THE APPLICATION OF BLOCKCHAIN TECHNOLOGY IN AUTHENTICATING PROPERTY OWNERSHIP ON THE INTERNET IN VIETNAM

Nguyen Minh Duc, Tran Ha Phuong, Duong Anh Tuyet, Nguyen Phuong Anh and Nguyen Hai Anh.

. Faculty of Economic information systems and E-commerce, Thuongmai University

ABSTRACT

The development of science and technology and the convenience of an open environment are favorable conditions for someone with bad intentions to pursue profiteering purposes by infringing on property rights and intellectual property rights. According to research by BSA - The Software Alliance, by 2023, the rate of pirated software use in Vietnam will reach 74%, higher than the global average (54%). 90% of Internet users in Vietnam said they have encountered pirated content. The above statistics show that the situation of copyright infringement and plagiarism on the internet in Vietnam is a painful problem that needs to be thoroughly cared for and resolved. Therefore, researching the issue "Application of Blockchain technology in authenticating property ownership on the Internet in Vietnam" is necessary and urgent, with high theoretical and practical significance.

KEYWORDS: Blockchain, authentication, property ownership, Internet

1. INTRODUCTION

TechSci Research's report shows that Vietnam's Blockchain market is predicted to grow in double digits in the period 2023-2027. A representative of the Vietnam Blockchain Association said that Vietnam is currently a market with a high level of Blockchain acceptance and leading Blockchain technology development today. According to research by BSA - The Software Alliance, by 2023, the rate of pirated software use in Vietnam will reach 74%, higher than the global average (54%). Or according to statistics from the National Center for Science & Technology Informatics and Statistics, more than 40% of scientific articles published in Vietnam in the period 2012-2022 have signs of plagiarism. The above statistics show that the situation of copyright infringement and plagiarism on the internet in Vietnam is a painful problem that needs to be thoroughly cared for and resolved. Therefore, researching the issue "Application of Blockchain technology in authenticating property ownership on the Internet in Vietnam" is necessary and urgent, with high theoretical and practical significance.

2. LITERATURE REVIEW
2.1. Overview of Blockchain Technology

Blockchain is a distributed database that stores information in blocks of data that are linked together using cryptography and grow over time. Each block of information contains information about the time of creation and is linked to the previous block, along with a timestamp and transaction data. Blockchain is designed to be resistant to data changes: Once data has been accepted by the network, there is no way to change it.

How Blockchain Works
Encryption Principle

Given the issues mentioned above and how Blockchain works, it can be seen that Blockchain is maintained based on a horizontal system that is closely linked together. Therefore, it will create a difference: Users can view all user transactions and exchanges; Transactions do not need to be processed by a third party; Block blade technology is encrypted through special mathematical functions. In addition, to perform transactions on Blockchain, it is necessary to exchange through electronic wallets. All will be secured by special encryption methods using private keys and public keys. This means that when a user encrypts with a public key, the owner of Private is the only one who can decrypt the content and data sent. On the other hand, when using a private key, the user needs to create a special character such as an electronic signature. From there, new Blockchain networks can control and conduct subject checks to identify transactions.

Ledger Rules

Each node on the network system stores a copy of the ledger. So through the nodes you will know your account balance. The way Blockchain works is to only store your transactions without interfering with how much balance you have. In addition, if you want to know the balance on your electronic wallet, the user must verify and check the transactions around the electronic wallet based on the previous transaction link. Based on that, the linked nodes will verify the details of the amount of money during your transaction.

However, with the way Blockchain works, you need to remember to protect your password and private key securely. Because when you lose the "key", no entity can help you recover or retrieve your electronic wallet password.

Block Creation Principle

After a transaction occurs on the Blockchain network, thanks to the way Blockchain works, they will be grouped into a group of blocks in the same block at the same time. Each node will become a block and report to the system as an implication to create the next linked blocks. When updated to

Blockchain, each block will integrate a piece of code for a complex mathematical function. To solve this problem, you will have to choose the probability between random numbers. The process in the system that a string will be created within 10 minutes. The node that solves the problem will continue to have the right to the next block in the chain and will be sent to the entire network.

With the way Blockchain works like this, there is less chance of blocks being built together. Therefore, it is impossible for blocks to be resolved simultaneously and create different tailing blocks. Therefore, you can be completely assured of the consensus between the entire chain of blocks.

Applications of Blockchain Technology

Smart contracts are blocks for building decentralized applications. A smart contract is equivalent to a small program that you can trust with a unit of value and manage that value. The basic idea behind smart contracts is that contract management for a transaction between two or more parties can be verified in order through the blockchain, rather than through a specific intermediary.

Decentralized applications (DApps) are digital applications or programs that work thanks to smart contracts running on blockchains, instead of centralized servers. DApps are applications that work thanks to smart contracts. The back-end of these applications runs on decentralized peer-to-peer networks. When and if certain conditions are met, all network nodes will perform the tasks specified by the contract.

