Legal Framework of Smart Contracts Integrated in Block Chain Technology
"Comparative Descriptive Analytical Study"
in Light of the Saudi Civil Transactions System

الإطار القانوني للعقود الذكية المدمجة عبر تقنية البلوك تشين
دراسة وصفية تحليلية مقارنة في ضوء نظام المعاملات المدنية السعودي

Doctor

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ملخص البحث:

من خلال هذه الدراسة، ناقشنا الإطار القانوني للعقود الذكية المدمجة في تقنية البلوكشين. ووضحنا أن تقنية البلوكشين، من بين التقنيات التي قد رفعت مستوى الثقة والمصداقية في العقود الذكية إلى مستويات كبيرة تتميز هذه التكنولوجيا بمزايا فريدة تعزز الظروف الحالية في العقود الذكية، حيث يكون دور الأطراف مقتصرًا على الموافقة أو عدم الموافقة على علي شروط التعاقد دون أي تدخل أو تعديل

في سياق دراستنا، شرحنا طبيعة تقنية البلوكشين، وأبرزنا مميزاتها وعيوبها. بعد ذلك، قدمنا توضيحًا للعقود الذكية، مع تعريفها وسرد سماتها الرئيسية. وتناولنا التحديات القانونية التي تواجه العقود الذكية بسبب استخدامها للإنترنت وتقنية البلوك تشين، بالمقارنة مع العقود التقليدية. بالإضافة إلى ذلك، أبرزنا الموقف التنظيمي في المملكة العربية السعودية تجاه هذه التكنولوجيا، بما في ذلك موقفها من العقود الذكية، وذلك بالإشارة إلى نظام المعاملات المدنية السعودي الجديد

الكلمـات المفتاحيـة: تقنيـة البلوكـشين العقـود الذكيـة، التنفيـذ التلقـائي للعقـود، التحديات القانونية في العقود الذكية.

Legal Framework of Smart Contracts Integrated in Block Chain Technology (Comparative Descriptive Analytical Study) in Light of the Saudi Civil Transactions System

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Abstract:

Through this study, we discussed the legal framework of smart contracts integrated with blockchain technology. We clarified that blockchain technology, among various technologies, has elevated the trust and credibility of smart contracts to significant levels. This technology is distinguished by unique advantages that enhance the current conditions in smart contracts, where the role of the parties is limited to approving or disapproving the contractual terms without any interference or modification.

In the context of our study, we explained the nature of blockchain technology, highlighting its features and drawbacks. Subsequently, we provided an elucidation of smart contracts, defining them and outlining their key characteristics. We addressed the legal challenges facing smart contracts due to their use of the internet and blockchain technology, in comparison to traditional contracts. Additionally, we highlighted the regulatory stance in the Kingdom of Saudi Arabia regarding this technology, including its position on smart contracts, referencing the newly enacted Saudi Civil Transactions System.

Keywords: Blockchain Smart Contracts, Automated Contract Execution, Legal Challenges in Smart Contracts.

1: Introduction

In this study, we will address smart contracts, which have recently emerged due to technological advancements. Through our examination of smart contracts, we will elucidate their relationship with blockchain technology, where blockchain serves as the fertile environment upon which smart contracts rely for the circulation of their transactions. Through the study, we will shed light on the nature of smart contracts, defining them, outlining their characteristics, and discussing their advantages and disadvantages. Subsequently, we will delve into blockchain technology, explaining its origins, nature, concept, and the level of security it provides for electronic transactions conducted within it. The study will also highlight the speed and security specifically offered by smart contracts, along with numerous features that have significantly facilitated the exchange of hundreds of thousands of smart contracts due to this technology. We will provide a detailed explanation of how smart contracts operate through blockchain.

Occasionally, we may delve into the technical aspect to help readers understand the mechanism of integrated smart contracts through blockchain. Furthermore, through this study, we will clarify the legal challenges facing smart contracts, arising from the distinct environment in which they operate, unlike traditional contracts. We will find that many rules existing in traditional contracts are challenging to apply significantly to integrated smart contracts through blockchain technology. Additionally, we will clarify the Saudi regulatory position and some international legislations regarding blockchain technology. We will explore how Saudi systems, in general, deal with smart contracts and blockchain technology. Our research will be conducted in light of Saudi Civil Transactions Law, reviewing its key legal provisions discussing contracts in general, and whether they can be applied to integrated smart contracts through blockchain technology. We will

also address some legal texts within the Saudi Electronic Transactions System.

1.1: Importance of the Study:

Through this study, we will focus on the significance of blockchain technology for smart contracts. We will discuss the impact of technological advancements on both smart contracts and blockchain. Additionally, our emphasis will be on elucidating the functionality of smart contracts, highlighting key legal challenges faced by integrated smart contracts through blockchain technology due to their electronic environment. This environment differs substantially from traditional contracts, owing to the distinctive nature of blockchain technology. Its unique features make it an exceedingly secure environment for the execution of smart contracts.

1.2: Problem Statement:

Through this study, we will clarify the legal challenges facing integrated smart contracts through blockchain technology. We will summarize a set of questions that express some of the legal issues we encounter, and through the study, we will address them. Some of these questions include:

1. Do various Saudi regulations, including the recently issued Saudi Civil Transactions System, address smart contracts and blockchain technology or not?

2. How can the pillars and conditions of traditional contracts be applied to smart contracts within the framework of blockchain technology, and are smart contracts compatible with fundamental legal principles?

3. What is the Saudi regulatory stance on smart technologies such as blockchain and smart contracts?

4. What are the legal challenges facing smart contracts? How are these contracts interpreted, and what are the mechanisms for termination, dismissal, and dispute resolution?

The primary questions of this study aim to investigate and comprehend the legal and legislative dimensions of blockchain technology and smart contracts, with a particular focus on the Saudi context. The study seeks to fill knowledge gaps and provide insights into the integration of these technologies with existing legal systems, along with the challenges that may arise.

1.3: Research Methodology:

In this study, an analytical and comparative descriptive approach has been adopted to examine blockchain technology and smart contracts. The study includes a meticulous review and analysis of digital legislative texts related to these technologies, with a specific focus on a description that highlights the essence of the subject in the context of current and potential future applications of this technology locally, regionally, and internationally. Through this study, we will discuss the various Saudi systems, including the Saudi Civil Transactions System, comparing them with different legal systems to illustrate how the Saudi regulator deals with these modern technologies. The study aims to clarify the legal challenges facing blockchain and smart contracts

1.4: Research Plan:

1: Introduction

2: Fundamentals of Blockchain Technology and Smart Contracts: A Comprehensive Overview

2.1: Legal Framework for Blockchain Technology and Smart Contracts

2.1.1: Concept of Blockchain Technology, Its Elements, Types, Features, and Drawbacks

2.1.2: Smart Contracts, Definition, Features, and Components

2.2: Operation of Technology-Driven Contracts (Smart Contracts)

2.3: International and National Recognition of Blockchain Technology and Integrated Smart Contracts

3: Availability of Pillars and Conditions of Smart Contracts in the Saudi System Compared to Traditional Contracts

3.1: Formulation and Conditions in Smart Contracts Integrated into Blockchain Technology

3.2: Contractors and Their Conditions in Smart Contracts Integrated into Blockchain Technology

3.3: Venue and Its Conditions in Smart Contracts Integrated into Blockchain Technology

4: Legal Challenges Associated with Smart Contracts Integrated into Blockchain Technology According to Different Saudi Systems

4.1: First Challenge: Can Blockchain Solutions truly replace traditional and electronic mediation in smart contracts?

