CIVIL LAW ASPECTS IN THE UTILIZATION OF BLOCKCHAIN TECHNOLOGY FOR AGRIBUSINESS TRANSACTIONS

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ABSTRACT

Blockchain technology has become a promising innovation in various sectors, including agribusiness, due to its ability to improve transparency, efficiency, and trust in transactions. In the context of civil law, blockchain presents new challenges and opportunities, especially in the management of agribusiness transactions through electronic contracts and smart contracts. This technology allows for permanent transaction records, contract automation, and transparent product tracking. However, the application of blockchain also raises legal issues, such as the validity of electronic contracts, digital signatures, and personal data protection regulated by Indonesian law, including the Civil Code, the ITE Law, and the PDP Law.
This study uses a descriptive-analytical approach with normative legal research methods to explore the validity of blockchain-based contracts in agribusiness and solutions to emerging legal challenges. The results show that while blockchain offers innovative solutions, its implementation requires specific regulations to ensure interoperability, legal validity, and protection of the rights of the parties. The recommendations included strengthening the legal framework of electronic contracts, integrating technology with the PDP Law, and educating agribusiness actors related to blockchain. With adaptive regulation, blockchain can foster a sustainable and inclusive agribusiness ecosystem.

Keywords: Blockchain, Civil Law, Electronic Contracts, Agribusiness Transactions

1. INTRODUCTION

Blockchain technology has brought about a revolution in various sectors, including agribusiness, which has been faced with the challenges of efficiency, transparency, and trust in transactions. The advantage of this technology as a decentralized digital ledger system, blockchain allows for immutable and transparent recording of transactions. In the context of agribusiness, this technology supports supply chain management, real-time product tracking, and contract management through *smart contracts*.
Problems arise when the adoption of blockchain technology is inseparable from legal challenges, especially in ensuring the validity of electronic contracts, digital signatures, and personal data protection. Electronic contracts that use blockchain must comply with the conditions for the validity of the agreement as stipulated in Article 1320 of the Civil Code, while digital signatures require recognition based on the ITE Law. On the other hand, the immutable nature of blockchain that makes data immutable also has the potential to violate the rights of Personal Data Subjects regulated in the PDP Law.
This research aims to explore the validity of electronic contracts and digital signatures in blockchain-based agribusiness transactions, as well as offer legal solutions to emerging challenges. Through a normative legal approach, this study examines relevant laws and regulations and provides recommendations to develop a legal framework that is adaptive to blockchain technology.
Based on this exposure, this study examines two problems related to this issue, namely how is the validity of electronic contracts and digital signatures in agribusiness transactions using blockchain technology based on Indonesian civil law

and what are the *legal challenges and solutions faced in the implementation of blockchain technology in agribusiness transactions.*

2. METHODOLOGICAL RESEARCH

This type of research is normative law research that lays the law as a norm system building. The norm system that is built is about the principles, norms, rules of laws and regulations, court decisions and doctrines (Mukti & Yulianto, 2017). The research approach used is a legislative approach, namely by examining laws and regulations related to the legal issues being studied (Marzuki, 2007). In addition, using a conceptual approach, namely by studying the views and doctrines in legal science, researchers will find ideas that give birth to legal understandings, legal concepts and legal principles that are relevant to the issue at hand. The legal materials are in the form of primary legal materials consisting of laws and regulations, secondary legal materials consisting of textbooks, legal journals, opinions of scholars, the internet, as well as scientific papers, as well as tertiary legal materials such as legal dictionaries and encyclopedias. The technique of collecting legal materials will be collected and arranged systematically to facilitate the analysis process. After the collection of legal materials is carried out, the analysis technique of the legal materials is carried out using the descriptive analysis method.

3. RELATED RESEARCH

Previous studies related to the legal issues raised have differences, so this research is expected to be an additional literature material for the same legal issue and can provide a different view for future research.

Research Title	Research Aspects	Research Results
Application of Blockchain Technology in Optimizing Supply Chain Management Process Using the SWOT Method (Maula et al., 2024).	Integrate blockchain technology in the supply chain to improve security, transparency, efficiency, and authentication using SWOT analysis.	1. Increased transparency: all parties can verify transactions in real-time. 2. High data security: the risk of data manipulation is reduced. 3. Accurate product tracking: helps detect counterfeit products and delayed shipments. 4. Consumer engagement: allows for product history tracking for more ethical purchasing decisions.
Digital Marketing Strategies in Improving Company Competitiveness in the Global Market (Solihin et al., 2024)	Analyze how digital marketing can improve a company's competitiveness, with a focus on the adoption of digital technologies, data analytics, and innovative marketing strategies.	1. Digital marketing is able to reach the global market effectively by using SEO, social media, and data analysis.2. Adaptation to digital technology and innovation can increase the company's visibility and sales.3. Challenges include the cost of implementing technology and measuring the effectiveness of marketing campaigns.
Blockchain Technology Innovation in Business Transformation (Fauzi, 2024).	Exploring the application of blockchain technology to improve efficiency, security, and transparency across various business	1. Blockchain reduces transaction costs by eliminating the role of intermediaries.2. This technology strengthens data security through encryption and decentralization.3. Implementation in the supply chain increases transparency and real-time tracking.4. Challenges

	sectors, including finance, logistics, and healthcare.	include diverse regulations, technical complexity, and a lack of public understanding of blockchain.

