Regulation Model Implementing Smart Contract (Terminable Contract) in Commercial Contracts in Indonesia (Comparative Study: Singapore, England, Netherlands, Switzerland and Italy)

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Abstract. This research aims to analyze the regulatory model for implementing smart contracts in commercial contracts in Indonesia and conduct comparative studies with other countries such as Singapore, England, the Netherlands, Switzerland, and Italy. Smart contracts and electronic instructions executed automatically in a blockchain network provide security, efficiency, and transparency advantages. This research uses a normative juridical approach with comparative legal methods. Data was collected through literature study and analysis of related legal documents. This research found that in Indonesia, regulations related to smart contracts are still in the development stage, and no specific regulations regulate their implementation in detail. However, the use of blockchain technology underlying smart contracts has begun to be recognized by the relevant authorities. The research results show that regulations in the countries compared are more advanced in accommodating the use of smart contracts. Singapore, for example, has developed various guidelines and policies supporting this technology's application in multiple sectors. The UK has also recognized the legal validity of smart contracts through reports and guidance issued by the Law Commission. In the Netherlands, traditional contract law principles are applied to smart contracts with some adjustments. Switzerland, known as the "Crypto Valley" of Zug, has adopted regulations that support blockchain technology innovation. Italy has also passed legislation providing smart contracts' legal definition and status. This research concludes that Indonesia needs to develop more comprehensive and specific regulations regarding innovative agreements to accommodate the development of this technology and provide legal certainty for parties involved in digital transactions following applicable legal principles.

Keywords: Smart Contract, Blockchain, Regulatory Model, Comparative Law, Security and Efficiency.

1 Introduction

Digital technology's development has significantly influenced various aspects of life, including law and agreements. One significant technological innovation is the

E. Lisdyono et al. (eds.), *Proceedings of the 2nd International Conference Changing of Business Law (ICOCLB 2024)*, Advances in Social Science, Education and Humanities Research 902,
https://doi.org/10.2991/978-2-38476-356-6_40

application of smart contracts in commercial contracts. Intelligent contracts utilize blockchain technology and offer higher efficiency and security than conventional agreements. Blockchain technology has rapidly evolved from blockchain 1.0 to blockchain X.0, combining artificial intelligence for broader applications. Blockchain is a distributed ledger technology used as the basis for cryptocurrencies such as Bitcoin, but it also has vast potential in the financial sector and various other applications.

Smart contracts are electronic agreements executed automatically based on computer code stored on the blockchain. This technology enables the execution of agreements without the involvement of third parties, thereby increasing efficiency and reducing costs. In a legal context, smart contracts are subject to the basic principles of traditional contracts, such as agreement of the parties, skills, specific objects, and lawful purposes, as regulated in Article 1320 of the Civil Code. The implementation of smart contracts in Indonesia is still in its early stages, with regulations still needing to be fully formed. However, its potential use is enormous, especially in trading and financial services. Comprehensive regulations and harmonization of related rules are necessary to ensure legal certainty and protection for the parties involved.

This study will discuss various models for regulating the implementation of smart contracts in multiple countries, including Singapore, England, the Netherlands, Switzerland, and Italy, and how these models can be adapted in the Indonesian legal context. The aim is to provide guidance and recommendations for creating a regulatory framework that upholds relevant legal standards while encouraging technology innovation.

2. Method

The regulatory paradigm for integrating smart contracts into Indonesian business contracts is examined in this study using a qualitative methodology and descriptive-analytical techniques. The main focus of the study is to identify the legal challenges faced in implementing smart contracts and how regulations in various countries can guide Indonesia. Several methods used in this research include Literature Study: Conducting a literature review from multiple sources, including scientific journals, books, and legal documents relevant to intelligent contracts and blockchain technology. The literature reviewed includes fundamental contract theories, blockchain technology, and the practice of implementing smart contracts in various countries.

Comparative Analysis: This method compares the settings and implementation of smart contracts in several countries, such as Singapore, England, the Netherlands, Switzerland, and Italy. The aim is to understand how these countries overcome the legal and regulatory challenges of using smart contracts. Case Study technique: To investigate the use of smart contracts in a variety of industries, including finance, trade, and insurance, this study also employs a case study technique. Case studies were conducted to gain an in-depth understanding of the working mechanisms of smart contracts and their impact on legal certainty and consumer protection.

In-depth Interviews: Conduct interviews with experts in law information technology and representatives from industrial sectors that have implemented smart contracts. This interview aims to gain direct insight from practitioners and academics regarding the

challenges and opportunities faced in implementing smart contracts in Indonesia. Juridical Analysis: Analyzing various regulations and legal documents in force in Indonesia to assess the extent to which the current legal framework can accommodate the implementation of smart contracts. This analysis also includes an evaluation of the conformity of existing regulations with the basic principles of contract law and personal data protection.

3. Results and Discussion

3.1 Indonesia Condition

In the development of the digital world, technology has also influenced agreements known as electronic agreements. A contract online, according to Edmon Makarim, is an agreement between two or more parties that is carried out using computer media, particularly the internet network, and is defined as an engagement or legal arrangement conducted electronically by the integration of computer-based information system networks (networking) with e-contract systems. An agreement made between parties using an electronic technology is known as an electronic contract. There are two ways that an electronic contract (e-contract) can be formed: (1) through electronic mail communication (e-mail), where offers and acceptances are sent and received via email or in conjunction with other electronic communication media; and (2) through websites and online services, where the offer is made via a website and the customer accepts it by completing the form that is provided.

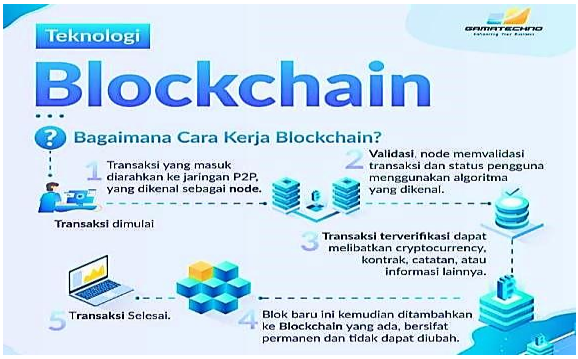
Technological developments then increasingly developed rapidly, one of which is technology blockchain, which is a database that records transactions and is shared with people who are members of a distributed database network. Blockchain has undergone an evolution, which is divided into several phases, namely phases blockchain 1.0, blockchain 2.0, and blockchain 3.0. At the moment, blockchain has developed in phases, such as blockchain X.0, which utilizes this technology in all aspects of life combined with artificial intelligence technology (artificial intelligence).