4.2: Second Challenge: Applying theories of coercion and force majeure to smart contracts integrated through blockchain technology

4.3: Third Challenge: State control over contracts integrated through blockchain technology

4.4: Fourth Challenge: Difficulty in aligning integrated smart contracts through blockchain technology with some pillars of civil law

5: Conclusion

6: Results

7: Recommendations

8: Reference

2: Fundamentals of Blockchain Technology and Smart Contracts: A Comprehensive Overview

If we look at blockchain technology, we will find it to be the suitable electronic environment upon which this technology is based. Blockchain provides the necessary security for the execution of smart contracts that are carried out easily and quickly, and there is a very high degree of security thanks to this technology. Therefore, due to blockchain technology, there are hundreds of thousands of smart contracts executed annually through this technology, offering ease of use and pre-set conditions prepared by the contracting parties, and executed without the intervention of any intermediary. Despite these significant advantages, this technology is still relatively new, and parties have not yet accustomed themselves to its use, due to their lack of familiarity with the method and their general concerns about security issues (Crosby, 2015, p16).

2.1: Legal Framework of Blockchain Technology and Smart Contracts

We will delve into the concept of blockchain technology, its components, types, advantages, and disadvantages in the first section. In the second section, we will focus on smart contracts integrated into blockchain technology, exploring their definition, features, and how they operate within the blockchain framework.

2.1.1: The Concept of Blockchain Technology, Its Elements, Types, Advantages, and Disadvantages

In 1991, the first signs of "Blockchain" technology emerged when a group of researchers introduced an innovative method for encrypting data within an interconnected series of digital blocks. This groundbreaking technology served as a qualitative leap in the field of data security, limiting the possibility of manipulation or alteration of records in any form (Berryhill & Hanson, 2018, p.15).

Approximately two decades later, in 2008, a pivotal development occurred when a team of developers, known by the alias "Satoshi Nakamoto," created an advanced model of Blockchain. This model laid the foundation for the cryptocurrency "Bitcoin," representing a revolution in the world of digital financial transactions (Andoni, M., Robu, V & OTHERS, 2018, p.143)

A crucial milestone in the journey of Blockchain occurred in 2014, as this technology separated from Bitcoin and began finding applications in various fields beyond digital currencies. Among the notable applications is the development of smart contracts, which automatically execute when specific conditions are met, providing an efficient and reliable mechanism for conducting business and legal transactions (Boucher & Kritikos, 2017, p.18).

Blockchain is not just a technology for data storage; it also serves as a platform for innovation in areas such as supply chain tracking, identity management, and even healthcare for securing patient records. Due to its transparency and security, Blockchain is considered one of the most promising technologies in our current era, expected to continue impacting various industries and fields.

Blockchain technology can be described as "a platform embodied in the largest distributed and open digital ledger, allowing the storage of vast amounts of information and transactions in a decentralized ledger." (Jaber, 2022, p.9).

From the preceding definition, it is evident that Blockchain technology fundamentally relies on eliminating intermediaries in transactions, whether they be banks, notaries, or administrative entities. All of these intermediaries are rendered unnecessary due to the encrypted nature of Blockchain technology, which provides a high level of security for users, enabling them to access ledgers at any time with utmost privacy (Jaber, 2022, p.15).

Based on this, the researcher views Blockchain technology as "a special type of decentralized database, representing the public

record of transactions between participating members. It consists of a series of interconnected blocks encrypted together, and its transactions are verified by the consensus of the majority of participants." (CROSPY, 2015, p.19).

2.1.1.1: Elements, Types, Advantages, and Disadvantages of Blockchain Technology:

Blockchain technology comprises several elements, with the primary one being the "block." To illustrate further, imagine a shop in a commercial mall offering various foods, surrounded by other commercial shops within a shopping mall. The total of these commercial shops represents the shopping mall, analogous to how blocks function in blockchain. Each block, akin to a commercial shop, undergoes various operations, and all these operations are meticulously recorded. The blocks are interconnected through a code called a "hash," ensuring the transaction's timestamp and validating any changes, modifications, or additions within the block, thus nullifying the cryptographic fingerprint of the entire chain (Hassan, 2023, p.11).

From the aforementioned points, it becomes evident that encryption in blockchain technology is accomplished using a "hash," sometimes referred to as a digital signature. The hash performs several key functions; each chain in the blockchain possesses a unique hash, distinguishing it. Additionally, each block within the chain is uniquely identified, and the hash ensures a linkage among the blocks, preventing modifications to existing blocks. Consequently, the hash guarantees that all operations within the blocks are encrypted, and the stored data remains secure and unalterable. This encryption provides a high level of security and trust in the data circulated across the blockchain, making it an ideal technology for applications requiring the safeguarding of sensitive and crucial information (Issa, 2021, p.12).

Among the essential and vital elements of blockchain technology is its ability to precisely document digital history. The creation time of each block, along with all data and transactions conducted by blockchain users, is recorded. This process, known as "timestamping," serves as a crucial tool for achieving transparency and credibility within the network, providing an accurate and unchangeable record for every activity conducted via blockchain. This feature makes it challenging to execute any manipulation or forgery in the records, thereby enhancing confidence in the system and ensuring the safety and security of exchanged data (Moreau, 2016, p.26).

2.1.1.1.1: Types of Blockchain

Blockchain technology is categorized based on the controlling entity. If the network operates without control or supervision, open to users globally with anyone having access, it is known as a decentralized or public blockchain. In contrast, if the network is managed by specific entities, allowing access only with their permission and approval, whether governmental or non-governmental, it is referred to as a private blockchain (Buterin, 2015, P23).

A distinction can be made between public and private blockchains. In a public network, users can participate in the verification, validation, and authentication processes for transactions and new data. In a private blockchain, these processes are conducted by a specific number of participants, not everyone in the network (Buterin, 2015, P24).

Another type of blockchain is the federated blockchain, which is not open to the public but restricted to a group of institutions, such as banks and governmental organizations. There are various types of blockchain networks, each serving specific purposes (Khalifa, 2018, P24).

2.1.1.1.2: **Features of Blockchain Technology and Its Role in the Flourishing of Smart Contract Transactions**

Blockchain technology is characterized by a set of features that have created an ideal environment for the development of transactions between different parties, significantly contributing to the growth and evolution of smart contracts. One of these features is that blockchain is a secure and tamper-proof platform, ensuring the preservation of records and accurate tracking of ownership of funds and rights. Blockchain technology and the blockchain play a crucial role in documenting executed transactions, replacing traditional intermediaries and eliminating the need for financial and commercial mediation, such as in the transfer of funds from banks to their clients, recording real estate and vehicle ownership, and managing sales and lease operations (Al Burai, 2020, p. 26).

Moreover, blockchain technology stands out for its transparency and high security. This is attributed to the functioning of the blockchain, which goes beyond storing data on a single device but involves copying this data to several devices distributed worldwide, reducing the likelihood of loss. In cases of data modification, approval from all participants is required, increasing security and minimizing opportunities for manipulation and data

alteration. The unique timestamp for each transaction adds another level of accuracy and security to documentation (Atiya, 2021, p. 29).

One of the most significant advantages is the high level of security provided by blockchain technology against hacking attempts and malicious attacks. Since its creation in 2008, over the past approximately 25 years, this technology has proven its effectiveness in confronting cyber-attacks and breaches, representing a significant achievement in the field of information security and data protection (Khalifa, 2018, p. 30).

2.1.2: Smart Contracts, Definition, Features, Elements:

Smart contracts are one of the latest developments in the digital contract field and are still in the stages of development and experimentation. This type of contract has been defined in various ways by scholars and experts, with each definition focusing on a specific aspect of these contracts. They are referred to by various names such as "Blockchain Contracts," "Crypto Contracts," "Digital Contracts," and "Self-Executing Contracts." Here are some of the prominent definitions:

In 1994, Nick Szabo presented a definition for smart contracts, describing them as "a set of digitally defined promises that include protocols for the parties to execute those promises." With the emergence of Bitcoin in 2009, smart contracts began to evolve significantly, especially since 2015, allowing users to create smart contracts described as a "decentralized software platform that

enables the creation and operation of distributed applications without any third-party interference," as defined by (Abu Lail, 2020, p. 19).

In the US legislation, a smart contract is defined as "interactive computer software used for automating transactions, executed on a decentralized, distributed, and replicated ledger," as mentioned by (Hassan, 2023, p. 8).