2.2. Owner Authentication

Owner authentication is the process of verifying that a person or entity is the legitimate owner of something. This is an essential part of any secure online system that handles sensitive data or transactions. Whether the systems are the Internet of Things, Industrial Internet of Things, social networks, or payment gateways, authentication is a key aspect of these systems. The authentication process directly affects user perception and trust. Therefore, the ideal authentication process must be efficient, reliable, and verifiable of information and data, while protecting user privacy.

Owner authentication methods

Password authentication

Password authentication is very simple and easy to use, but it must have a certain level of complexity and be changed frequently to ensure security. One of the strengths is that if the password is long, it will be very difficult to crack. Administrators recommend that users set passwords with 12 characters. A 12-character password will take 55 days to crack if a supercomputer is used.

Third-party authentication

Using trusted third-party services will establish the necessary level of trust and provide ideal solutions to maintain data security, integrity, and authenticity. The combination of a public key infrastructure (PKI) and a trusted third party that provides technological and legal resources will maximize the authentication and authorization process. PKI is a mechanism for a third party to provide and verify the identities of parties involved in the information exchange process.

Multi-factor authentication (MFA)

Multi-factor authentication (MFA) is a security system that requires more than one authentication method from independent categories of information to verify the user's identity when logging in or performing other transactions. MFA combines two or more independent pieces of information: what the user knows (password), what the user has (security token), and user authentication (biometric verification).

The goal of MFA is to create a layer of defense and make it more difficult for unauthorized individuals to access target information such as geographic location, computer devices, networks, or databases. If one factor is compromised or breached, the attacker still has at least one more barrier to overcome before successfully breaching the target.

Blockchain-based authentication

Blockchain is immutable and ensures that users, transactions, and messages are legitimate. Blockchain identification is performed using smart contracts that are written and deployed on the blockchain. The smart contract generator can be programmed through the Smart Contract Authentication (SCA) layer to trigger and enforce whenever either party requests authentication and self-manage within a predetermined scope. Authentication through blockchain technology has eliminated the need for intermediaries. Costs can be reduced while security and privacy are significantly improved.

2.3. Asset Types

Tangible Assets

According to point a of clause 1 of Article 4 of Circular 23/2023/TT-BTC (effective from June 10, 2023), tangible assets are assets that have a physical form, are independent structures or are a system of many individual components linked together to perform one or a number of specific functions. The role of tangible assets according to the financial publisher Finance is:

Create products and services: Tangible assets are an important factor for businesses to create products and services.

Increase production and business efficiency: Tangible assets help businesses to improve production and business efficiency.

Increase competitiveness: Tangible assets help businesses to increase their competitiveness.
Increase business value: Tangible assets are one of the important factors determining business value.

Intangible Assets
According to sub-item 3.1 of Section 3 of Valuation Standard No. 13 Valuation of intangible assets issued together with Circular 06/2014/TT-BTC, intangible assets are assets that do not have a physical form and have the ability to create business rights and benefits.

According to the Financial Accounting Textbook, National Economics University, intangible assets play an important role in the success and competitiveness of businesses. Specifically, intangible assets can help businesses:

Create a competitive advantage: Intangible assets can help businesses create a competitive advantage over their competitors. For example, a strong brand can help businesses attract customers, increase sales and profits.

Increase revenue and profit: Intangible assets can help businesses increase revenue and profit. For example, a patent can help businesses exclusively manufacture a new product or service, generating higher profits.

Reduce costs: Intangible assets can help businesses reduce costs. For example, business secrets can help businesses improve production efficiency and reduce production costs.
Increase business value: Intangible assets can help increase business value. For example, a strong brand can increase the value of a business when it is resold.

Financial Assets
A financial asset is an intangible asset with a value derived from contractual claims for compensation, such as bank deposits, bonds, and stocks. Financial assets are typically more liquid than other tangible assets, such as goods or real estate, and can be traded on financial markets.

Some common types of financial assets today are: bonds, stocks, certificates of deposit (CDs), derivatives and currencies.

Financial assets participate in the process of transferring surplus capital to invest in tangible assets.

Accordingly, idle capital is transferred from investors to issuers for use. At this time, investors will have an additional income from profits, and issuers will have capital to carry out business activities. Financial assets help to diversify business risks and share some of the disadvantages for financial investors.

Digital Assets

According to the textbook Monetary Finance, author: Nguyen Van Ngoc, National Economics University Publishing House, Digital assets (digital asset) are assets that are stored and represented in digital form, including data, software, cryptocurrencies, Digital assetscan be bought and sold, exchanged on the market.

Role

One of the most prominent roles of blockchain can be mentioned as: Data storage, financial transactions, promoting the development of e-commerce, promoting innovation, and can be invested.

3. METHODOLOGY

The article will employ the following research methods:

Dialectical materialism and historical materialism: These foundational methodologies will underpin the entire research endeavor.

Synthesis method: This approach involves synthesizing research findings from various published domestic and international scientific works.