Blockchain is an underlying register or ledger technology cryptocurrency, or electronic money, such as bitcoin, which is used as a growing payment medium, especially in banking and digital finance. A network of computers that have been joined to a sequence of earlier transactions using cryptographic techniques and a significant amount of processing capacity authenticates each transaction. Each party's public address and private access key in a transaction are matched using mathematical techniques, and these are then shared with other parties for validation and addition to the ledger in the blockchain. Blockchain employs encryption and a combination of "keys" for good security, both public and private. Until the privilege of blockchain, this is distributed, open, and transparent data (when using the public key), data stored in blockchain safe, and its contents can only be changed or stopped if the parties agree or all existing requirements have been fulfilled (difficult to change). This is a unique attraction for banks and companies operating in the financial sector.

One of the products of a blockchain's technological advancement is the smart contract. Because the electronic agreement is far more functional than a traditional agreement,

Nick Szabo refers to it as a smart contract. Furthermore, According to Nick Szabo, a smart contract is a set of digitally stated promises along with the protocol that the parties use to carry them out. Mark Giancaspro explains smart contracts as follows:
"… is a computer program which verifies and executes its terms upon the occurrence of predetermined events. Once coded and entered into the blockchain, the contract cannot be changed and operates following its programmed instructions."
Based on these, One way to understand a smart contract is as an electronic instruction executed automatically and arranged in a computer code. This gives the contract its "intelligence" since it enables the machine to "read" it and, frequently, carry out its commands.
Smart contracts are the same as agreements in general but are formed with computer code running on the network blockchain, which is stored in a public database and cannot be changed. Technology blockchain will process the transaction in smart contracts when the agreement has been fulfilled, and smart contracts can be sent automatically without a third party. In simple terms, a smart contract is generally made as an agreement only made using artificial intelligence. The parties continue to hold a meeting of wills in which one party makes an offer through a smart contract, and one agrees on a smart contract. When both parties agree, negotiations will occur between the two, and the smart contract will start being implemented when it is agreed upon. Budi wants to buy Sean's house for Rp as an example of how it works 5,000,000,000,- where the sale and purchase agreement is made using a smart contract. Sean will enter the offer in the Dapp system , which will continue to the Vexanium platform . Here, a smart contract that contains an agreement between Budi and Sean can only occur after the agreement has been fulfilled. So that Sean can get Rp. 5,000,000,000, he must give the house certificate to Budi. After Budi received the certificate, Sean could receive the money from the sale of his house following a smart contract that had been made and agreed upon together. Here, third parties, such as lawyers and brokers, have no role in processing the agreement. As for how it works, blockchain can be seen through the following image:

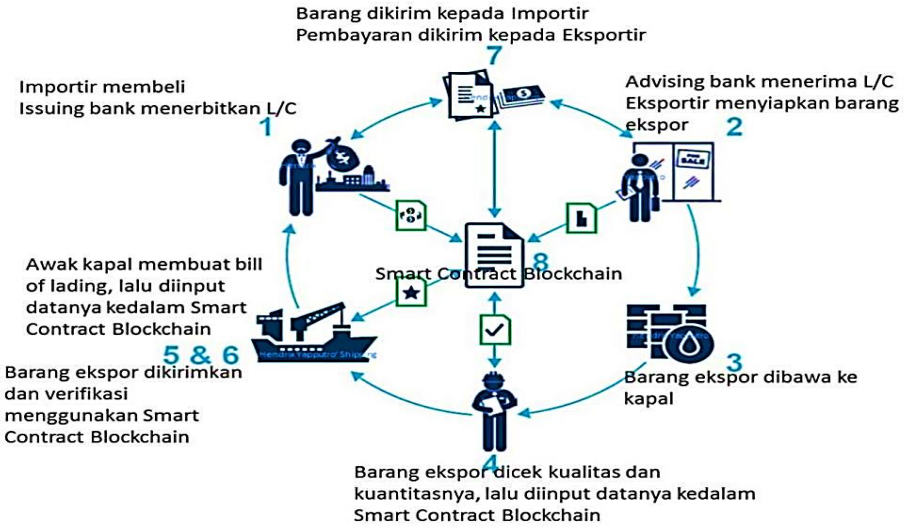
Picture 1. How it Works Blockchain



Based on the image above, it can be understood that incoming transactions will be validated by the nodes and algorithms created by the blockchain, then later verified transactions that can involve smart contracts. Then, there will be a new block added to the blockchain, which cannot be changed. After that, the transaction is complete. The

purpose of smart contracts is to cooperate with technology blockchain to enforce transactions in the blockchain. The contract is made in a computer code, entered into the blockchain, and can run itself (automatically). It works the same way as a vending machine, which only carries out the instructions given. For example, as part of the virtual contract, a person who hires a room will automatically obtain a digital receipt and a key to access the room after paying the rental amount in bitcoin indicated in the blockchain. A smart contract, for instance, describes the terms of an insurance policy. Let's say the policyholder has a damaged car and he complies with the requirements of the insurance policy, which include submitting damage-related documentation and making the premium payments on schedule. The contract will then automatically pay the insurance for the damaged vehicle. No one or anything other than the contractual parties themselves may be involved in the full life cycle of the smart contract (i.e., no court, arbitrator, lawyer, or even banker necessary). Until now, smart contracts have been used in the trade sector, as illustrated in the following picture.

Picture 2. Trading Process Chart With Smart Contract



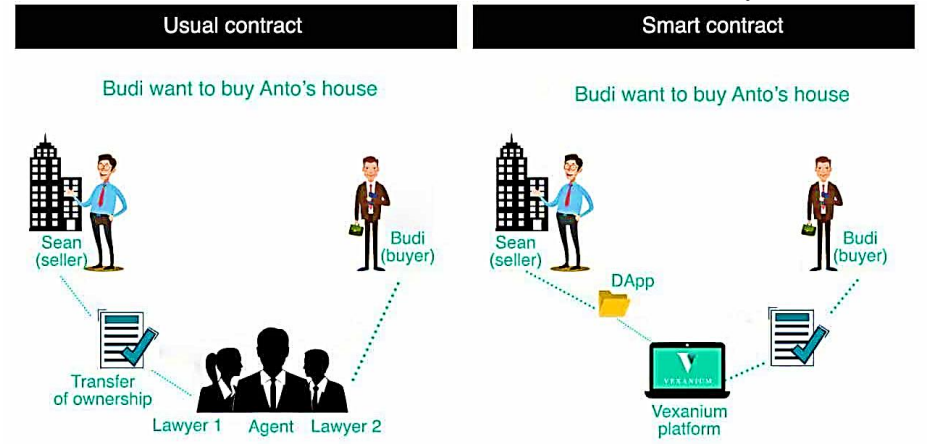
Additionally, the parties "sign" smart contracts using cryptographic security and deploy it to the blockchain. When the computer code has been entered, the program will carry out the action referred to by the code; for example, after the goods are delivered, the smart contract will make the payment. If you don't pay, then the goods will be delayed. Until smart contracts, they have large and growing potential uses, such as trading financial instruments, loan transactions, and securities settlement. Based on these, a smart contract can execute the clause agreed terms such as payment clauses, delivery, force majeure, and automatic limitation of the parties' liability. There are 5 (five) types of smart contracts with different forms and implementations. Forms smart contracts that are Contracts for basic tokens, crowd sales, mintable tokens, refunds, and terminations are all possible. There are four types of smart contracts. The first is several forms of agreements that are often applied in buying and selling cryptocurrencies, whereas a Terminable Contract is a form of agreement applied in the system blockchain