In the Saudi legal system, there hasn't been a specific and direct definition for smart contracts yet. However, a certain understanding of smart contracts can be derived from the Saudi Electronic Transactions System, issued in 1428 H. It states that "expressing acceptance and agreement in contracts is permissible through electronic means" (Article 10, Saudi Electronic Transactions System, 1428 H).

This document defines electronic transactions as "any exchange, correspondence, contracting, or any other action concluded or executed - in whole or in part - electronically." This definition indicates the possibility of recognizing contracts that are concluded or executed electronically, opening the door to considering smart contracts as part of the legal framework for electronic transactions (Article 1, Saudi Electronic Transactions System, 1428 H).

Although there is no explicit and clear definition of smart contracts in Saudi legislation, it can be considered that the Saudi Electronic Transactions System provides a legal basis through which the concept of smart contracts can be interpreted and applied within the Saudi legal framework.

These definitions highlight various aspects of smart contracts, explaining their evolution and increasing impact in the field of digital contracts and transactions.

From the above, we can conclude that smart contracts, also known as technological contracts, are defined as "software programs written as code by programmers, relying on the legal foundations and principles existing in traditional contracts" (Atiya, 2021, p. 32).

 These contracts must contain all the essential elements of a valid contract, such as the will and consent of the parties to the contract's subject matter, clearly defined to avoid any confusion or ambiguity. In addition, both parties must have the legal capacity to contract, and there must be a valid reason justifying the commitment (Guerlain, 2017, p. 512).

These contracts are characterized by creating obligations and granting rights to the contracting parties. The parties can include terms and clauses that meet their interests and enhance the effectiveness of the contract, known as the "contract structure." Smart contracts operate on a blockchain platform in a precise and reliable manner, according to an agreed-upon protocol between the parties, ensuring their automatic and accurate execution (Hinkes, 2014, p. 139).

In addition, these contracts offer extensive opportunities for innovation and development in the field of electronic contracts, allowing the execution of complex and multi-party transactions efficiently and with high transparency. This technology has the potential to enhance business and legal processes by reducing the need for intermediaries and providing safer and faster methods to verify the validity and legitimacy of contracts (Beckham & Sendra, 2018, p. 54).

Smart contracts, classified as either deterministic or non-deterministic contracts, stand out due to their diversity based on the sources of information they use. Deterministic contracts rely on information available within the blockchain network itself,

while non-deterministic contracts depend on data fetched from outside the network with the assistance of external parties providing the necessary information for contract execution (Aparicio Bijuesca, 2018, p. 129).

Prominent aspects of smart contracts and electronic contracts, in general, include their unique properties not found in traditional contract types. These contracts are entirely executed in the electronic environment, where their contents are transformed into programming code compatible with the programming language used in blockchain technology. These codes typically include a set of conditional statements that define the workflow, such as "If Ibrahim delivers the computer to Mustafa, the amount will be transferred to Ibrahim's account" (Hassan, 2023, p. 16).

Moreover, smart contracts provide a high level of automation and precision in execution, reducing the likelihood of human error and increasing transaction efficiency. They also enhance transparency, facilitate auditing and review processes, making them valuable tools in areas such as financial services, property record management, and the execution of complex agreements (Guerlain, 2017, p. 515).

2.1.2.1: Features of Smart Contracts Integrated into Blockchain Technology)

Undoubtedly, the emergence of both blockchain technology and the integrated contracts within it has brought forth a myriad of significant advantages. These advantages can be attributed at times to the functioning mechanism of these contracts themselves and at other times to what blockchain technology offers them in terms of services. We will elaborate on this in detail as follows :

1- Smart contracts are self-executing contracts.

Smart contracts, when formulating their conditions and transforming them into programming code, then deploying them on the blockchain system, are automatically executed upon the approval of the involved parties. This type of contract is characterized by not requiring intervention for its execution from any of the parties or the need for additional approvals. Blockchain technology acts as an efficient intermediary in verifying the stipulated conditions, as well as in transferring assets and obligations associated with the contract. Once the necessary data is entered, the smart contract becomes binding for all parties, and it does not allow for withdrawal or alteration of the agreed-upon commitments due to the impossibility of changing the programming code specific to the contract terms (Dondero 2017, p. 247).

These contracts are executed autonomously and independently, without the need for intervention from any of the parties or traditional intermediaries such as brokers or notaries. Smart contracts serve as a model for independent contracts that are automatically concluded upon the agreement and acceptance of the parties, according to pre-defined terms. These contracts enhance efficiency and reduce the risks of human errors, making them a valuable tool in various fields, including financial and commercial transactions, as well as real estate management (Roda, 2018, p. 125).

2-Smart contracts are contracts that cannot be amended.

Smart contracts are characterized by the feature of being non-amendable, as their content or terms cannot be changed after being recorded on the blockchain network. This aspect of smart contracts is attributed to the inherent properties of blockchain technology, which includes a system that preserves data in a way that makes it impossible to remove or alter. This feature ensures a

high level of accuracy in maintaining rights and obligations, reducing the risks of manipulation or error (Issa, 2021, p. 29).

Furthermore, this feature provides security for users to access the blockchain platform and track all previous transactions on the chain without any restrictions, control, or influence from external parties. Users can obtain a complete record of previous operations with full confidence that the recorded data has not changed or been tampered with. This transparency and security make smart contracts an effective and reliable tool in various fields, including financial transactions, real estate, and rights and asset management (Al-Buraie, 2020, p. 33).

3-Smart contracts provide the highest level of contractual security.

Since the launch of the blockchain platform in 2008, this technology has proven to provide a high level of security. No cases of platform breaches or manipulation of the content of smart contracts executed through it have been recorded. This security can be attributed to several factors, including the automatic and sequential execution of contracts on the blockchain. Each step in the contracts is executed only after confirming the execution of the preceding step, providing a high degree of security and instilling complete trust in those dealing with contracts on the blockchain, making them confident in the security of their funds (Tareeh, 2019, p. 476).

Furthermore, all contract data is stored in decentralized, unchangeable records, enhancing the contractual security of smart contracts executed through this technology. Smart contracts on the blockchain also provide another important feature: privacy and identity protection. Parties can refrain from disclosing their true identities and use pseudonyms, ensuring independence and privacy in transactions (Atiya, 2021, p. 34).

4–Smart contracts are characterized by a high level of precision.

Smart contracts stand out for their high precision in interpreting contract clauses, in contrast to traditional contracts where the ambiguity of some expressions often leads to legal disputes due to multiple interpretations and possible intentions. Smart contracts significantly reduce this ambiguity, as they are designed to be clear and specific in their meaning, leaving no room for misunderstanding or misinterpretation (Jean, & Filippi, 2016, p52).

Smart contracts are formed after the parties agree on specific terms and convert these terms into programming code. These codes are executed automatically based on the agreed-upon conditions by the parties, reducing the likelihood of disputes arising from different interpretations of contractual texts. Thus, smart contracts provide a higher level of clarity and accuracy in contractual transactions, contributing to the reduction of conflicts and enhancing trust between contracting parties (Aissi, 2021, p30).

5–The Unique Nature of Smart Contracts Compared to Other Contracts

Smart contracts have a unique nature that distinguishes them from other types of contracts, whether traditional or electronic. In traditional contracts, parties directly negotiate face-to-face within what is known as the contract council, agreeing on specific terms, and the contract is executed accordingly. On the other hand, electronic contracts are characterized by conducting transactions entirely online, involving processes of will exchange, expression, and digital approval. One prominent example is "click wrap contracts," where contract terms are presented in a box on a web page, and a button at the bottom provides consent to the terms. When the other party clicks on this button, the contract is

considered executed. There are many other electronic contracts that operate according to this mechanism. (Raskin, 2017, p304.)

While electronic contracts are known for their ease of execution and accessibility, they may lack some levels of security and verification found in smart contracts. One of the significant features of smart contracts is their use of blockchain technology and its inherent advantages, providing substantial security for smart contract transactions and preventing any manipulation of terms previously agreed upon by the parties without their intervention. Consequently, the error rate is minimal, even negligible, as human intervention decreases, the fewer errors are committed (Kong & Lin, 2019, p1465).

