1), 134-138.

12) Muhammad, Simatupang J, Khair A. 2022. Implementasi Sistem Informasi Sertifikat Tanah pada Kantor Badan Pertanahan Nasional (BPN) Kota Pekanbaru. *Jurnal Intra Tech*, 6(1), 35-49.

13) Mujiburohman DA. 2021. Transformasi Dari Kertas Ke Elektronik: Telaah Yuridis Dan Teknis Sertipikat Tanah Elektronik, Bhumi, *Jurnal Agraria dan Pertanahan*, 7 (1), 57-67.

14) Nakamoto, S. 2008. *Bitcoin: A Peer to Peer Electronic Cash System*. Tersedia: [online] https://bitcoin.org/bitcoin.pdf. (Diakses 20 April 2021).

15) Nugraha A, Mahardika A. 2016. *Penerapan Tanda Tangan Elektronik Pada Sistem Elektronik Pemerintahan Guna Mendukung E-Government*. Sesindo Seminar Nasional Sistem Informasi Indonesia, 259-264.

16) Ouadah A, Elkalam AA, Ouahman AA. 2017. Towards a Novel-Privacy-Preserving Access Control Model Based on Blockchain Technology in IoT in Rocha et al. (eds.). *Europe and MENA Cooperation Advancesin Information and Communication Technologies*, Advances in Intelligent Systems and Computing 520. doi: 10.1007/978-3-319-46568-5_53

17) Prakasa JEW. 2020. Peningkatan keamanan sistem informasi melalui klasifikasi serangan terhadap sistem informasi. *Jurnal Ilmiah Teknologi Informasi Asia*, 14(2), 75-84.

18) Rahardjo B. 2005. *Keamanan sistem informasi berbasis internet*. Bandung: PT Insan Indonesia.

19) Rizaldy MR. 2014. Perbandingan tanda tangan digital RSA dan DSA serta implementasinya untuk antisipasi pembajakan perangkat lunak. *Jurnal Program Studi Teknik Informatika, Institut Teknologi Bandung*, Bandung.

20) Romano D, Schmid G. 2017. Beyond Bitcoin: A Critical Look at Blockchain-Based System. *Cryptography*, 1(15). doi: 10.3390/cryptography 1020015.

21) Sari RF, Azizah N. 2020. Sistem validasi keaslian dokumen digital berbasis QR-Code. *JurTI (Jurnal Teknologi Informasi)*, 4(2), 321-327.

22) Sladic G, Milosavljevic B, Nikolic S, Sladic D, Radulovic A. 2021. A Blockchain Solution for Securing Real Property Transactions: A Case Study for Serbia. *International Journal of Geo-Information*. 10 (35). doi: https://doi.org/10.3390/ijgi10010035.

23) Suratma AGP & Azis A. 2017. Tanda tangan digital menggunakan QR code dengan metode advanced encryption standard. Techno. *Jurnal Fakultas Teknik, Universitas Muhammadiyah Purwokerto*, 18(1), 59-68.

24) Susanti L, Fajar M. 2018. *BIG: Teknologi Blockchain Bisa Untuk Pembuatan Sertifikat Tanah.* AntaraMegapolitan, Kamis, 11 Januari 2018. [online]. Tersedia:

ISSN 1533-9211

DOI 10.17605/OSF.IO/BT7VY

https://megapolitan.antaranews.com/berita/36172/big-teknologi-blockchain-bisa-untuk-pembuatan-sertifikat-tanah.

25) Wright A. 2018. *Beyond Bitcoin: Emerging Applications for Blockchain Technology*. Disampaikan dalam Joint Hearing Before The Subcommittee on Oversight & Subcommittee on Research and Technology, Committee on Science, Space, and Technology House of Representatives, One Hundred Fifteenth Congress, Second Session, 14 Februari 2018, 68.

26) Yani A & Syafiin RA. 2021. Pengarsipan Elektronik Sertifikat Tanah Untuk Menjamin Ketersediaan Arsip Sebagai Alat Bukti Yang Sah Pada Sengketa Pertanahan I. *Jurnal Pengembang Kearsipan* 12(1), 57–73.

27) Yanty RV. 2020. Sistem Informasi Pengarsipan Sertifikat Tanah Pada Badan Pertanahan Nasional Aceh Besar. *Jurnal JTIK (Jurnal Teknologi Informasi Dan Komunikasi)* 4(2), 52.

28) Yuniningsih T, & Sriwahyuni N. 2018. Government-Business Partnership (GBPs) Dalam Pengembangan Pariwisata di Kota Semarang, *Jurnal Core.ac.uk.*