in online buying and selling as well as program implementation blockchain in financial services. Smart contracts are widely used in business and commerce, along with the increasingly massive digitalization of the economy, such as Etherisc .

It also needs to be understood that smart contracts use cryptographic technology. Cryptography is a protocol based on mathematics, which is the basic building block that implements an exchange between observability, verifiability, privity, and enforceability in smart contracts. Cryptography is a field of science that studies application techniques whose existence depends on the existence of a problem, the hard one. Cryptography is a solution that answers the deep convergence between law and technology smart contracts. There is the possibility of errors in drafting the contract, which can cause losses to the buyer. In a technological system, obscurity becomes very important in security. This cryptography is also built from obscurities, which are usually referred to as keys. 0 These keys are irregular, making it difficult for anyone to know and understand. The purpose of using cryptography is to ensure the confidentiality of content and internal information smart contract; maintain data integrity, which is related to guarding against unauthorized changes to data authentication; which is related to identification both as a whole system and the information itself; and non-repudiation which means that information that has been sent cannot be canceled. There are various types of cryptography, such as secret keys, set to encrypt messages between parties in text messages, and public keys, which allow various kinds of digital signatures, such as in the RSA algorithm.

A smart contract's goal is to limit deliberate and unintentional exceptions while reducing the need for third-party middlemen. It also aims to satisfy all contract criteria, including general conditions like payment terms, confidentiality, and law enforcement. You can view the following graphic for further information:

Picture 3. Differences between Smart Contracts and Ordinary Contracts



Even though smart contracts remain subject to the legal arrangements of conventional contracts or electronic contracts in general, this can be seen from the similarities between the two, which contain terms and conditions that must produce something the parties desire. For example, in Indonesia, one type of agreement between the parties is a smart contract. It is also subject to Article 1320 of the Civil Code in its validity,

namely the parties' agreement, the parties' competence, a certain thing, and a lawful cause. Comparisons between smart contracts and traditional (conventional) contracts are as follows:

Table 1. Comparison of Smart Contract with a Conventional Contract

Comparison	**Traditional Contract (Conventional)**	***Smart Contract***
Equality	Subject to legal arrangements contract (Book III of the Civil Code).	Subject to arrangement contract law.
Difference	It is made in writing and typed on a computer (electronic contracts in general).	We made it *online* using computer code.
	Involve a lawyer or legal expert to draft the contents of the contract.	It can be done without the involvement of other parties. It may require a computer expert because it is made with computer codes.
	The contents of the contract can be customized with the wishes and discretion of the parties.	The contents of the contract are only fixed on available codes, so there is little room for discretion and intentions from the parties because the requirements are clear and precise.
	The contents of the contract can be changed or repaired by the parties.	The contents of the contract must remain the same.
	Implementation requires help from humans.	Can execute contracts automatically.

	Data protection and security not guaranteed and risky.	Protection and security data is safer and has minimal risk because it uses a data encryption system.

In Table 1 above, smart contracts differ from conventional and electronic contracts in several ways. They are made automatically online using computer code that involves programming. Apart from that, if you look at traditional contracts, you can include lawyers in designing the contents of the contract with the intention that it can be adjusted to the wishes and policies of the parties. Meanwhile, a smart contract can be done without the involvement of other parties and is stuck to the available codes, so there is little room for discretion and intentions from the parties because the requirements are clear and precise. For example, force majeure can only be assessed subjectively from the wisdom of the parties in conventional or electronic contracts in general. Another differentiator is that smart contracts cannot be changed once coded on the blockchain, unlike traditional or electronic contracts, where the parties can change or revise the terms. Besides that, smart contracts can also execute content automatically without human intervention. This differs from conventional and electronic contracts, whose implementation requires the parties' assistance, such as collecting debts or not providing goods if payment has yet to be made. If you look at a smart contract and other electronic agreements related to the protection and security of data, a smart contract is safer. It has minimal risk because of the data encryption system.

3.2 Best Practice

3.2.1 Best Practice: Smart Contract Development and Management in Singapore

There are a number of agreements that support electronic commerce in international practice, A modern legal tool that promotes the continuous harmonization of international trade is the United Nations Commission on International Trade Law's (UNCITRAL) Model Law on Electronic Commerce, the UNCITRAL Model Law on Electronic Signatures, and the United Nations Contracts for International Sale of Goods (CISG). Various innovations in the use of technology e-commerce experience model modifications seek to enable access, confidentiality, diversity of choices, comfort, and efficiency in transactions, slowly replacing conventional agreements in that the parties do not have to be in the exact location. This was then offered by smart contracts, which are not limited to trading activities but also in the insurance sector, crowd-funding, and service providers.

In Singapore, smart contracts have been applied in electronic transactions such as applications A shower .202 A shower using technology blockchain where every transaction is carried out through smart contracts so buyers can shop safely and at

competitive prices. A shower uses escrow in a smart contract to ensure the product can reach the buyer by holding and securing the buyer's payment to the seller smart contract before the buyer has received proof of the goods in the form of confirmation of product receipt through the expedition delivery service company. In addition, there is CSE SG, a Singaporean business that developed Smart Contract 2.0 and implemented it in sectors like banking, e-commerce, healthcare, education, and agriculture. All contracts may eventually develop into smart contracts, and code may be used to carry out contractual duties.

Singapore, as a country, follows a legal system of common law, and several countries' common laws have actively implemented smart contracts in electronic transaction activities with broad legal regulations (expansive). For example, in America, as a legal system adherent common law enforces the law and legality of smart contracts under the conditions of the Uniform Electronic Transaction Act (UETA) in 1999, Electronic Signatures in Global and National Commerce Act (ESIGN) in 2000 until several Court decisions and state laws were adjusted to overcome the overlap in the existence of valid legal agreements with smart contract. Singapore has also been actively conducting transaction activities with smart contracts, establishing companies operating in trading services, educational services, exchange, and financial services in the blockchain system, like Quoine. Many cases have so far been resolved in Singapore (The Singaporean High Court) regarding contracts that run automatically (automated processing contracts) like smart contracts.