The comparison of this study lies in the aspect of research where this research focuses on assessing the validity of electronic contracts and digital signatures on blockchain in agribusiness based on Indonesian civil law and the results of the research are that there is the validity of contracts and digital signatures in civil law, there are legal challenges, especially in the protection of personal data in the blockchain immutable system, and the need for cross-border legal harmonization, considering that this blockchain technology is very helpful for agribusiness transactions in Indonesia if its application is adjusted to the legal certainty that exists in Indonesia.

4. RESULTS AND DISCUSSION

4.1. Validity of Electronic Contracts and Digital Signatures in Agribusiness Transactions Using Blockchain Technology Based on Indonesian Civil Law

In today's digital era, blockchain technology has brought significant changes in various sectors, including agribusiness. This technology enables the creation of more secure, transparent, and efficient electronic contracts and digital signatures. However, the validity of electronic contracts and digital signatures in agribusiness transactions using blockchain technology needs to be reviewed based on civil law in Indonesia.

A contract is said to have legal force, if in making the contract, it has been based on the conditions for the validity of a contract as stipulated in Article 1320 of the Indonesian Civil Code, namely: 1. the agreement of those who bind them; 2. the ability to make an alliance; 3. a specific subject matter; 4. An unforbidden cause. Therefore, with the fulfillment of the conditions of the contract, article 1338 of the Civil Code emphasizes that all agreements made in accordance with the law apply as laws for those who make them. The agreement cannot be withdrawn other than by agreement of both parties, or for reasons prescribed by law. Approval must be carried out in good faith.

An Electronic Contract (e-contract) is an agreement between the parties made through an electronic system. Law of the Republic of Indonesia Number 11 of 2008 concerning Information and Electronic Transactions as amended by Law of the Republic of Indonesia Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Information and Electronic Transactions and subsequently amended by Law of the Republic of Indonesia Number 1 of 2024 concerning the Second Amendment to Law Number 1 of 2008 concerning Electronic Information and Transactions (abbreviated as ITE Law) Recognize the validity of electronic documents and digital signatures as valid legal evidence. Article 5 paragraph (1) of the ITE Law states that Electronic Information and/or Electronic Documents and/or their printouts are valid legal evidence. The content of the electronic contract that will carry out an electronic transaction contains at least: identity data of the parties, objects and specifications, terms of electronic transactions, prices and fees, procedures in the event of cancellation by the parties, provisions that give the aggrieved party the right to be able to return the goods and/or request a replacement of the product if there is a hidden defect, legal options for settling electronic transactions (Amajihono, 2022). An electronic contract is considered an agreement when viewed from the definition of an agreement in Article 1313 of the Civil Code, namely an agreement is an act in which one or more people bind themselves to one or more other persons. Government Regulation of the Republic of Indonesia Number 2019 concerning the Implementation of Electronic Systems and Transactions (abbreviated as PP PSTE) further regulates the implementation of electronic systems, including the use of legally recognized digital signatures.

Digital Signatures and Electronic Signatures are two different things. This difference is clearly seen in terms of security, authenticity, validity and confidentiality of the signature owner's data. But in reality, there are still many people who are wrong in defining and interpreting these two things. Article 1 number 12 of the ITE Law states that an Electronic Signature is a signature consisting of Electronic Information that is attached, associated with or related to other Electronic Information used as a verification and authentication tool.

An Electronic Signature refers to data in its electronic form, which is attached to an electronic document. The data is electronic information from the signer and its form is not limited to only wet signatures (handwriting) made into electronic form. Meanwhile, Digital Signatures are a cryptographic mechanism that is often implemented into Electronic Signatures. The information affixed using a Digital Signature is not only data or a signature in its electronic form, but also an encrypted data and digital certificate from the owner of the Digital Signature (Privy, 2025). A Digital Signature is not a signature affixed on paper as is usually a signature. Digital Signatures are obtained by first creating what is called Message Digest or Hast, which is a Mathematical Summary of documents sent through Cyberspace (Soemarno, 2009). This is different from ordinary signatures that serve as acknowledgment and acceptance of the content of a message or document. A Digital Signature is a data item related to the encoding of a digital message to provide certainty about the authenticity of the data and ensure that the data is not modified.