However, one of the critical questions raised about smart contracts is whether they differ from electronic contracts. To the uninitiated, smart contracts and electronic contracts may seem identical at first glance. But to address this query, it is essential to clarify that the difference between smart contracts and electronic contracts lies in the system through which these contracts are executed. Electronic contracts are typically executed through a centralized system, overseen and controlled by a single entity. In contrast, smart contracts operate through the blockchain, a decentralized network not controlled by any single entity. The nature of its composition makes it extremely difficult to control, as it consists of a network of nodes (noodles) that operate independently, and no one can interfere in their operation Each node within this network makes decisions based on specific and agreed-upon mechanisms within the network, ensuring the execution of transactions and contracts in a transparent and distributed manner. (Jean & Filippi, 2016, p56.)

This feature is considered a significant and unique advantage of smart contracts, providing a higher level of security and transparency compared to electronic contracts that rely on a

centralized system. Additionally, this decentralized nature reduces the risk of relying on a single entity and increases the difficulty of manipulation or errors in contracts and transactions. (Durovic, 2019, p265)

We find that there is a disagreement among legal scholars regarding the legal nature of smart contracts, raising several questions: Are smart contracts considered genuine and complete contracts, or are they merely a collection of integrated conditions in a contract where not all the elements of a traditional contract are fulfilled?

The first opinion supports the idea that smart contracts are indeed genuine contracts, containing all the essential elements of a contract such as consent, subject matter, and consideration. This opinion suggests that smart contracts intelligently and automatically emerge through the blockchain platform. (Al-Khatib, 2020, p26.)

On the other hand, the second opinion views smart contracts not as genuine contracts in the traditional sense but as a set of conditions characterized by transparency, simplification, and clarity. They are applicable to various types of contracts and transactions. This opinion indicates that smart contracts are a set of protocols and codes between the contracting parties, facilitating the execution and completion of contracts. They are considered a form of contractual promise executed once the computer program receives a set of instructions rather than traditional legal conditions. (Al-Omari, 2022, p50.)

However, the prevailing opinion tends to believe that smart contracts are independent contracts.

6-The ability to monitor and track contracting processes

One of the remarkable features of blockchain technology is that it allows contracting parties to view and monitor the entire contracting process from start to finish. This includes initial approvals, scheduled payment dates, final deadlines for payments, and the execution of obligations. Blockchain technology ensures the security of funds, as funds are not transferred until it is confirmed that each party has fulfilled their respective obligations. As a result, a high level of trust is established between the parties, and we also find that the problems and disputes common in traditional contracts are completely eliminated due to the significant trust inherent in blockchain technology (Bourgeda, 2019, p. 22).

In my opinion, this feature is one of the most important advantages of smart contracts because it fosters trust between the parties.

2.1.2.2: Elements of Smart Contracts Integrated via Blockchain Technology

There are several key components that make up smart contracts embedded through blockchain technology: These elements include:

Contracting Parties: They are the main parties in the contract, seeking to create a specific transaction, such as the sale of goods, services, or benefits. The parties define the transaction's terms, which constitute the subject of the contract, and realize its effects according to specific conditions. The parties may be known to each other or anonymous. (Jaber, 2022, p. 36)

Contract Terms (Protocol): The contract terms transform from written texts into codes and symbols published on the blockchain

platform. All participants can access, verify, and agree on these terms. (Hassan, 2023, p. 34)

Digital Signatures: Each party in the contract possesses a private key enabling them to sign the contract, ensuring security and privacy.

Execution of the Smart Contract: The contract is automatically executed on the blockchain platform once both parties agree to the agreed-upon terms. Payment is typically made in cryptocurrencies, sometimes in fiat currency according to the agreement between the parties. (Jaccard, G. 2017, p. 26)

Blockchain technology provides a framework that ensures accuracy and security in the execution of smart contracts, enhancing the efficiency of contractual processes and reducing potential risks associated with traditional contracts

2.2: **Working Mechanism of Smart Contracts:**

Smart contracts are executed over the electronic network; this network, a product of scientific advancements in communications and information technology, provides various services to its users. As technology continues to evolve, the scope of its activities expands (digital technology), making it an auditory, visual, and interactive means.

Some characteristics of smart contracts may resemble certain types of contracts concluded over the electronic network. Moreover, the most distinguishing feature of these contracts is that the physical presence of the contracting parties is unnecessary, effectively eliminating the element of time. We are dealing with contracts between present parties in terms of time but absent parties in terms of location. This aligns with the nature of advanced technological contracts and smart contracts. These contracts will be accompanied by information technology security measures, confirming the identities and verifying the information

of the contracting parties, thus ensuring security and trust for the parties involved.

It is acknowledged that any electronic transaction conducted today requires obtaining electronic certification from a trusted third party. This third party could be a bank, an insurance company, a notary, etc. To eliminate the third party in electronic contracts, smart contracts were invented. These encrypted contracts will be integrated with blockchain technology. After the parties agree on all essential matters, the smart contract enables them to record and authenticate their contractual commitments. The results are automatically executed according to the provisions of the smart contract code. Each participant in the network will receive their private key (account number) to manage their transactions on the blockchain platform. Additionally, they will have a public key for accessing the electronic network (Jaccard, 2017, p. 58).

Consequently, it will not pay attention to the behavior of the contract parties, nor will it consider the goodwill or ill-intentions of the parties, especially since the philosophy of contracting according to this scheme is based on algorithmic nature. The contracting must undergo the legal formal procedures required by the contract, after the contracting parties agree on all essential points (Bakr, 2015, p. 98).

For instance, the mechanism of real estate sales revolves around individuals interested in joining the network by publicly registering all data related to their properties on this platform. This information will be encrypted and made available for any network participant to view (Tariya, 2019, p. 480).

The integration of smart contracts into blockchain technology can be summarized by having the parties agree on the contract terms and provisions. The contract could be ready for one party to input all its conditions, and the other party can either accept or reject them. Afterward, the agreed-upon conditions and terms will be transformed into programming code using one of the languages

supported in blockchain technology. The smart contract will then be ready for deployment on a blockchain network specialized in smart contracts. Here, the network's members, or "nodes," play a role in ensuring that the conditions in the contract are executed. Once they verify that the first party has fulfilled its commitment in delivery, they automatically approve the associated condition. For example, if the contract stipulates that Ibrahim sells specific goods to Mustafa, trustworthy entities confirm that Mustafa has indeed received these goods, and they automatically approve the pending financial amount, awaiting their approval once they ensure that the first party has fulfilled its delivery commitment (Jean & Filippi, 2016, p. 54).

Blockchain technology, described by experts as one of the most important innovations in the field of information technology (digital technology), is entering the era of programmable transactions. This technology is likely to bring about a new economic revolution as it offers control over sales, purchases, auction bids, and banking transactions. All these operations will be conducted transparently, automatically, and securely, immune to manipulation and alteration. Thus, we will deal with a service rather than a product (Tariya, 2019, p. 481).

2.3: International and National Recognition of Blockchain Technology and Smart Contracts Integrated Through It

The rapid technological advancements and the emergence of blockchain technology and smart contracts that rely on this technology have necessitated the update of international and national legislations to keep pace with this rapid change. This is attributed to the ease and simplicity provided by smart contracts through blockchain technology.

In this context, smart contracts have enabled the precise execution of agreed-upon conditions in transactions with greater accuracy and much less time compared to traditional contracts. When the

contract's conditions are matched, and after numerous parties, also known as "nodes," participate in the blockchain network by examining and verifying the validity of these conditions, the contractual commitment is ensured to be accurate and executed smoothly and efficiently.

In cases where parties fail to execute the agreed-upon conditions in the contract, blockchain technology can automatically impose penalties on the party that did not adhere to the contract terms. This contributes to enhancing compliance with contract terms and reduces the need for intervention by intermediaries or legal proceedings in cases of disputes.