Based on the results of the World Bank's annual research (World Bank), Singapore ranks second in value Ease of Doing Business (EoDB). This indicates that an economic policy that supports the ease of doing business based on information technology and provides legal certainty for society in developing the digital economy is needed. However, the legality of smart contracts in Singapore is also still on the verge of uncertainty because its implementation depends on the type and clause of smart contracts. An offer and acceptance of an offer made to establish a legal relationship, as well as provisions for consideration (anything promised or supplied in lieu of money), are necessary for a contract to be enforceable in Singapore. Although Singaporean courts have not specifically confirmed it, smart contracts are enforceable even though they satisfy the legal prerequisites for such legally binding agreements. Therefore, each smart contract needs to be examined to see if it is applicable. Understandably, a smart contract executes automatically so that it does not require another party to enforce it unless there are other conditions; for example, if the contract was made unlawfully or under duress, it requires a court to cancel it. This means smart contracts are inconsistent, so their legal certainty could be better. Therefore, in resolving disputes, the court will look at all circumstances objectively, including the parties, so that the agreement is legally binding and can be implemented. . For certain transaction agreements such as ship transfer contracts, hire-purchase agreements, and property sale and purchase agreements, there is an additional formality requirement that the contract or its evidence must be in writing and signed by the parties. This is because the Singapore Court has yet to decide whether smart contracts, the contents of which are made in code form, can fulfill formality requirements so that they can be legally enforced.

Besides that, using smart contracts has raised various issues, such as accessibility and control of computer systems on smart contracts and how the existing system can consider changes in business conditions. This ultimately causes problems, which are proven by the emergence of Asus in Singapore, namely B2C2 Ltd v Quoine Pte Ltd in 2019 Which provides guidelines for applying the law to problems that arise. As a result, smart contracts can be solved. From there, the importance of legal certainty regarding the enforcement of smart contracts in technology blockchain can be seen. There is no guarantee of legal certainty for smart contracts, and it can cause non-compliance with the agreement agreed by the parties within a smart contract. The next issue, which is no less critical, is jurisdiction-related. Blockchain distributed throughout nodes can be found worldwide, and there is no concrete method to determine the actual location of these servers. So, the issue that arises is about appropriate jurisdiction and governing law. This is important because there are huge differences between the world's countries in how they view technology. One of them is profound. According to the ruling in the 2010 case of RTS Flexible System v. Molkerei Alois Muller, this is determined by the communication between the parties and whether or not it objectively led to the conclusion that the parties intended to establish a legal relationship. and it has been decided. This means that a violation of a smart contract can only happen when it can be proven that the smart contract was made by fulfilling the elements of the contract and that one of the parties defaults without a valid reason.

Another problem is how smart contracts have the nature of automatic execution after the contract's terms have all been met. This indicates no more room for not carrying out the contract. However, risks such as programming errors can cause the contract to produce results contrary to the parties' intent, which must be resolved by law. To overcome this, external data is needed through Oracle, namely third-party services that send data from outside to inside the blockchain. From there, solutions can be provided for violations of smart contracts; for example, a payment has been made for an asset in smart contracts, but the asset was stolen, or the contract did not meet the desired results. Hence, it needs recovery, such as a refund in the blockchain. You can also take legal action, such as compensation or restitution. This can be done with smart contracts made to improve and accurately represent the parties' intentions.

3.2.2 Best Practice: Development of Smart Contract Arrangements in Europe

This entails funding pilot initiatives and setting up conferences and workshops to involve stakeholders and collect crucial data. In order to map important efforts in Europe and beyond and improve stakeholder participation in Europe, In 2018, the EU Blockchain Observatory and Forum was concurrently founded by the European Commission. The EU Blockchain Observatory and Forum offered a number of guidelines in a June 2020 report to assist legislators in addressing the legislative issues raised by smart contracts.

In 2019, the European Commission established the International Association of Trusted Blockchain Applications (INATBA). In order to encourage the development of Smart Contract arrangements across nations and sectors, the goal is to bring together industry,

small and medium-sized businesses (SMEs), policymakers, international organizations, regulators, civil society, and standards-setting agencies.

3.2.2.1 Best Practice: Development of Smart Contract Arrangements in the UK

Computer systems known as "smart contracts" automatically carry out a contract's provisions when specific criteria are satisfied. In the UK, As long as a smart contract satisfies the fundamental conditions of a traditional contract—offer, acceptance, consideration, and desire to establish a legal relationship—it is accepted as a legitimate type of agreement. These principles are expressed in Common Law, which is flexible and can accommodate technological innovation. Through various bodies such as the Law Commission, the UK government has reviewed the use of smart contracts and provided guidance on how this technology can be used within the existing legal framework. In 2019, the Law Commission released a report confirming that smart contracts can be recognized and enforced under UK law if they meet the requirements of conventional contracts .

An essential component of putting smart contracts into practice is protecting consumers. The 2018 Data Protection Act which implements GDPR in the UK, provides a legal framework to protect personal data that may be used in smart contracts. This protection includes transparency, access rights, and data security . Several legal risks are associated with the use of smart contracts, including legal uncertainty, code errors, and challenges in dispute resolution. This risk needs to be managed well so as not to hinder technology applications. The use of escrow and oracles are some ways to reduce this risk, such as providing a third-party verification mechanism in contract execution. Various sectors in the UK have started to adopt smart contracts, especially in the finance and insurance industries. For example, some insurance companies use smart contracts to automate insurance claims, which reduces operational costs and increases efficiency. Apart from that, the property sector is also starting to utilize this technology to automate property transactions.

The UK Ministry of Justice is concentrating on enhancing legal certainty for smart contracts under the laws of England and Wales as part of a larger initiative pertaining to legal challenges associated with technological advancements. Under the direction of the UK Jurisdiction Taskforce, this work was completed. In November 2019, the Task A legal statement about the state of cryptocurrency assets was released by Force. and smart contracts, which resulted in a series of findings, including the legal implications of smart contracts. It states that "there is no good reason to treat smart contracts as fundamentally different from conventional contracts." If an out-of-code event impacts a transaction, existing legal rules must apply to resolve potential disputes. According to the Taskforce, smart contracts can satisfy three contractual requirements: The existence of a "agreement": under English and Welsh law, a contract can be formed without written terms or signatures, and a smart contract can legally fulfill the "written" requirement in any case; a definite desire to be legally linked; and the requirement that each party provide something beneficial.