Analysis and comparison method: This method will be utilized to address the research problem through in-depth analysis and comparison of data.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Blockchain Applications in Asset Ownership Authentication Worldwide

A notable project utilizing blockchain technology for authenticating ownership of tangible assets globally is Validated ID. Headquartered in Barcelona with offices in Madrid, Paris, London, and Berlin, Validated ID provides secure identification solutions aimed at ensuring privacy, rights, and freedoms of individuals while promoting a more sustainable digital world. The company offers a range of service solutions, including electronic signatures, digital identity, and electronic invoicing.

Figure 1: VID signatures (validatedid.com)

Through its VIDchain services, Validated ID provides a unified, interoperable, and tamper-proof infrastructure with significant benefits for businesses, users, and IoT management systems. Its goal is to bring true identity to the digital world by helping businesses send and sign documents online and identify users and customers with maximum efficiency, security, trust, and legal compliance.

Regarding tangible assets, China has implemented a framework for rural property ownership transactions based on blockchain technology. Due to several issues in rural property ownership transactions in China, such as poor credit reporting systems, low transaction efficiency, non-standardized transaction contracts, and high rights protection costs, a group of researchers proposed a "framework system for rural property ownership transactions based on Hyperledger Fabric consortium blockchain."
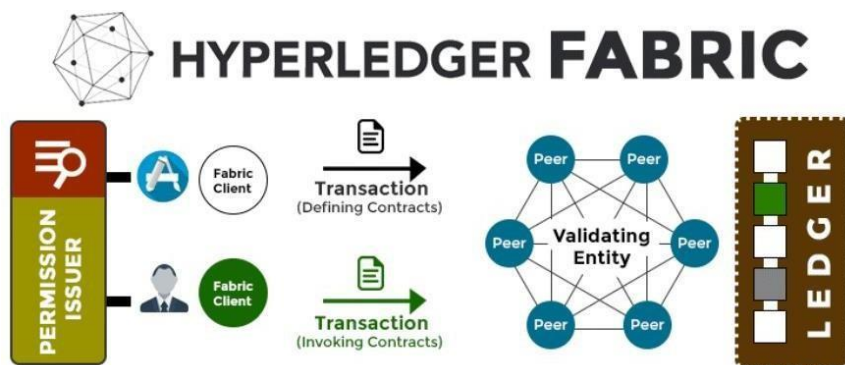

Figure 2: Hyperledger Fabric Tutorial (https://www.aerowong.com/the- complete-guide-to-hyperledger-fabric-in-2023/)

This system aims to improve transaction efficiency, enhance security in rural property ownership transactions, effectively resolve contract disputes in ownership transactions, and promote rural

revitalization and development. In fact, some localities have successfully adopted this technology, such as Suqian County in Suzhou, which conducted the first national electronic signing of a rural land transfer contract using blockchain technology in 2020. Additionally, Kunshan in Jiangsu and Shacaoguan in Guangdong have completed the transfer of idle rural housing ownership based on blockchain technology, marking successful use cases of blockchain in rural property ownership.

For digital assets, BCdiploma is a digital certification platform founded in 2018 by a group of experts in blockchain technology and education based in Paris, France.
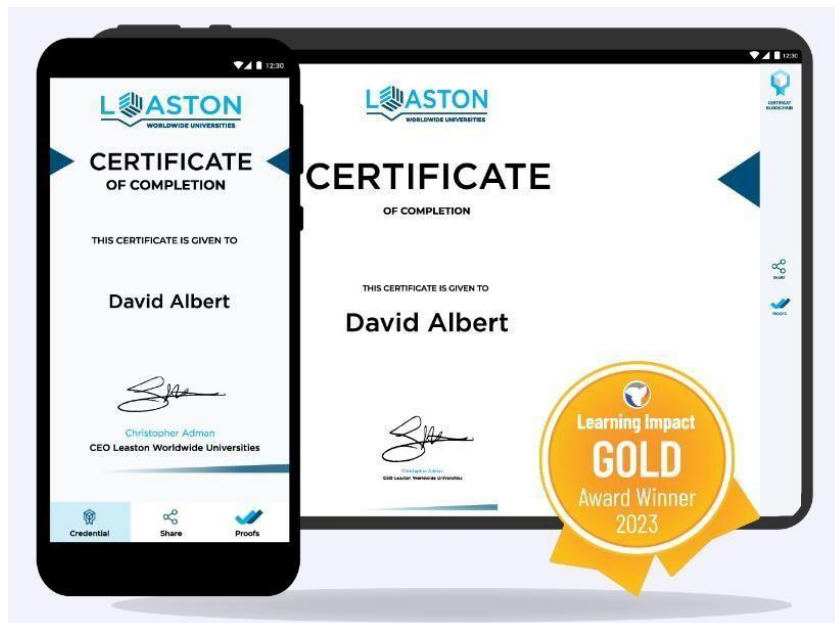

Figure 3: Digitize diplomas, certificates, and micro-credentials (sumber: bcdiploma.com)

BCdiploma helps universities, training institutions, and certification organizations create fully customizable digital certificates in terms of content, multi-device design, multilingual support, and storage on the blockchain. BCdiploma also provides customization tools to create training certificates, professional certifications, and other skill certificates. BCdiploma's digital certificates are authenticated online and cannot be modified.