In this way, blockchain technology and smart contracts significantly contribute to enhancing trust and efficiency in commercial transactions and ensure the adaptation of legislations to this rapid technological advancement. We find that numerous legislations have recognized this technology, including, for example:

The American legislator's recognition of blockchain technology was demonstrated through the amendment of the United States Electronic Commerce Transactions Act (ETA), adding a new Section (5). This amendment recognized blockchain technology and defined it in Article 2417 HB as: 'A distributed, decentralized, shared, and repetitive ledger, which can be public, private, permissioned, or less licensed, paid, encrypted, or less tokenized,' (Article 2417 of the American ETA). It further stated that 'ledger data is encrypted, immutable, auditable, and provides an uncontrolled truth.' (Yahya, 2021, p. 309)

Additionally, Article 2417 defined smart contracts as: 'An event-driven program, with state, that operates on a distributed, decentralized, shared, and repetitive ledger, which can manage and request the transfer of assets.' (Cong, L. & He, Z. (2018, p11–12)).

The French legislator also recognized the documentation of contractual transactions through an electronic joint registration

system. This was achieved when the French legislator amended the Contracts Law and the General Provisions of Obligations, dedicating several legal articles to regulate contracts concluded by electronic means. Article (1125) stipulates: 'Electronic means may be used to express the terms of the contract or information about the goods or services.'

Upon reviewing the French legislator's amendments, although there was no direct mention of blockchain technology, there was significant flexibility in the texts to accommodate the nature of this modern technology underlying the concept of smart contracts, namely blockchain technology. This general treatment of all types of electronically concluded contracts implies that smart contracts executed through blockchain technology will be subject to these provisions (Article 1125 of the amended French Civil Code) (Yahya, 2021, p. 310).

Looking at the Saudi regulator, the Saudi Electronic Transactions System explicitly states the following:

Contracting through automated electronic data systems or directly between two or more electronic data systems, pre-programmed for such tasks, is permissible. These systems represent both parties to the contract, making the contract valid, enforceable, and legally effective despite the direct intervention of any natural person in the contract formation process.' (Article 11, Saudi Civil Transactions System, 1428H)

Contracting between an automated electronic data system and a natural person is permissible if the person knows, or is supposed to know, that they are dealing with an automated system that will undertake the contract formation or execution. (Article 11, Saudi Civil Transactions System, 1428H)

If we analyze what the Saudi regulator has stipulated in the previous texts, we find that it did not directly mention blockchain technology, but it showed a significant degree of flexibility,

similar to what the French legislator did. It explicitly states that a contract can be made through one or more pre-programmed electronic data systems, and such contracting is valid and produces its effects. This precisely describes what occurs through blockchain technology.

At the time of writing this research, there are hundreds of thousands of smart contracts being executed using blockchain technology. Nevertheless, a gap is observed in Arab legislations regarding dealing with these contracts or blockchain technology, as they have not directly addressed it. However, recently, some Arab electronic legislations have started to approach an understanding and integration of modern smart contracting methods. This includes the recognition of automated electronic systems and the concept of an automated electronic intermediary, as well as contracting using automated electronic systems through documents or electronic records, which represents the essence of smart contracts and blockchain technology.

3: The Extent of Availability of the Elements and Conditions of Smart Contracts in the Saudi System Compared to Traditional Contracts

Blockchain is a new way of concluding contracts, so it must be controlled by a balance and the law to prevent it from becoming a means of violating public order provisions. Therefore, these new innovative methods in the financial industry should not be a means of violating the law. Smart contracts must abide by the general rules that govern and control transactions according to the laws and regulations in effect within the Saudi Arabian judiciary, including the availability of the required elements and conditions according to the Saudi Civil Transactions Law. We will address this as per the following requirements:

3.1: The Formulation and Its Conditions in Smart Contracts Integrated through Blockchain

Jurisprudence agrees that formulation is one of the pillars of a contract. Therefore, we will discuss this requirement through the following subsections:

3.1.1: Expression of Consent in Smart Contracts

In traditional contracts, offer and acceptance are expressed in various ways such as words, writing, or electronic means. However, smart contracts have introduced a revolutionary way to express these concepts using digital symbols that can be automatically understood. These contracts are drafted in one of the modern high-level programming languages and are then deployed on the blockchain by the offeror after digitally signing them with their private key (Al−Balooshi, 2019, p. 23).

When the contract is deployed on the network, network members interested in contracting can interact with and execute it. The acceptance is issued by the party to whom the offer is directed, by showing their agreement to the contract by signing it with their encryption key. This method represents a significant advancement in how contracts are concluded, providing a simplified and more secure mechanism for contracting in an increasingly digital world (Al−Dubousi, 2020, p. 25).

The council of contract' in smart contracts using blockchain occurs from the issuance of the offer until it meets acceptance. The computer program replaces the offeror in knowing the issuance of acceptance from the offeree, making it a contract between parties present in terms of time because the smart contract system automatically manages the contract without the parties intervention. However, it is a contract between parties absent in terms of place, as the offeror and offeree are in different locations (Al−Bara'i, 2020, p. 52).

We see that the 'council of contract' in smart contracts is the situation where both parties are engaged in contracting, and it is the time when blockchain technology reconciles the wills of both

parties and records the contract on the blockchain network. Therefore, we see that the network is the place that can be called the 'council of contract' due to the availability of the conditions and specifications set for the council of contract in this network (Borghdah, 2019, p. 35).

The place of conclusion of the smart contract is where the acceptor is located at the moment of acceptance unless otherwise agreed or there is a legal provision contradicting this, as stipulated in Article (38) of the Saudi Civil Transactions Law, which states: "If the contracting parties are present in one place or in different places through direct communication means; the contract is considered concluded at the time and place of acceptance, unless otherwise agreed." (Art. 38, Saudi Civil Transactions System).

We note that most laws allow the expression of the form in any way that indicates consent because transactions are based on custom, and the principle in them is permissibility. The regulator has not specified a term without which transactions would not be valid. Therefore, any means that people are accustomed to completing transactions with, and have agreed upon to express consent, are expressive and legal as long as they do not violate public order or morals. This is what the Saudi regulator stipulated in the Civil Transactions Law, clarifying that "consent is achieved if the will of each party aligns and is expressed in any form that indicates it." (Art. 32, Saudi Civil Transactions System) The Saudi regulator wisely left the matter unspecified.

Upon closer inspection, we find that smart contracts using blockchain technology are contracted in writing because the smart contract's terms are written in one of the digital programming languages before being uploaded to the blockchain network. On the other hand, traditional contracts are conducted between parties present in terms of time and place. However, contracting in smart contracts occurs between parties present in terms of time, but absent in terms of place, as blockchain technology fully and

automatically executes the contract terms as previously determined by each party and converted into programming codes.

Also, traditional contracts are based on the principle of mutual obligations between both parties, the creditor and the debtor. Each party is committed to providing something; the seller to deliver the item owed, and the buyer to pay the price. In smart contracts, the exchange process is fully carried out through blockchain technology with previously written and coded terms (Haniti, 2019, p. 20).

3.1.2: Conditions of Offer and Acceptance in the Saudi Systems and Their Availability in Smart Contracts Integrated through Blockchain Technology

The Saudi systems have stipulated several conditions for offer and acceptance, including that the offer and acceptance must be clear and unambiguous, explicitly expressing the will of the contracting parties, leaving no room for doubt. The Saudi regulator did not require a specific form for expressing this will, whether verbal or written, but recognized the conclusion of a contract in any form that clearly indicates the will of the contracting parties. This is stated in the Saudi Civil Transactions System, which stipulates: "Expression of will may be verbal, written, through understandable gestures or customary practice, and may be explicit or implicit, unless statutory texts, agreement, or the nature of the transaction require otherwise." (Art. 33, Saudi Civil Transactions System)

This is also what Article (4) of the Saudi Electronic Transactions System states: "...and such consent may be explicit or implicit." (Art. 4, Saudi Electronic Transactions System)

If we apply this to smart contracts, we find that the offer and acceptance are clearly indicative in expressing the will of each of the contracting parties in the contract, even if the terms are present

in digital electronic form or a set of codes. Each of the contracting parties can understand them, and if one party is unable to comprehend the digital codes expressing the contract terms, they can delegate someone with sufficient expertise in understanding these codes to clarify them correctly or to conclude the contract on their behalf. This is stipulated in Article (12) of the Saudi Electronic Transactions System.