However, it is recognized that "modern approaches to the interpretation of commercial contracts are heavily focused on language," so smart contracts that rely solely on code

may not leave room for legal interpretation. The contract will be considered an unambiguous agreement, with no compelling reason to deviater, a judge may intervene in situations where the code does not reflect the parties' original intentions to the contract or in cases of fraud . Although this creates challenges in the event of a breach of contract, the Task Force also clarifies that smart contracts between anonymous (or pseudo-anonymous) parties entail legal duties. According to the research, it is completely acceptable under UK law for a party to be unaware of the identity of the contract partner; this is not unique to smart contracts.
Building on the Law Commission's earlier research on smart contracts and the conclusions presented in the Legal Statement, the UK Ministry of Justice is collaborating with the Law Commission of England and Wales on a project.

3.2.2.2 Best Practice: Development of Smart Contract Arrangements in the Netherlands

The Netherlands is known to have a legal system that is progressive and adaptive to technological innovation. The Dutch legal system has accommodated smart contracts by integrating the basic principles of existing contract law. In the Dutch Civil Code, a valid agreement must meet the terms of offer, acceptance, and consideration, similar to traditional contract law principles . The Netherlands does not explicitly have specific regulations governing smart contracts, but general principles in contract law and commercial law can be applied through tons such as the Dutch Blockchain Coalition (DBC); the Dutch government has reviewed and developed guidelines for using blockchain and smart contracts in various sectors. This includes the energy, finance, and logistics sectors, which have begun to adopt this technology . Data protection and privacy are the main focus of regulations related to smart contracts in the Netherlands. The General Data Protection Regulation (GDPR), which applies throughout the European Union, including the Netherlands, provides a legal framework to protect personal data used in smart contracts. It is essential to ensure that the use of data in these contracts complies with strict data protection laws .
A report on smart contracts was released in 2019 by the Dutch Ministry of Justice and Security's Research and Documentation Center. According to the paper, smart contracts are subject to Dutch contract law; as a result, changing the legal environment seems to be optional. As previously noted, the Haviltex standard may still apply, where external circumstances such as the parties' original intentions will factor in interpreting the contractual clauses. However, according to this research, the code itself may be given more weight for interpretational purposes when it comes to smart contracts. The paper also points out that it could be difficult to apply several fundamental contractual concepts under Dutch law to smart contracts.
An example is the concept of 'force majeure.' These normative principles cannot be included in codes because no strict rules govern their application. The solution is to introduce third parties into the contracting equation, although this will reduce the benefits of smart contracts . The research warns that the dangers of harm may outweigh the potential benefits of utilizing smart contracts, but it offers no specific guidance in

light of these challenges. The government is anticipated to provide a formal response shortly.

3.2.2.3 Best Practice: Smart Contract Development and Setup in Switzerland

Switzerland is known as one of the progressive countries that have adopted blockchain and smart contract technology. The city of Zug, known as "Crypto Valley," has become the center of blockchain innovation in Switzerland. Many blockchain-based technology companies and startups are headquartered there, taking advantage of supportive regulations and a conducive ecosystem. Swiss regulations tend to favor technological innovation. In favor of blockchain and smart contract technologies, Guidelines have been issued by the Swiss Financial Market Supervisory Authority (FINMA) and the Swiss government. These regulations cover data protection, security, and compliance with anti-money laundering laws. In 2020, Switzerland amended several laws to more clearly accommodate the use of blockchain technology, including regarding the validity and enforcement of smart contracts

In order to outline the legal framework that applies to smart contracts and determine whether regulatory action is necessary, the Swiss Federal Council released a report in 2019. According to the research, smart contracts are not contracts in the sense of the Swiss Code of Obligations, and their unchangeable character causes conflicts with traditional civil law. Against this background, the Federal Council stated that "parties wishing to establish smart contracts must provide appropriate mechanisms for possible changes in circumstances and resolution of disputes. There will certainly be further developments in the field of smart contracts, but as they are still in the embryonic stage, it is likely too early to legislate at this time" . One sector where smart contracts show great potential is the energy sector. This technology can regulate the distribution of renewable energy, facilitate transactions between energy producers and consumers, and optimize the use of the electricity network. Using smart contracts in energy systems can improve operational efficiency and transparency, ensuring that all transactions are recorded clearly and cannot be changed . Even though it has great potential, the use of smart contracts also faces various legal challenges and risks. Some of the main challenges include :

- Legal Uncertainty: Although regulations have begun to accommodate this technology, there is still some uncertainty regarding the laws that apply to smart contracts.
- Errors in Code: Bugs or errors in smart contract code can cause significant financial and operational losses.
- Dispute resolution: Resolving disputes arising from the execution of smart contracts can be complex due to the decentralized nature of blockchain technology.

3.2.2.4 Best Practice: Development and Setup of Smart Contracts in Italy

To give smart contracts legal standing, governments can enact laws specifically designed for them. For instance, a law introducing smart contracts into the legal system was passed by the Italian Parliament. The law, which went into effect in 2019, defines

smart contracts legally and says that they satisfy the written form criteria as long as the parties' identification follows the guidelines established by Agenzia per l'Italia Digital. Additionally, according to the agreement, smart contracts are legally equivalent to "electronic timestamps," as specified by the European Regulation on Electronic Identification.

Regarding the Italian proposal, smart contracts are likewise defined under the law. Following Arizona's initiative, Delaware, Florida, Ohio, Nevada, Tennessee, and Wyoming approved similar laws, indicating the common view that smart contracts may be enforced within current legal systems. A state definition of smart contracts has also been included by New York State to its technology law in order to acknowledge them in business.

Smart contracts in Italy are recognized as tools that can increase transaction efficiency and transparency. The blockchain technology underlying smart contracts allows for an immutable record of transactions that can be verified by all parties involved. This is particularly relevant in sectors such as health and agribusiness, where the resilience and sustainability of public services are critical . Regulation of smart contracts in Italy is still in its infancy, with strong influence from the European Union legal framework. Italy adopted many rules from the European Union to ensure data protection and security when using digital technology. The General Data Protection Act (GDPR) is one of the principal regulations governing how personal data can be used in smart contracts.