A notable project applying blockchain technology in the authentication of financial asset ownership is JPMorgan Chase & Co, the largest bank in the United States and the largest bank in the world by market capitalization as of 2023.
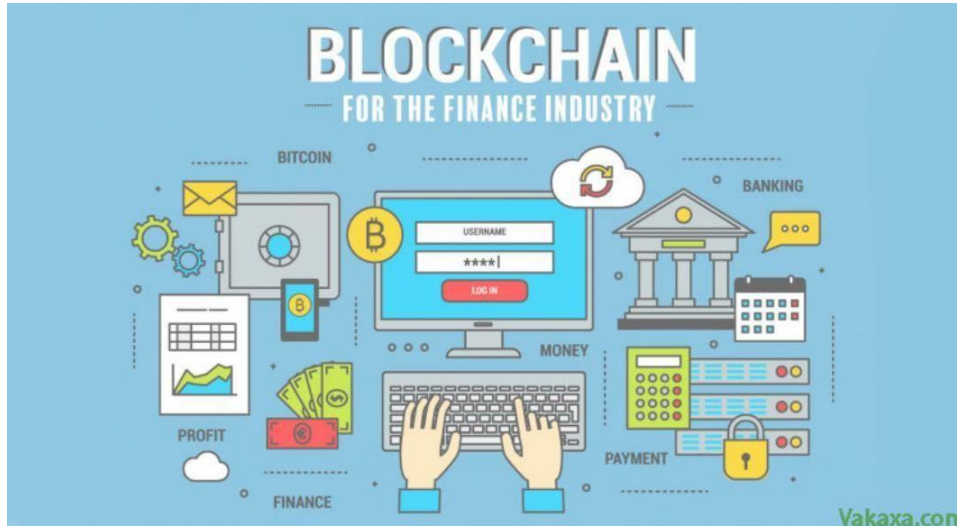
Figure 4: Blockchain technology is one of the breakthrough technology trends in the financial sector (Vakaxa.com)

J.P. Morgan announced that it is using blockchain technology to improve money transfers between banking institutions globally, including payments originating from Taiwanese banks to beneficiary banks in other markets. By enhancing information exchange related to such payments, the new solution named Confirm is expected to reduce the number of transactions rejected or returned due to mismatched payment details, thereby lowering costs for both sending and receiving banks. By leveraging Confirm—a global account information verification application on J.P.Morgan's LiinkSM—partner banking institutions, including Taiwanese banks, will be able to request account information verification of beneficiaries and receive near-real-time feedback from participating banks receiving the request. Once the information is verified, the payment can be sent via JPMorgan's global clearing solution PayDirect to route the payment in the most efficient manner.

4.2. Application of Blockchain in Asset Ownership Verification in Vietnam
### 4.2.1. Current Status of Asset Ownership Verification in Vietnam
The current status of asset ownership verification in Vietnam, especially for intangible assets, also known as digital assets—assets on the Internet, still lacks a clear legal framework. There are no legal regulations affirming that digital assets are a type of property. Practically, it is very difficult to identify the owners of virtual assets and virtual currency, collect and preserve evidence of ownership violations, and there is no clear and effective mechanism to handle such violations. Additionally, there is a lack of awareness among the public and businesses about ownership rights for assets on the Internet. Some individuals are not concerned with protecting their ownership rights when transacting on the Internet.

Regarding intellectual property rights, this includes copyright, related rights, and industrial property rights. Copyright is the right of organizations and individuals to the works they create or own. Related rights are the rights of organizations and individuals to performances, sound recordings, video recordings, broadcasts, and encrypted program-carrying satellite signals. Industrial property rights are the rights of organizations and individuals to inventions, industrial designs, layout designs of semiconductor integrated circuits, trademarks, trade names, geographical indications, trade secrets they create or own, and the right to prevent unfair competition. The types of works protected by copyright include: literature, science, textbooks; lectures, speeches; journalistic works; musical, theatrical, and cinematographic works; graphic and applied art works; architectural works, maps, technical drawings; literary, artistic folklore works; computer programs, data collections. Infringements of copyright include: appropriation of copyright; impersonation of the author; unauthorized distribution of works; modification, mutilation of works causing harm to the author's reputation; unauthorized reproduction of works; unauthorized creation of derivative works; unauthorized use of works; unauthorized rental of works; unauthorized duplication, display, transmission of works; unauthorized publication of works; removal of technical protection measures; alteration of copyright information; sale of devices disabling work protection measures; production of counterfeit works with the author's signature; unauthorized import/export of works. Infringements of industrial property rights and trade secrets include: unauthorized use of inventions, industrial designs; failure to pay compensation for the use of inventions, industrial designs; unauthorized use of trade secrets; failure to protect trade secrets.