Specifically, an electronic contract is considered valid if it meets the requirements in article 46 paragraph (2) of PP PSTE, as follows: a. there is an agreement between the parties; b. is carried out by a competent or authorized legal subject in accordance with the provisions of laws and regulations; c. There are certain things; and d. the object of the transaction must not be contrary to laws and regulations, decency and public order.

In relation to the validity of electronic contracts and digital signatures in an agreement, this can be used best in an agribusiness transaction because digital marketing has become an important component in the marketing strategy of an agribusiness business. Digital marketing refers to the use of technology and digital media, such as the internet, mobile devices, or online platforms to reach, interact, and transact with consumers more effectively and efficiently.

In the context of agribusiness transactions, several articles in Law of the Republic of Indonesia Number 19 of 2013 concerning the Protection and Empowerment of Farmers (abbreviated as PPP Law) that are relevant to provide legal protection include Article 3 of the PPP Law, where the purpose of protecting and empowering farmers in letter c is to provide certainty of farming businesses; letter e is to improve the ability and capacity of farmers and farmer institutions in running productive, advanced, modern, and sustainable farming businesses; And the letter f is to develop agricultural financing institutions that serve the interests of farmers. This article ensures that farmers have legal protection to run agribusiness businesses, including in electronic-based transactions. Furthermore, in Article 7 paragraph (3) of the PPP Law, the farmer empowerment strategy is carried out through the development of systems and means of marketing agricultural products (letter c) and easy access to science, technology, and information (letter f). This is related to the development of marketing facilities and easy access to technology to support agribusiness transactions carried out electronically, including those that utilize blockchain technology. Blockchain technology can support the implementation of these articles by creating transparency, security, and efficiency in agribusiness transactions.

Blockchain technology has emerged as one of the leading innovations that has the potential to transform various sectors, including the financial sector. Blockchain is a decentralized transaction system, where transaction information is recorded openly, transparently, and securely in interconnected blocks (Viriyasitavat & Hoonsopon, 2019).

Blockchain is a distributed digital ledger that allows transactions to be recorded transparently and securely without the need for intermediaries. With its ability to

ensure the authenticity and integrity of data, this technology promises to revolutionize the current financial system (Chairunnas et al., 2024).

In general, a blockchain can be described as a distributed ledger that is able to maintain immutable transaction records within a network (Ali et al., 2019). Every transaction that occurs within the blockchain is recorded in blocks that are connected to each other chronologically, forming a chain of blocks that cannot be manipulated (Termizi et al., 2022). The main advantage of blockchain technology is its ability to provide security, transparency, resilience to change, and high auditability (Dahiya et al., 2022).

Using blockchain-based electronic contracts, farmers can ensure price certainty and payment in agricultural product transactions, ensure transaction data, so that there are no unilateral changes to contracts, and supply chain transparency, which allows farmers to monitor the distribution of agricultural products in real-time.

Analysis of the validity of electronic contracts and digital signatures in agribusiness transactions using blockchain technology based on civil law in Indonesia, namely:

a. The agreement of the parties, where in a blockchain-based electronic contract, the agreement is reached through digital mechanisms, such as clicks or digital signatures. As long as the parties understand and agree on the contents of the contract, the agreement is considered valid according to Article 1320 of the Civil Code.
b. Legal proficiency, where the parties involved must have legal skills to make an agreement, as stipulated in Article 1320 of the Civil Code. This also applies to electronic contracts.
c. Halal objects and causes, where the object of the contract must be clear and not contradict the law. In the context of agribusiness, objects can be in the form of crops, services, or means of production. Because the contract must also be halal, in accordance with the provisions of the law in Indonesia.
d. Digital signatures Digital signatures used in blockchain-based electronic contracts must meet the requirements in the ITE Law, namely:
    - Signature creation data is associated only with the signer.
    - The signature creation data is under the control of the signer.
    - Any changes to the digital signature can be detected.

4.2. Legal Challenges and Solutions Faced in the Implementation of Blockchain Technology in Agribusiness Transactions

Regarding the validity of electronic contracts and digital signatures, although the ITE Law recognizes the validity of electronic contracts and digital signatures, its application to blockchain raises questions about the authority authorized to validate digital signatures in the context of blockchain. Although Article 13A letter f of the ITE Law mentions the preservation of Electronic Signatures and/or electronic seals, this does not provide legal certainty because what is meant by "preservation of Electronic Signatures and/or electronic seals" is a service that guarantees the legal force of Electronic Signatures and/or electronic seals in an Electronic Information and/or Electronic Document can still be validated even though the validity period of the Electronic Certificate has expired.