Additionally, there are several initiatives from the Italian government and independent institutions to develop guidelines and standards for using smart contracts in various sectors . Using smart contracts in public services has great potential to improve efficiency and transparency. In the healthcare sector, for example, smart contracts can manage patient medical records securely and efficiently, ensuring only authorized parties can access information. In the agribusiness sector, smart contracts can be used to track supply chains, ensuring that every step in the production and distribution process is recorded correctly and cannot be changed . Although smart contracts offer many benefits, several legal challenges and risks must be overcome. One of the main challenges is the legal uncertainty regarding the validity and enforceability of smart contracts under Italian law. Other risks include potential errors in smart contract code that could lead to undesired outcomes, as well as challenges in resolving disputes arising from the implementation of smart contract

3.2.2.5 Regulatory challenges for governments

The difference in speed between technological development and regulations is always an issue of concern. However, a growing consensus is that this speed issue is particularly challenging for intelligent contracts. One of the reasons the government needs help keeping up with this rapid technological development is the complexity of this technology. Smart contracts create possibilities for novel transaction structures even when governments lack the technological know-how and business models that may need help with understanding, monitoring, and regulating ; this problem can be mapped in the following ways:

a) Challenges in Territoriality, Applicability, and Responsibility

Especially for smart contracts, territorial issues become more complex: the parties involved (parties to the contract, code developers, minors, validators, etc.) may be governed by various regulatory frameworks in their own nations, and often neither party third or responsible authority. These territorial disputes provide governments and corporations with enforcement and liability challenges in addition to the possibility of regulatory arbitrage. One-third of respondents to a 2019 Deloitte survey called smart contract enforcement a regulatory issue .

Potential breaches by either party, smart contracts could be flawed due to coding or design errors, giving rise to unforeseen or undesirable consequences. The claim that smart contracts and related programming languages resolve all ambiguities is partly misleading. Code that cannot be observed by the parties to the contract can also create ambiguity, leading to transaction failure and potential losses for the parties to the transaction . In many cases, no third party is responsible for the system and the information it conveys. Who should be held responsible if a smart contract fails to function due to coding or design issues? Are auditors who audit and certify smart contracts also responsible? These problems make it difficult to carry out essential legal and regulatory functions such as ensuring responsibility, determining the rules that apply in a particular situation, monitoring, or enforcing regulations. .

b) Challenges to the Existing Regulatory Framework

Because technology-based contracts are cross-sectoral and involve multiple technologies, the existing regulatory landscape may be unclear, redundant, or overlapping. Traditional regulatory frameworks are usually designed in isolation based on a particular issue, sector, or technology and may not be suited to the nature of smart contracts. This has several negative impacts, such as (1) Uncertainty, which can reduce incentives to enter new markets, and (2) Poor risk management. One of the primary effects of the creation of smart contracts is the transition from traditional rules (such property law) to private governance systems, in addition to the clarification of market and sector definitions. Conventional regulatory systems face additional difficulties as decentralized transactions run by code without public authority proliferate.

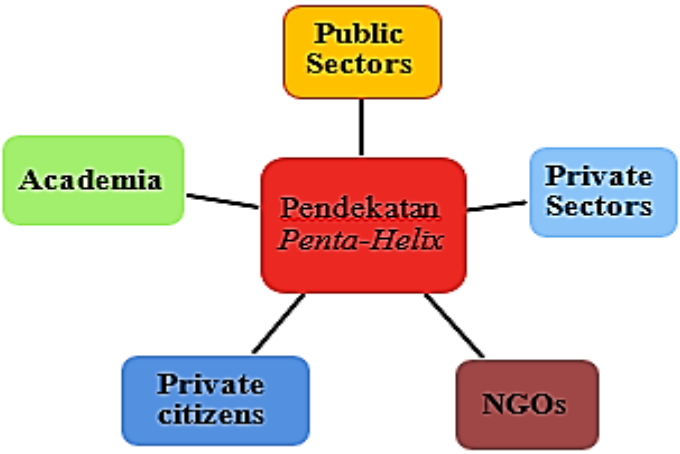
3.3 Regulation Model in Indonesia for Smar Contract Implementation

3.3.1 Setting Model Arrangement Stage

The approach used in building the Virtual Diagnostic System Management Model is a Human-Centric approach. The approach to preparing a policy has an essential role in determining the design and the implications that will arise from it. Therefore, choosing the right strategy will significantly determine the outcome and impact of the policy.

The five primary elements of the penta-helix method are (1) the most impacted groups; (2) the primary stakeholders; (3) interest groups; (4) advocacy groups; and (5) the general public. These elements are relevant to policymaking in the digital economy as well. These five elements are implemented by academics, civic citizens, non-governmental organizations (NGOs), the public and business sectors, and others.

Picture 4: The Penta-Helix Approach to Policy Making



The parties referred to in the diagram include the Ministry of Health and the Ministry of Communication and Information of the Republic of Indonesia.
This approach will yield several benefits, including:

1) Stakeholders' combined strength, ability, and resources to create and execute policies that can effectively address requirements;
2) Involve the commitment of stakeholders from the start so that a sense of ownership of the policies developed develops;
3) An implementation that is more reliable because of this commitment and
4) Get all of the stakeholders' input to produce thoughtful policy formulation considerations.

This approach is more appropriate than the traditional top-down approach to policymaking. This approach provides a more comprehensive arrangement because the drafting process involves various perspectives and stakeholders.

3.3.2 Regulation Model in Indonesia

Regulations regarding smart contracts in Indonesia are still developing, and the specific regulations governing them have yet to be fully formed. According to existing sources, smart contracts are set in the broader context of blockchain technology. Existing regulations are general and do not touch on the specific details of smart contracts on platforms such as Ethereum. However, the application of smart contracts has been recognized as having potential in various applications, including protecting personal data on NFT platforms in Indonesia .
In Indonesian law, smart contracts still need to have detailed specific regulations. However, the blockchain technology that supports them is starting to receive recognition and guidance from the relevant authorities. Legal risks need to be

considered, considering that the lack of a clear legal framework can affect the validity and implementation of smart contracts in the eyes of Indonesian law. . Legal sources that can be used as a general reference include jurisprudence and doctrine, which can guide how smart contracts can be applied or interpreted in the context of existing law . For more depth, academic literature and current research can be a good source of knowledge. Journals and scientific articles often discuss the application and legal implications of using modern technology, such as smart contracts, in the context of national law.