For tangible assets, the ownership rights are defined by a system of legal norms issued by the state to regulate social relations arising during the possession, use, and disposal of assets by the owner. Ownership rights include the right to possess, the right to use, and the right to dispose of the assets according to the law. The right to dispose of assets is the right to transfer ownership or renounce the ownership. The owner has the right to perform any acts according to their will concerning the asset, provided it does not cause harm or affect the interests of the state, public interests, or the legal rights and interests of others.

4.2.2. Projects Applying Blockchain Technology in Vietnam for Asset Ownership Verification Intangible Assets

BVOTE is a prime example of a project applying Blockchain technology in Vietnam. Recently, BVOTE has quickly become the top choice for many businesses, both large and small. Many small, scattered shareholders who are unable or reluctant to attend would reduce the fairness of the General Meeting and could lead to the cancellation of the AGM due to insufficient valid votes. Additionally, the manual vote-counting process poses a significant risk of errors. BVOTE's superior features include applicability, connectivity, serviceability, and solution provision.
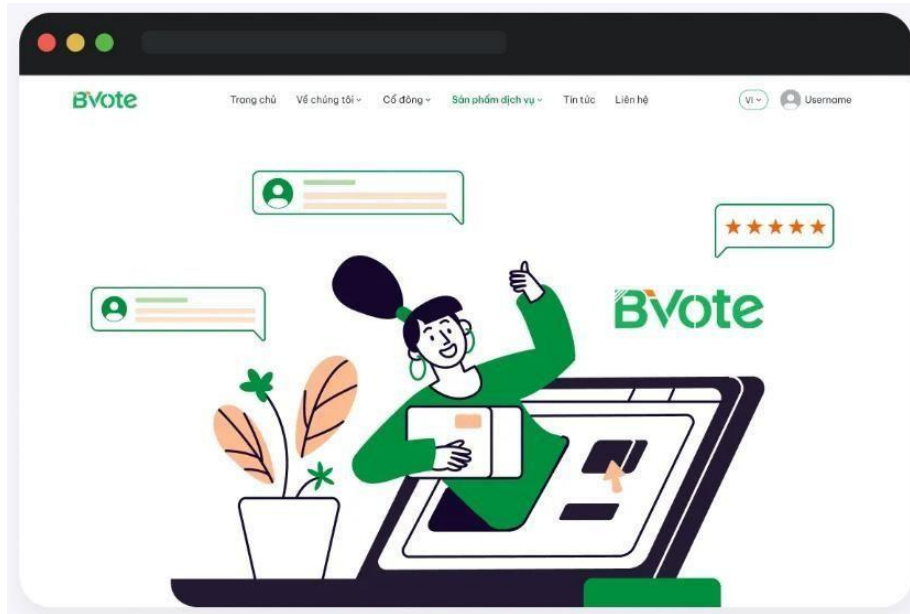
Figure 5: Bvote - Online voting software (sumber: bvote.vn)

The application of Blockchain technology ensures absolute data security and transparency because once recorded in the system, information cannot be altered. BVOTE can connect up to 500,000 delegates simultaneously from anywhere through teleconference points in each province. BVOTE's all-inclusive service supports declaration, export, and disclosure of post-AGM information to the State Securities Commission, helping businesses save time and effort, reducing costs by up to 95% compared to traditional AGM organization methods by eliminating large-scale event organization costs such as venue, personnel, time, transportation, and logistics.

Tangible Assets

Bytesoft is one of the leading pioneers in the field of Information Technology in Vietnam.

Figure 6: Bytesoft - Software to authenticate asset ownership on the blockchain platform (sumber: bytesoft.vn)

Bytesoft was founded with the mission to "research and develop optimal IT solutions and products to bring real value to customers." At the same time, Bytesoft strives to "make positive contributions to the development of Vietnam's information technology sector and the country as a whole." Bytesoft aims to become the leading software development and IT service provider in Vietnam. Currently, Bytesoft has developed hundreds of high-quality software products (including State products, enterprise products, and new technology products) in unique Bytesoft styles. Besides software development and IT services, Bytesoft also provides a Blockchain- based asset ownership verification solution. Bytesoft's asset ownership verification activities ensure secure, transparent storage of asset information, easy traceability, and quick ownership verification when needed. Once asset information is stored on the blockchain, it cannot be changed, and thorough verification prevents fraud. Bytesoft's asset ownership verification includes three steps:

1. Asset registration: Bytesoft creates a digital record for the asset to be verified.
2. Legal verification: Bytesoft uses advanced techniques to verify the asset's legality and ownership.
3. Issuance of digital certificate: Bytesoft provides a digital certificate confirming the owner's ownership of the asset.