The Saudi Electronic Transactions System states: "It is permissible to express offer and acceptance in contracts through electronic dealings, and the contract is considered valid and enforceable when concluded in accordance with the provisions of this system." (Art. 4, Saudi Electronic Transactions System)

In traditional contracts, one of the conditions is complete agreement between offer and acceptance, where both the buyer and seller agree on all the terms of the contract identically. In the same mechanism, the reciprocal contractual terms in smart contracts integrated through blockchain technology are matched (Hamoud, 2005, p. 63).

In traditional contracts, it is required that acceptance is connected to the offer: "the offer and acceptance should be in the same meeting, without any indication from either party of ignoring or being distracted from the contract. As for the connection between acceptance and offer in smart contracts integrated through blockchain technology (Badr, 2017, p. 52), acceptance is linked to the offer in smart contracts, where the council of the smart contract begins from the issuance of the offer by converting the terms into codes and integrating them into the blockchain technology until it meets acceptance from the other party. According to blockchain technology (Aparicio Bijuesca, 2018, p. 133).

However, there is an issue regarding the extent of the offeror's right in smart contracts to retract their offer after it has been made.

To answer this question, we must first review the legal rules in traditional contracts and whether they are applicable to smart contracts or not. Looking at the Saudi Civil Transactions Law, it states: "The offeror has the right to withdraw the offer before acceptance unless the offer has a specific duration" (Art. 35, Saudi Civil Transactions Law). We find that the Saudi regulator has specified certain cases for the offeror to retract their offer, namely, to retract before acceptance from the other party. If we apply this to smart contracts integrated through blockchain technology, we find that both parties lose their right to retract based on their desire because they both know that contracts conducted through blockchain cannot be modified or changed. Therefore, they are aware from the beginning of their inability to retract and have agreed to it, which is considered a waiver of this right. (Sano, 2019, p. 25)

There is another issue arising from applying traditional contract rules to smart contracts, which is the possibility of retracting from the transaction or what is known as the option of withdrawal from the contract between traditional and smart contracts. If we analyze this issue, we find that there is no difference between a traditional contract and a smart contract. The essence of contracts is to be executed and to be binding from their creation, whether in traditional contracts or smart contracts. According to the unique blockchain technology, which makes it impossible to retract, modify, or change, and makes the smart contract uploaded on its system binding in all its steps, there is no legal issue. Both parties are well aware of the characteristics of smart contracts through blockchain and that it is impossible to retract. Either they agree to the contract terms and bear the consequences or they refuse from the beginning. (Tariya, 2019, p. 488)

Whereas the Saudi Civil Transactions Law stipulates: "Contracting with the condition of the option to withdraw from the contract is permissible, and the option to withdraw from the

contract is waived either explicitly or implicitly by the one who has the option." (Art. 106, Saudi Civil Transactions Law) Analyzing the statutory text on smart contracts, we find that the option to retract is available, but this option is waived if both parties of the contract agree to waive it. In the application to smart contracts, we find that both parties are aware from the beginning that it is impossible to modify or retract the smart contract, which is considered a waiver by them of the option of withdrawal in the smart contract.

3.2: Contracting Parties and Their Conditions in Smart Contracts Integrated through Blockchain Technology

According to the Saudi Civil Transactions System, for a contract to be valid, it must have the essential elements of mutual consent, subject matter, and cause. Therefore, the contract's elements, especially mutual consent, must be exercised by parties with legal capacity for the contract to be valid. Legal capacity in the Saudi system requires the person to be of legal age and to have full legal capacity (Articles 32, 70, 75, Saudi Civil Transactions System).

The Saudi Civil Transactions System in Article 47 states: "Every person is capable of transacting unless they are completely incapacitated or partially incapacitated as per a statutory provision" (Art. 47, Saudi Civil Transactions System). To be fully capable in the Saudi system, a person must be 18 years old and free from defects in capacity (Art. 12, Saudi Civil Transactions System). Applying this to smart contracts, the original principle is that the contracting parties in smart contracts must meet the same conditions as in the Saudi Transactions System. However, there is an issue in verifying whether the contracting parties in smart contracts have reached the legal age or possess the legal capacity, especially in smart contracts executed on the blockchain platform, where their identities are virtual within the blockchain network, and they express their identities through their private keys and digital signatures in conducting and executing transactions on the

blockchain. Therefore, there is a possibility that someone may impersonate one of the contracting parties, making it difficult to confirm the party's legal capacity (Issa, 2021, p. 57).

In smart contracts using blockchain technology, especially in open-source public networks, anyone can register and conclude contracts through them without any conditions on the contracting parties, whether verifying their legal age or legal capacity. Thus, anyone can create an electronic wallet or an account on blockchain platforms, except for complying with the operating rules of the blockchain. As for smart contracts executed on private blockchain platforms, there is some form of control, unlike public networks, as private blockchain platforms are managed by central entities that have the right to verify the identities of users. The general trend in most countries that have adopted transactions through blockchain platforms and smart contracts is to establish rules to verify the identities of users (Jean & Filippi, 2016, p. 60).

Looking at what the Saudi Civil Transactions System stipulates, we find it states: "If a person with limited capacity resorts to fraudulent means to conceal their lack of capacity, they are liable for compensation for the damage caused to the other party due to the annulment of the contract" (Art. 56, Saudi Civil Transactions System). According to this article, if a person with limited capacity uses fraudulent means to hide their identity, they are obliged to compensate if the other contracting party suffers damage due to these fraudulent methods (Stark, J., 2016, p. 35).

If smart contracts are concluded with the contracting parties' conditions being met according to the Saudi systems, they are considered valid. If any of these conditions are not met, it causes a defect in the contract, even if the contract is correctly executed through blockchain.

There are several ways to verify the capacity of the contracting parties, such as verifying the capacity of the contract parties

through electronic cards, which are smart cards carrying a chip with all the personal data of the person, and these cards are only given to people with full capacity. Another way to verify the capacity of the contracting parties in smart contracts is to use electronic certification authorities, whose role is to verify the identity of the contracting parties and their legal capacity and to issue certificates related to the contracting parties (Ibrahim, 2020, p. 1370).

Despite these mechanisms being insufficient to identify the contracting parties in smart contracts, as a smart contract via blockchain may be concluded without using smart cards and also does not fall under electronic certification authorities, one of the main features of contracting through blockchain is eliminating intermediaries. Therefore, these conditions are insufficient to verify the capacity of the contracting parties (Issa, 2021, p. 60).

Despite criticisms directed at smart contracts for not verifying the capacity of the contracting parties, in my opinion, we can rely on the theory of apparent status to protect the good faith parties. In the worst-case scenario, if it is proven that the other party is a minor and not eligible to contract, the other party can claim the invalidity of the contract and hold the minor fully legally responsible. The contracting party with the minor is considered in good faith in this case and can be compensated as per Article 56 of the previously mentioned Saudi Civil Transactions System.

3.3 Subject Matter and Its Conditions in Smart Contracts Integrated in Blockchain in a traditional contract,

 the subject matter is what the contractors have committed to and is the second pillar of a contract according to the Saudi Civil Transactions System. It can be defined as: "The performance that the debtor must carry out for the benefit of the creditor." The subject matter can be the transfer of a real right, performing an

act, or refraining from an act, as stipulated (Art. 7, Saudi Civil Transactions System).