Based on the above, several legal problems could arise from using smart contracts in Indonesia. This is because smart contracts that use blockchain technology are very flexible, so they can be implemented in various industrial sectors and are even believed to be still used in human life, as is the case with virtual money. Includes:

- Regulation and Legal Validity: The development and implementation of smart contracts in Indonesia face challenges due to the need for specific regulations. However, the government has tried reviewing developments in this technology and creating an appropriate regulatory framework. The legal validity of smart contracts in Indonesia must be ensured through in-depth studies and clear regulations to accommodate the unique characteristics of blockchain-based smart contracts .
- Consumer protection: In the context of consumer protection, both Indonesia and neighboring countries such as Singapore have begun to include relevant regulations. This shows that there is attention to the legal aspects and protection of consumer rights in implementing smart contracts .
- Blockchain Technology Use: Smart contracts are based on blockchain technology, which is becoming an essential focus in regulation. Using this technology in contract transactions in Indonesia requires legal rules that ensure security and clarity in contract implementation. This is important to avoid legal risks that may arise .
- Legal Risk: There are several legal risks associated with the use of smart contracts in Indonesia, including regulatory risks, contract risks, and compliance risks. It is essential to pay attention to and manage these risks so that the implementation of smart contracts can run effectively and by applicable law
- Security and Legal Certainty: Studies show that the characteristics of smart contracts executed via blockchain technology provide higher legal certainty compared to traditional contracts. However, clear and detailed regulations are still needed to ensure implementation by Indonesian law .

The dilemma that smart contracts present for law enforcement is further highlighted by recent government initiatives. The idea that smart contracts are comprehensive contractual arrangements eliminates the need for the law to enforce a contract's terms, rendering the need of contractual interpretation moot. General norms of interpretation still hold true, though, as new guidelines from the UK and the Netherlands signal that current laws might also apply to smart contracts. For instance, the Haviltex standard provides the primary principle of interpretation in the Netherlands, stating that external factors like the parties' original intentions are just as important as the text of the contract (the code of conduct). Similar guidelines are applicable in the UK, where a 2009 House of Lords ruling emphasised how crucial it is to make sure that a contract's wording aligns with the parties' intentions. However, this guidance raises a question for

policymakers: how can these interpretive principles be combined with the idea that smart contracts are complete arrangements adequate to coordinate contracting parties? Some initial ideas have been put forward, but this question still puzzles governments, and no official statements or regulatory decisions have been made. The disintermediation and autonomous organization features of smart contracts mean that law is often considered an inactive element of transactions.

In this situation, assigning blame, approving transactions, and reconciling these technologies with data protection concerns become important regulatory challenges for governments . Although smart contracts allow transactions, they are essentially a 'simple' set of code-based instructions with automated decision-making. Smart contracts are different from traditional contracts in that they are legally binding. Technological advances have led to speculation that smart contracts could replace entire legal systems. While there are strong reasons to be skeptical of this view, smart contracts have the potential to create an "alternative" ecosystem to the existing legal system. In some cases, smart contracts can operate in a regulatory vacuum, leading to illicit activities such as money laundering . Smart contracts also raise tensions between the nature of blockchain technology and data protection laws. The principles of Smart Conceptually, contracts and the General Data Protection Regulation (GDPR) frequently conflict. Core blockchain features like decentralization, immutability, and immutable data storage stand in sharp contrast to the data protection techniques created for centralized institutions. To comply with GDPR, two main points of tension were identified: GDPR assumes that there is one legal entity (data controller) responsible for each data point. This principle goes against smart contracts' decentralized nature, allocating challenging responsibilities under these rules. .

Here, improvements are needed in legal instruments related to information technology and its use. Bambang Pratama believes that it is essential to provide a fulcrum for regulations from a technological perspective, considering that legal regulations will always lag because technology will continue to change following the increasingly rapid dynamics of scientific development. The Civil Code does provide freedom in contracting, but when viewed in the context of a smart contract, if there is unilateral execution or transfer of the contract, it will cause problems for one of the parties. Apart from that, it is also related to the issue of electronic system standardization in Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Electronic Transactions which still does not regulate the use of blockchain so special rules need to be made because blockchain is a unique system whose scope must be regulated so as not to disrupt certain markets.

It has been said before that smart contracts are a development of blockchain technology in the era of blockchain 2.0. Ministry of Communication and Informatics, through the Directorate General of Information Applications, in collaboration with the Centre for Innovation Policy and Governance (C, IPG), maps the sociotechnical dynamics of development blockchain in Indonesia into 3 (three) types, namely micro, meso, and macro . In the era blockchain 1.0, The expectations of Indonesians about blockchain As a traditional financial services offering, it remains unique because it is a development blockchain still focused on financial services applications as well as the many reports in the media that expose bitcoin and blockchain simultaneously. From there, it seems

that the dynamics of practice develop blockchain is still viewed negatively because abuse occurs in Bitcoin for illegal transactions, so the Indonesian Government, through the Financial Services Authority (OJK), stopped several cryptocurrency transaction practices to protect the public and Bank Indonesia which stated that the practice of using cryptocurrency is illegal in Indonesia because it could be utilized for illicit purposes including financing terrorism and money laundering. However, As blockchain applications expand beyond the currency sector, Indonesians' expectations of blockchain are growing in the post-era of blockchain 1.0, raising public awareness that cryptocurrencies are just one use case for blockchain technology. 251 In blockchain 2.0, several banks in Indonesia apply it to support efficiency, security, and trust in banking business processes. Apart from that, there is the presence of Indonesian companies such as DattaBot and Online Tax which has achieved success in the international arena opens up space for other companies to move to develop products by targeting the market share in Indonesia which is economically potential, but has not yet been optimally touched by technology based on blockchain .
There are opportunities and challenges for implementation blockchain in Indonesia is as follows :

Table 2. Opportunities and Challenges Blockchain 1.0 in Indonesia

Factor		Opportunity	Challenge
Human Aspect (HR)	Technology Developer	There are several standing *merchant blockchain 1.0* in several areas	• lack of human resources with qualified capabilities in processing *blockchain* 1.0 • *blockchain 1.0* only familiar in certain circles
	User Technology	• Hope in technology: openness of financial services • The development of the middle social class, Gen-X, and Gen-Y who are familiar with digital technology	• Technology risks: privacy, illegal transactions, value fluctuations, widespread negative news about *blockchain 1.0* • *blockchain 1.0* only familiar in certain circles
Aspect	Main (Data)	Continuous increase in transaction *blockchain 1.0*	*Blocksize, transaction per second*

Technical	Support (Infrastructure)	Increased penetration Internet	The Internet as a data channel is not evenly distributed
Governance Aspects	Government		Enforcement of government regulations (BI, OJK, PPATK, Polri) regarding the use of cryptocurrency
	Non-Government	Several communities *blockchain 1.0* began to form to exchange information	

Table 3. Opportunities and Challenges Blockchain in the Post Era Blockchain 1.0 by Indonesia

Factor		Opportunity	Challenge
Human Aspect (HR)	Developer Technology	• Establishment of the company *blockchain* based *blockchain 2.0* and *blockchain 3.0* • formation of the Indonesian Blockchain Association • Information center plan *blockchain*	lack of human resources with qualified capabilities in processing *blockchain*
	User Technology	• Hope in Technology: safer and more efficient multi-application Solutions • The development of the middle social class, Gen-X, and Gen-Y who are familiar with digital technology	• Technology risks: privacy, illegal transactions • people's misunderstanding of the concept of Bitcoin and *blockchain*.
	Main (Data)	Developing *blockchain* for	*Blocksize, transaction per second*

Aspect Technical		applications that suit Indonesian needs	
	Support (Infrastructure)	Increased Internet and smartphone penetration	Internet penetration as a data channel is uneven
Governance Aspects	Government		• Inadequate data governance, privacy, ownership and data acquisition mechanisms. • There has yet to be an audit mechanism guide.
	Non-Government	Several communities *blockchain* began to form to exchange information.	