Financial Assets

Vietnam is also applying numerous blockchain technology projects for verifying ownership of financial assets. One notable financial project is the e-share project by Tien Phong Securities Corporation (TPS). This project uses blockchain technology to create a distributed, decentralized share verification system without intermediaries like banks or other securities companies. Share ownership information is securely stored and verified on a network of nodes. Each share transaction is recorded, verified on the blockchain, and made public and immutable. When an investor buys shares of a

company, TPS issues a token corresponding to the number of shares owned. This token is stored on the blockchain and represents a digital asset encrypted with blockchain technology. The token can be easily and safely transferred to others. When the investor wants to sell their shares, they simply transfer the token to the buyer. The token is transferred from TPS's blockchain to the buyer's blockchain, thus facilitating share transfer through token exchange. This token is stored on the blockchain, ensuring the transparency and safety of the transaction. The e-share project helps reduce risks and fraud in share transactions, bringing convenience and time-saving benefits to participants. Transactions can be executed quickly and safely. The e-share project is being robustly developed and expanded to include public companies and individual investors. TPS is also researching and developing new features for the project to further enhance user efficiency and convenience.

Digital Assets

A notable representative in the digital realm is NFT (Non-Fungible Token), a type of virtual item authenticated by Blockchain technology. This technology uses digital signatures to confirm the original work and its owner. Due to this characteristic, NFTs become unique assets that cannot be copied or forged. Although anyone can view, link to, or even download the token of an NFT work, it is only owned by one person at a time. Once entered into the Blockchain, NFT artworks possess an unmistakable authentication certificate. The creator, purchase price, subsequent owners, and even resale prices are all associated with the work. This contributes to an unprecedented level of transparency in the market compared to the traditional art world.

4.3. Conditions and Requirements for Applying Blockchain Technology to Authenticate Property Ownership in Vietnam

The rapid development and widespread application of Blockchain technology worldwide have brought about numerous benefits, including transparency, security, decentralization, and efficiency. In the context of property ownership authentication, Blockchain technology has facilitated the transparent storage and public disclosure of transactions and related information, enabling users to easily access and verify information while eliminating online fraud. Blockchain's encryption technology safeguards user information, preventing data theft and unauthorized tampering. Furthermore, its decentralized nature empowers users to take control of registering their copyrights and property ownership, eliminating the need for intermediaries. In Vietnam, several projects have already begun utilizing Blockchain technology to authenticate ownership of various assets, including Bvote, Bytesoft, and the e-share project of Tien Phong Securities JSC (TPS). However, the adoption of Blockchain technology remains relatively limited due to several barriers and challenges, necessitating specific requirements for its effective implementation in Vietnam.

4.3.1. Legal Requirements

Currently, Vietnam lacks dedicated legislation governing the application of Blockchain technology for property ownership authentication. Nevertheless, any such application must adhere to existing legal frameworks, including the Law on Electronic Transactions, the Civil Law, and the Intellectual Property Law. Firstly, **Law on Electronic Transactions**: Implementation must comply with electronic transaction regulations, digital signatures, and electronic certifications, including: Valid digital signatures for transactions conducted on the Blockchain platform, secure storage of transaction information in accordance with regulations, adherence to the rights and obligations of transaction participants. Secondly, **Civil Law:** Implementation must ensure compliance with property ownership rights and regulations related to valid property transactions. Thirdly, **Land Law:** Implementation must adhere to regulations regarding land and housing ownership registration, including: Registration of land and housing ownership rights with the competent state authority, ensuring the accuracy and timeliness of registered information. Article 48 of Decree No. 43/2014/NĐ-CP dated April 14, 2014, detailing the implementation of certain provisions of the Land Law, explicitly states: "Land use certificates are legal documents certifying the right to use land." The last one, **Intellectual Property Law:** Implementation must guarantee compliance with intellectual property protection regulations, including: Protection of works, inventions, and industrial designs as prescribed by law. Additionally, other legal regulations must be observed, such as tax laws, information security laws, and anti-money laundering laws.

4.3.2. Technological Requirements

Blockchain is a convergence of three technologies: cryptography, peer-to-peer networking, and game theory. Firstly, Cryptography: **Cryptography** serves as a security solution for protecting user transaction data and information by converting it into encrypted segments accessible only to authorized parties (sender and recipient). For Blockchain, cryptography safeguards the data and information of all transactions within the network.

Blockchain's cryptography employs public keys and hash functions to ensure transparency, integrity, and privacy. Secondly, **Peer-to-Peer Networking:** P2P stands for Peer-to-Peer, where participants can utilize P2P networks to share and store files without intermediaries. Specifically, P2P networks operate based on the computing power and bandwidth of individual computers rather than relying on a central server. The P2P model allows participants to function as both servers and clients. The last one, **Game Theory:** Game theory is a field of study that explores rational decision-making by players within a system (game, scenario, etc.) where parameters are defined. Game theory represents one of the two fundamental aspects of Blockchain technology by incentivizing network participants to behave in a specific manner to maintain network stability and security.