The next legal challenge faced is regarding the protection of personal data, this is because blockchain technology is immutable. The data stored in the block is immutable, meaning that once added, the data cannot be changed without the consent of the network. In addition, the use of encryption makes data more secure from unauthorized access (Zein, 2024). Against this, this immutable blockchain is also transparent, so it has the potential to violate the principles of personal data protection as stipulated in Law of the Republic of Indonesia Number 27 of 2022 concerning Personal Data Protection (abbreviated as PDP Law)

Until now, cross-border payments are still a problem, especially in terms of the availability of infrastructure and software that supports cross-border payments (Putranto et al., 2024). This is because blockchain allows cross-border transactions, thus posing challenges in determining applicable laws and dispute resolution mechanisms.

The lack of understanding of agribusiness actors can make it a challenge in the implementation of the use of this technology. Although this technology can be said to be very good and helpful, many agribusinesses, especially in rural areas, do not understand blockchain technology and related legal aspects.

The use of blockchain technology in agribusiness transactions brings great opportunities to improve efficiency, transparency, and accountability. However, from the perspective of civil law, especially in the context of contract law and personal data protection, there are a number of issues that need to be considered. Blockchain, which often uses *smart contracts* to record electronic agreements such as the sale and purchase of agricultural products or supply chain tracking, must comply with the provisions of Article 1320 of the Civil Code. Every agreement must meet the elements of the agreement of the parties, legal prowess, clear objects, and halal causes. Against this context, anonymous identities in blockchain can be a challenge in ensuring the legal prowess of the parties involved. In addition, smart *contract* arrangements need to provide clarity on dispute resolution mechanisms if one party feels aggrieved by contract automation.

In terms of personal data protection, blockchain, which is often used to store sensitive information such as farmer data, farm location, or crop yields, must comply with the PDP Law. According to Article 16 paragraph (2) of the PDP Law, the processing of personal data must be limited to specific purposes, by applying the principle of data minimization. However, the immutable nature of blockchain may conflict with the rights of Personal Data Subjects, such as the right to delete or correct data guaranteed in Article 8 of the PDP Law. This demands innovations such as the use of *off-chain storage*, where sensitive personal data is stored outside the blockchain, while hashed data is stored within the blockchain to ensure the security and integrity of the data.

Additionally, blockchain offers transparency in agribusiness supply chains, such as tracking organic certification or product provenance. However, this disclosure must comply with the right to trade confidentiality that is protected by law. Sensitive information such as production strategies or the identity of certain suppliers must be carefully managed so as not to infringe on the interests of business actors. This is in line with the principle of balance of interests regulated in Law of the Republic of Indonesia Number 8 of 1999 concerning Consumer Protection, which aims to protect consumer rights without sacrificing the legitimate interests of business actors.

The evidentiary aspect in civil law is also an important concern. Blockchain can function as a legitimate electronic proof tool based on Article 5 of the ITE Law. However, the validity of this evidence still requires additional verification, especially to ensure that the electronic signature or consent of the relevant party is in accordance with applicable law. Therefore, the development of a specific regulatory framework for digital agribusiness involving blockchain is urgently needed.

This research offers several solutions to these legal challenges, namely the development of blockchain-specific regulations, strengthening the legal framework of electronic contracts, compliance with the PDP Law, cross-border legal harmonization, effective dispute resolution, education and training, as well as data audits and certification.

Governments can develop regulations that specifically govern blockchain implementation in various sectors, including agribusiness. These regulations should include contract validity, digital signature validation, and data protection. The important thing is to clarify the application of the ITE Law to blockchain, including the recognition of blockchain-based digital signatures through cooperation with government-recognized electronic certification authorities. The application of blockchain that adopts the principle of privacy by design, such as using a private blockchain or encryption techniques to protect personal data.

Governments can increase international cooperation to harmonize rules regarding blockchain, especially in cross-border transactions. This will have a good impact on the implementation of technology-based dispute resolution mechanisms, such as smart contracts that automatically settle obligations or online arbitration powered by blockchain.

To the public, especially agribusiness transaction actors, training programs are provided to understand blockchain technology, its benefits, and its legal implications, so that they can integrate data audits before being entered into the blockchain to ensure the accuracy and validity of information in agribusiness transactions.

5. CONCLUSION

Blockchain technology has great potential to revolutionize the agribusiness sector by creating more efficient, transparent, and trustworthy transactions. In the context of Indonesian civil law, blockchain can be used for electronic contracts and digital signatures, which have been recognized as valid under the Civil Code and the ITE Law. However, the immutable nature of blockchain poses challenges in the application of personal data protection principles as stipulated in the PDP Law. In addition, anonymous identities in blockchain can be an obstacle in ensuring the validity of contracts in accordance with Indonesian law.

Solutions to this challenge include the development of special regulations governing the implementation of blockchain in agribusiness, strengthening the legal framework of electronic contracts, and harmonization with the PDP Law. The government also needs to provide education to agribusiness actors about the benefits and legal implications of blockchain technology. With the right approach, blockchain can support the sustainable growth of agribusiness while complying with applicable legal provisions.

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