The Government's attention to the development of blockchain in Indonesia, which looks explicitly at developments of smart contracts in Indonesia (in blockchain 2.0), indicates that it is a technology blockchain. It has been used extensively, but the existing laws and regulations must be revised and accommodate only some practices. Although regulations related to electronic contracts in electronic systems already exist in For legal clarity, the ITE Law has considered a number of international legal instruments, including the UNCITRAL Model Law on Electronic Commerce and the UNCITRAL Model Law on Electronic Signature; nonetheless, as is the case in Singapore and Russia, smart contract As an application that is different from electronic contracts in general, it needs to be regulated in special and comprehensive regulations. The regulations created must include but are not limited to principles such as rules being applicable regardless of the technology used, regulators not making regulations aimed at pushing the market towards a certain structure, and technical standards in regulations that limit negative impacts. may occur (but not limit the adoption of technological innovation). Limiting the negative impacts that might occur can be seen in practice in other countries, such as Singapore and Russia, as previously mentioned, about legality. smart contract, system implementation oracle, data security and system implementation, agreements that can be made with smart contract and which cannot be made with smart contract, how computer code can be understood and the parameters of the computer code used, as well as the protection of the rights and obligations of the parties who created it smart contract (principle of proportionality/balance) so that this does not happen smart contract have a negative impact on one of the parties, for example in a sale and purchase agreement which often contains provisions that are detrimental to the buyer.

With the formation of the regulation, opportunities will be opened in the future for using technology in electronic transactions with sufficient legal certainty. So that various technological innovations for the convenience of electronic transactions in the future

can still obtain clear legal certainty without the need to form new and specific regulations for certain technologies. In addition to that as an agreement or contract, smart contract it is necessary to fulfill the conditions for the validity of an agreement as stated in Article 1320 of the Civil Code, namely the agreement of the parties, the skills of the parties, a certain matter, and a lawful cause. In the context of a sale and purchase agreement, an agreement is formed in the event of acceptance of an offer response by the Seller and is realized by a payment mechanism by the Buyer as a form of acceptance statement, as well as smart contract which uses computer code to enter the contents of the agreement but the basic concept remains in contract law in general. However, what needs to be paid attention to is how smart contracts, mainly when applied in e-commerce, must use Indonesian and can at least be read, downloaded, and saved by consumers in e-commerce.

Apart from that, the Indonesian government only looks at general aspects and is limited to technology blockchain. The urgency of using smart contracts isn't as widely used as blockchain in other applications. Therefore, it is important and necessary for Indonesia to look at usage practices of smart contracts in other countries such as Russia and Singapore from all aspects, including but not limited to how to understand the application smart contract, how it works, limitations, advantages, and disadvantages, especially concerning sale and purchase agreements. Apart from understanding, it is also necessary to increase awareness and ability of all elements of society to use smart contracts, remembering that its use is mainly in global trade, so inevitably, sooner or later, it will be implemented in Indonesia. Thus, implementation protection must be carried out as soon as possible smart contract especially in sales and purchase agreements, bearing in mind that all countries in the world apply the principle of freedom of contract, so that in the context of sales and purchase transactions in global trade which in the era of globalization can be carried out across countries without borders. If necessary, the government can include it in the National Program for Economic Digitalization, which is happening in Russia.

Based on several practices in Singapore and Russia compared to practice smart contract In sales and purchase agreements in Indonesia, comprehensive regulations are needed and there is a harmonization of rules related to agreements, digital finance, global trade, and information technology. Existing regulations must ensure compliance with the norms and basic principles of existing agreement law in implementation smart contract. Understandably, smart contracts will be more widely used in various social transaction activities, specifically in sales and purchase agreements. Harmonizing digital finance and agreement regulations is very important in this context. It is essential to protect the parties involved and data security, for example, in consumer protection or development. cryptocurrency as well as technology blockchain. The formation of comprehensive and harmonized regulations is a logical consequence of the legal system adopted by Indonesia, namely civil law to avoid overlapping regulations. Apart from that, harmonization of regulations is also carried out regarding national regulations and international regulations to create legal certainty in their implementation and enforcement.

4. Conclusion

This article examines the model for regulating and implementing smart contracts in commercial contracts in Indonesia, and compares it with practices in other countries such as Singapore, England, the Netherlands, Switzerland and Italy. Smart contracts, which are electronic instructions that are executed automatically in a blockchain network, offer advantages in terms of security, efficiency, and transparency. The main findings are as follows:

a) Regulatory Status in Indonesia:
In Indonesia, regulations related to smart contracts are still in the development stage, and no specific regulations regulate their implementation in detail. The use of blockchain technology underlying smart contracts has begun to be recognized by the relevant authorities.

b) International Comparison:

- Singapore: Has developed various guidelines and policies that support the implementation of smart contracts in various sectors. Singapore recognizes the legal validity of smart contracts through various reports and guidelines.
- UK: Recognizes smart contracts as a valid form of agreement as long as they meet the basic requirements of a traditional contract. The UK uses flexible Common Law principles to accommodate technological innovation.
- Netherlands: Applying traditional contract law principles to smart contracts with some adjustments. The Netherlands does not have specific regulations governing smart contracts explicitly but uses general principles of contract law.
- Switzerland: Has adopted regulations supporting blockchain technology innovation, especially in the "Crypto Valley" in Zug.
- Italy: Has passed a law providing the legal definition and status of smart contracts.

c) Potential and Challenges:

Smart contracts offer high levels of automation and efficiency, reducing the need for third parties such as lawyers or brokers. Challenges faced include legal uncertainty, coding errors, and challenges in dispute resolution.

The recommendation is that regulatory development in Indonesia needs to develop more comprehensive and specific regulations regarding smart contracts to accommodate developments in this technology and provide legal certainty for parties involved in digital transactions. Lessons from Other Countries: Paying attention to best practices from other countries in regulating smart contracts can help Indonesia formulate effective and relevant policies.

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