Looking at the subject matter in smart contracts, it is not much different from traditional contracts. The subject matter in smart contracts can be a service or goods, and payment in smart contracts is made through digital currencies associated with the contract platform. Mostly, blockchain platforms use digital currencies like Bitcoin or Ethereum. There is also the possibility of using fiat currencies like Euro and Dollar, depending on what is agreed upon between the two parties and endorsed by the blockchain platform. The process starts with the seller writing the contract terms and uploading them in the form of codes understandable by users on the blockchain platform. This is considered an offer from them. As soon as the acceptance matches the offer, the contract is made without the need for an intermediary, as the platform performs this role. As soon as a person agrees, the amount for the service, goods, or benefit that is the subject of the contract is transferred, and the person also receives the benefit or goods at the same time with ease and smoothness (Guerlain, G. (2017), p. 515).

3.3.1 Conditions Required for the Subject Matter for the Contract to Be Valid According to the Saudi Civil Transactions System

The Saudi legislator in its Article Seventy-Two has set conditions that must be met in the subject matter of the traditional contract for it to be valid, and this applies to all types of contracts, whether lease, sale, insurance, or donation contracts. Therefore, the conditions are:

–The subject of the contract should not be contrary to public order:

It is a general condition in contracts that they should not violate public order within the Kingdom of Saudi Arabia (Art. 72, Saudi Civil Transactions System). Similarly, for smart contracts concluded via blockchain technology. If the subject of the contract concluded via blockchain is lawful, the contract is valid. If it is unlawful, the smart contract is not valid; such as contracts involving items contrary to public order like arms and drug trafficking.

−The subject of the contract must be possible:

The subject or service offered must be possible and not impossible, as an impossible subject renders the contract void (Art. 73, Saudi Civil Transactions System). By impossibility here, it means absolute impossibility, so it is not permissible to sell non-existent or extinct things. In smart contracts, if the subject of the contract exists or is expected to exist in the future, the contract is valid, but if not, the contract is not valid.

−The subject of the contract must be known:

The Saudi legislator in the Civil Transactions System requires the subject of the contract (the item sold) to be known. It states: "The item sold must be known to the buyer by sight or by describing its distinguishing features" (Art. 308, Saudi Civil Transactions System). Thus, the subject of the contract must be specified, whether by its essence or by its kind and amount, or be capable of specification in the future, as without specification, there can be no delivery, and delivery is crucial for the buyer to benefit from the sale and for the seller to receive the price. In smart contracts, we find that the subject of the contract is present on the blockchain technology, and the parties are fully aware of it through the blockchain network (Hamoud, 2005, p. 76).

In smart contracts completely executed using blockchain, most of them have the subject matter absent from the contract council, and its description, kind, genre, and price are determined in the program formula published on the blockchain network. The contract is executed by matching the contractual terms, and if the agreed conditions are not available, the contract does not occur (Ibrahim, 2020, p. 1375).

The subject matter must be deliverable at the time of the contract: "In smart contracts executed using blockchain, both the item sold

and the price are automatically delivered upon the completion of the smart contract" (Ibrahim, 2020, p.1376).

3.3.2: The Price in Smart Contracts Compared to Traditional Contracts

In traditional contracts, the price is based on what the contracting parties have agreed upon and mutually consented to. The price is determined by agreement according to the terms of the contract. The Saudi Civil Transactions System states: "It is permissible for the price estimation to be restricted to stating valid bases upon which it is to be determined." (Art. 313, Saudi Civil Transactions System)

The same applies to smart contracts, where the price and pre-determined conditions are precisely and clearly agreed upon by the contracting parties. These conditions and the price are then documented within a programmed smart contract. The smart contract program uses blockchain technology to record and automatically execute the conditions when the agreed-upon circumstances are met. Blockchain technology provides a high level of security and transparency, making it difficult to alter or manipulate the data once it has been recorded in the chain. This ensures that the parties adhere to the agreed terms without the need for an intermediary or third party to enforce the contract. (Borghdah, 2019, p. 29)

The payment in smart contracts using blockchain can be made using several options, including digital currencies like Bitcoin or fiat currencies like the Dollar and Euro. If the price is paid using paper money or recognized digital currencies, there is no issue with the subject matter of the contract; because it is what was agreed upon according to the predetermined contract terms. (Shadab, H. B. (2014, p. 109))

The issue of using encrypted digital currencies in smart contracts poses legal challenges in the Kingdom of Saudi Arabia, especially

with the warnings from the Saudi Central Bank about the risks of these currencies to the economy and national security. Given these reservations, smart contracts that use cryptocurrencies as a means of payment may be at risk of invalidation due to the illegality of the subject matter, i.e., the agreed-upon price. However, with rapid development in Saudi Arabia, clearer regulations for dealing with cryptocurrencies may emerge in the future, including the establishment of a legal framework that regulates their use in a safe and effective manner. (Al–Jaroudi, A., & Altounjy, R. (2021, p. 245))

4: Legal Challenges Associated with Smart Contracts Integrated in Blockchain Technology According to Various Saudi Systems

Most legal issues facing smart contracts arise from the application of traditional contract rules to them, especially the digital environment provided by blockchain technology for these contracts and the somewhat rigid nature of this technology. It executes the conditions in smart contracts, which have been converted into codes, precisely and without any consideration for some of the rules present in traditional contracts. We will explain this in detail.

4.1: The First Challenge – Can Blockchain Truly Replace Traditional and Electronic (Automated) Mediation in Smart Contracts?

When smart contracts were integrated with blockchain, there were many viewpoints stating that blockchain would completely replace traditional and electronic (automated) mediation and that they would be entirely dispensable. However, looking at reality, it is very difficult to completely dispense with traditional or electronic mediation. For example, if there is a promise of real estate sale by the unilateral will of one of the parties, such an

action, if included in a smart contract, would most likely require the intervention of a notary in most cases, even with the subsequent automation of the execution process. (Tariya, 2019, p. 493)

4.2: The Second Challenge – Application of Theories of Force Majeure and Unforeseen Circumstances on Smart Contracts Integrated in Blockchain Technology

Looking at what the Saudi Civil Transactions Law stipulates, it discusses the issue of unforeseen circumstances, stating: "In the event of the emergence of exceptional, unforeseen circumstances after contracting, if fulfilling the obligation becomes extremely difficult and causes significant loss to the debtor, they have the right to invite the other party to negotiate without unjustified delay. However, the debtor is not exempted from fulfilling the obligation during the negotiation period. If an agreement is not reached within a reasonable period, the court may modify the obligation to make it reasonable in a way that suits the interests of both parties. Any agreement that contradicts these provisions is considered null and void." (Art. 97, Saudi Civil Transactions Law)

Article 97 of the Saudi Civil Transactions Law reflects the challenge of time-bound contracts, which specify a period for their execution. In cases where circumstances lead to a deviation in the balance between the obligations of the parties, the law allows the judge to intervene to restore contractual balance by modifying the contractual terms. However, it appears that this article cannot be effectively applied to smart contracts.

In the case of smart contracts, blockchain technology is characterized by its stability, where contracts set on the blockchain platform cannot be modified in the same way as traditional contracts. A smart contract is a set of encrypted codes, executed automatically when predetermined, agreed-upon

conditions are met, without the need for intervention from any party. (Durovic, M. (2019), p. 96)

From this, it is concluded that smart contracts do not contain a condition for modification and cannot be adapted to unforeseen changes. In this context, the only way to remove them from the blockchain platform is by adding a self-destruction feature in their programming instructions.

Regarding force majeure, looking at what the Saudi Civil Transactions Law stipulates, it states: "A person is not responsible if it is proven that the damage arose from a cause beyond their control, such as force majeure, the fault of others, or the fault of the victim; unless otherwise agreed." (Art. 125, Saudi Civil Transactions Law)

Analyzing the previous text, we find that the Saudi Civil Law stipulates limiting liability in the case of force majeure. According to the text, if it is proven that the damage arose from a cause beyond an individual's control, such as force majeure, the fault of others, or the fault of the victim, the person should be exempted from responsibility unless there is an agreement stipulating otherwise.

This text shows balance in determining civil liabilities, allowing individuals to exempt themselves from responsibility in case of damage resulting from causes beyond their control, unless there is a special agreement stipulating a different situation.