4.3.3. Infrastructure Requirements

Network: Blockchain necessitates a robust and stable network infrastructure to connect participating nodes, ensuring sufficient bandwidth to handle a high volume of transactions. **Scalability:** To address Blockchain's scalability issues, developers should explore improvements to existing Blockchain protocols, implement techniques like sharding, and develop new protocols such as Lightning Network and Plasma to mitigate the impact of these challenges.

Security: The more participants (nodes) involved, the more secure the network. The larger the number of parties, the more difficult it is for malicious actors to gain control of the system. **Interoperability:** Blockchains may employ different programming languages, smart contract platforms, or data structures. Achieving seamless interoperability between these Blockchains is crucial to facilitate smooth data and value transfers. Blockchain interoperability solutions should establish a common language or protocol enabling these

Blockchains to understand and interpret each other's transactions and data structures.
Storage: A sufficiently large and flexible data storage system is required to accommodate Blockchain blocks and associated data.

4.3.4. Financial Requirements

Financial requirements include**: Initial Investment Costs:** These costs encompass software, hardware, and Blockchain configuration setup, ranging from a few thousand USD to hundreds; **Initial Investment Costs:** These costs encompass software, hardware, and Blockchain configuration setup, ranging from a few thousand USD to hundreds of thousands USD, depending on the system's features and complexity; **Operational Costs:** These costs involve maintaining and securing the Blockchain system, including software security, security services, system maintenance, energy consumption costs, etc., ranging from a few thousand USD to tens of thousands USD annually; **Training Costs:** These costs cover Blockchain technology training courses, ranging from a few hundred USD to a few thousand USD. Hiring Blockchain technology training experts can cost from a few thousand USD to tens of thousands USD per day.

5. Conclusion and Proposed Solutions for Applying Blockchain to Property Ownership Authentication in Vietnam

The previous section highlighted several challenges in property ownership authentication in Vietnam, including legal limitations, practical constraints, awareness gaps, and copyright infringements in television programs, films, and e-commerce intellectual property. In response, the authors propose the following solutions:

Firstly, enhance the Legal Framework: Enact specific Blockchain legislation or incorporate provisions into relevant laws related to property ownership authentication, online property rights, and associated regulations. Clearly define concepts, legal status of digital assets, smart contracts, electronic signatures, and establish clear legal responsibilities for stakeholders involved in Blockchain applications. Enhance the capacity of regulatory bodies and relevant departments through training and education programs on Blockchain for officials and civil servants. Build a team of Blockchain experts to participate in lawmaking and enforcement processes.

Secondly, Practical Implementation: Establish technical infrastructure and invest in Blockchain infrastructure to ensure stability, security, and efficiency in applying Blockchain to property ownership authentication. The Ministry of Planning and Investment can support businesses in adopting Blockchain through training, consulting, and financial assistance programs. The Vietnam Blockchain Association can connect and encourage businesses to collaborate on developing joint Blockchain solutions.

Thirdly, address Awareness Issues: Raise public awareness about Blockchain to facilitate widespread adoption, not only among those directly involved but also within the broader community. Organize workshops, training sessions, and awareness campaigns about Blockchain for individuals, businesses, and develop Blockchain education and training materials. Utilize the government's electronic portal to publish Blockchain information and usage guidelines. Develop human resources by training highly skilled Blockchain professionals and encourage universities and colleges to incorporate Blockchain into their curricula.

Blockchain technology holds immense potential for property ownership authentication if appropriately applied in real-world scenarios. The authors propose a solution to address copyright infringement, specifically in the realm of television programs, films, and illegal websites, and to protect intellectual property rights in Vietnam in general. This solution involves utilizing Blockchain to create a digital property ownership authentication system that enables source tracking, anti-counterfeiting, and owner protection. This system would store copyright information. Upon creating a new work, authors would register it on the system. The system would verify and store all work-related information, including creation time, author name, etc. This authentication system would generate a digital "fingerprint" for each work, facilitating source identification, anti-counterfeiting, and anti-plagiarism, while enhancing copyright transparency. The system would also transparently record the work's transaction history. Blockchain's data immutability ensures that no one can alter verified and stored information. This safeguards copyrights against theft and plagiarism. The system would automatically copyright infringements, identifying unauthorized work appropriation and reposting without permission.

Furthermore, Blockchain's smart contract potential can address the prevalent issue of data breaches in finance, which Blockchain applications can effectively resolve. Smart contracts eliminate intermediaries, reduce costs, expedite transactions, mitigate financial risks during payments, and enhance outdated information technology management systems.

In the face of the global technology boom and the need to embrace new trends, numerous Blockchain applications within businesses have gained traction. MB Bank and Vietcombank have announced Blockchain applications in financial transactions, while notable Vietnamese crypto (cryptocurrency) and Blockchain projects include Axie Infinity, Coin98, Kyber Network, TomoChain, and KardiaChain.

Vietnamese businesses must thoroughly prepare before implementing Blockchain applications. Sound technical infrastructure preparation is crucial for businesses to initially apply smart contracts, contributing to transparent data management and security within the Blockchain ecosystem. Therefore, businesses can opt for existing Blockchain platforms to build effective business solutions tailored to their models without the initial investment in costly and challenging technical infrastructure. Developing human resources remains a significant challenge to overcome. Businesses need to conduct large-scale training for qualified personnel and implement attractive compensation policies to attract high-quality talent. Raising awareness among businesses, organizations, and the community about Blockchain technology and its application areas is paramount. Organizing workshops and seminars can provide stakeholders with a comprehensive understanding of Blockchain trends and how to leverage this new technology to optimize production, business, and organizational operations effectively.

REFERENCE

[1] Arnima Ghosh, Shashank Gupta, Amit Dua, Neeraj Kumar (2020). Security of Cryptocurrencies in blockchain technology: State-of-art, challenges and future prospects.

[2] Amna Qureshi, David Megías Jiménez (2020). Blockchain-Based Multimedia Content Protection: Review and Open Challenges.

[3] Atharv Chandratre, Abhinav Pathak (2019). Blockchain Based Intellectual Property Management.

[4] Chibuzor Udokwu, Robert Zimmermann, Alex Norta, Patrick Brandtner (2023). Exerting Qualitative Analytics and Blockchain Requirement-Engineering in Designing and Implementing a Luxury Products Authentication System.

[5] Dw Putu Alit Denbagus Rafli (2022). NFT Become aCopyright Solution.

[6] Ishaq Azhar Mohammed (2013). Intelligent authentication for identity and access management: a review paper.

[7] Feng Liu, Zhefu Feng, Jiayin Qi (2022). A Blockchain-Based Digital Asset Platform with Multi-Party Certification.

[8] Julia Hugendubel (2021). Blockchain Technology and Intellectual Property – A Basic Introduction.

[9] Jamal, Arshad; Helmi, Rabab Alayham Abbas; Syahirah, Ampuan Siti Nurin; Fatima, Mariam-Aisha (2019). Blockchain-Based Identity Verification System

[10] Junyao Wang, Shenling Wang, Junqi Guo, Yanchang Du, Shaochi Cheng, Xiangyang Li (2019). A Summary of Research on Blockchain in the Field of IntellectualProperty.

[11] Jnoub, Nour; Klas, Wolfgang (2019). Detection of Tampered Images Using Blockchain Technology.

[12] Jishnu Bhardwaj, Pulkit Jain, Preeti Nagrath, Mamta Mittal (2020). File Authentication Ownership Using Blockchain.

[13] Liya Luo (2022). Application of Blockchain Technology in Intellectual Property Protection.

[14] Md. Rakibul Hassan Robin (2021). Product Authentication Using Blockchain,

[15] Masha McConaghy, Greg McMullen, Glenn Charles Parry, Trent McConaghy (2017). Visibility and digital art: Blockchain as an ownership layer on the Internet.

[16] Nilesh A. Lal, Salendra Prasad, Mohammed Farik (2016). A Review Of Authentication Methods.

[17] Nour Jnoub, Wolfgang Klas (2019). Detection of Tampered Images Using Blockchain Technology

[18] Nishara Nizamuddin, Haya Hasan, Khaled Salah, Razi Iqbal (2019). Blockchain-Based Framework for Protecting Author Royalty of Digital Assets.

[19] Raffaele Fabio Ciriello, Alexandra Cecilie Gjøl Torbensen, Magnus Rotvit Perlt Hansen & Christoph Müller-Bloch (2023). Blockchain-based digital rights management systems: Design principles for the music industry.

[20] S.balaji (2019). BlockChain based Secure Smart Property Registration Management System and Smart Property Cards.

[21] Tatsuya Igarashi, Takabayashi Kazuhiko, Yoshiyuki Kobayashi, Hiroshi Kuno, Eric Diehl (2021). Photrace: A Blockchain-Based Traceability System for Photographs on the Internet.

[22] Vaibhav Sharma, Harish Chandra Sharma, Gd Makkar, Pradeep Semwal (2022). A Study On WhyAnd How Blockchain Can Aid In The Protection Of Intellectual Property In The Internet Of Things Era Running Title: -A Study On Why And HowBlockchain.

[23] Wie Liang Sim, Hui Na Chua, Mohammad Tahir (2019). Blockchain for Identity Management: The Implications to Personal Data Protection.

[24] Yhu Yun Lim, Pascal Tankam Fotsing, Abdullah Almasri, Omar Musa, Miss Laiha Mat Kiah, Tan Fong Ang, Reza Ismail (2018). Blockchain Technology the Identity Management and

Authentication Service Disruptor: ASurvey.

[25] Yang Liu, Debiao He, Mohammad S. Obaidat (Fellow of IEEE), Neeraj Kumar, Muhammad Khurram Khan, Kim-Kwang Raymond Choo (2020). Blockchain-based identity management systems: A review.