When applying Article 125 of the Saudi Civil Law to contracts integrated through blockchain technology, which is characterized by the automatic execution of smart contracts, challenges arise in applying the theory of force majeure. In this context, it becomes difficult for the debtor to argue using the concept of force majeure, as the smart contract is executed automatically without the need for court intervention.

Blockchain technology allows for the immediate and autonomous execution of smart contracts, based on pre-determined and

programmed conditions in the contract. Since this technology allows for immediate execution, we find that the parties are not in need of resorting to courts to enforce the contract, thus making the concept of force majeure inapplicable in this context (Berryhill & Hanson, 2018, p. 22).

Additionally, it indicates that the computer protocol supporting smart contracts does not understand the concept of force majeure, as the programmed conditions are executed strictly and autonomously without consideration for compelling circumstances that traditional law might consider as reasons for exemption from liability. (Mekki, M. (2019, p. 247))

4.3: The Third Challenge – State Monitoring of Contracts Integrated through Blockchain Technology

Due to the nature of smart contracts facilitated through blockchain technology, and the decentralized and encrypted nature of this technology which makes it impossible for anyone to access the transactions conducted through it, the blockchain's decentralized nature makes it extremely difficult to track the operations of smart contracts conducted via blockchain technology, even if the entity attempting to follow and monitor these operations is the government (Issa, 2018, p. 66). Consequently, the Saudi state faces numerous challenges in monitoring the operations conducted via the blockchain network, which fall outside the purview of the Saudi government's observation. This leads to several problems, including tracking the identity of the parties involved and the taxation of these operations. Therefore, Saudi Arabia needs to develop its tax legal system to align with modern technologies such as blockchain technology and establish various strategies to address these challenges. These challenges include:

1. Establishing specific legal mechanisms to deal with blockchain technology.

2. International cooperation among different countries for the easy exchange of information related to smart contract operations and blockchain technology.
3. Appointing skilled personnel capable of understanding the latest technologies, including smart contracts and blockchain technology, and training them to detect illicit activities.

Through these steps, the Saudi state can regulate the operations conducted through blockchain technology and bring them under state control, allowing the state to benefit from the taxes related to these contracts in its national development processes.. However, regulatory systems in Saudi Arabia are evolving to include financial activities and financial technology, including blockchain technology. Key regulatory bodies such as the Capital Market Authority and the Saudi Arabian Monetary Authority play a role in regulating financial activities and financial technology. These regulations include licenses for finance and crowdfunding activities and contain programs to support start-ups and medium-sized companies in the fintech sector. However, it seems that there is a future need to develop specific legislative and regulatory frameworks to deal with smart contracts executed through blockchain technology.

4.4: The Fourth Challenge: Difficulty in Aligning Smart Contracts Integrated via Blockchain Technology with Some Pillars of Traditional Contract Theory and Its Provisions.

Smart contracts, built on blockchain technology, offer a contractual environment that is entirely different from traditional contract systems. These contracts come in the form of finely crafted programming codes, making their interpretation and understanding a challenge, particularly in light of their substantial differences from traditional contracts. The challenges include:

4.4.1: The Issue of Interpreting Smart Contracts

In traditional contracts, interpretation involves understanding the mutual intentions of the contracting parties and exploring the meanings of the contract, especially in cases of ambiguous or flawed wording. The Saudi Civil Transactions Law stipulates: "If the wording of the contract is clear, its meaning should not be altered based on the interpretation of words to search for the intent of the contracting parties. In cases where interpretation is necessary, it is required to seek the common will of the contracting parties, focusing on the overall context of the contract, its circumstances, the nature of the transaction, the prevailing customs, as well as trust and honesty between the contracting parties. The article also emphasizes the importance of interpreting the terms of the contract based on their interconnected meanings, ensuring that this is done in a way that does not conflict with the terms." (Article 104, Saudi Civil Transactions Law)

However, in smart contracts, the terms are encrypted within a programming code, making it difficult for lawyers and judges to interpret them without assistance from technology experts. Moreover, the use of programming language in smart contracts limits discretionary authority in interpretation, as the programming codes are precise and do not allow for multiple interpretations as is possible with natural languages used in traditional contracts. This raises special challenges when interpreting smart contracts, necessitating reliance on computer science experts, who may lack adequate knowledge of legal principles or contract drafting. (Al-Omari, 2022, p. 56)

Due to these challenges, difficulties may arise in understanding and interpreting smart contracts, especially in the context of the gap between technical knowledge and legal understanding. Therefore, it is very important to establish a legislative system that regulates the basics of blockchain technology and smart contracts.

4.4.2: The Issue of Contract Termination in Smart Contracts vs. Traditional Contracts

The Saudi Civil Transactions Law states: "In bilateral contracts, if one of the contracting parties fails to fulfill its obligations, the other party may, after notifying the defaulting party, request the execution of the contract or its termination, with compensation in both cases if appropriate. The court may refuse the termination request if the portion not fulfilled by the defaulter is of minor importance relative to the obligation." (Article 107, Saudi Civil Transactions Law)

From this text, it is evident that smart contracts, based on blockchain technology, adopt a different approach from traditional contracts in terms of fulfilling obligations and dealing with breaches. In traditional legal systems, if one party fails to meet its contractual obligations, the other party can request the termination of the contract, and the judge has broad discretionary power to accept or reject this request. The judge may also grant a grace period for fulfilling the obligation in accordance with the principle of "facilitation" in civil law. (Al-Bara'i, 2020, p. 48)

In contrast, smart contracts differ fundamentally in this respect. Being programmed and automatic, smart contracts execute their terms as soon as the predetermined conditions in the programming code are met, without intervention or discretionary authority from a judge. This means that it is not possible to grant a grace period to the debtor in the case of smart contracts, nor can the terms of the contract be amended or intervened in after its conclusion unless these possibilities are programmed into the contract in advance. (Bakr, 2015, p. 89)

These characteristics make smart contracts effective and precise in execution, but they also raise legal and practical challenges, particularly regarding flexibility and the ability to adapt to

unforeseen circumstances that may arise during contractual relationships.

4.4.3: The Issue of Rescission in Smart Contracts and Traditional Contracts

The Saudi Civil Transactions Law states: "The contracting parties may mutually rescind the contract in whole or in part, and the conditions of the contract apply to the rescission." (Article 104, Saudi Civil Transactions Law)

From the above text, it is clear that rescission is defined as an agreement between the parties to terminate the contract by mutual consent. In traditional contracts, the judge can use his discretionary power to accept the rescission or termination based on the circumstances surrounding the contract. In the case of smart contracts, which rely on blockchain technology, such an option is not available due to their automatic and mechanistic nature. (Ibrahim, 2020, p. 1380)

In conclusion, these challenges do not detract from the importance of smart contracts and the use of modern technology represented by blockchain, in keeping up with the technological and scientific advancements in our world today, which employs artificial intelligence to facilitate aspects of life, most importantly transactions and legal dealings between individuals. What we need is the necessity of establishing legislative regulation and a legal framework that recognizes smart contracts, regulates them, and addresses their challenges.

5: Conclusion

As we conclude this in-depth research on blockchain technology and smart contracts, we find ourselves with a deeper and broader understanding of this evolving field. This study has enabled us to explore the multiple dimensions of blockchain technology, starting from its basic aspects, such as its definition and components, to analyzing its advantages and challenges. In our research, we have addressed all aspects related to smart contracts, including their operational methods, features, and how they have emerged through blockchain technology. We also clarified the international community's perspective on blockchain technology and smart contracts, and the extent of their recognition of these modern technologies. Furthermore, we analyzed smart contracts and compared them with traditional contracts, through the texts of the Saudi Civil Transactions System, to identify the points of agreement and difference between smart contracts and traditional contracts, and the challenges faced in implementing smart contracts. Based on the foregoing, we have reached a set of conclusions and recommendations, which we will elucidate subsequently.

6: Research Results

1. Smart contracts integrated through blockchain technology are characterized by transparency and security in transactions conducted through them, given their decentralized nature that prevents fraud and forgery present in contracts executed through traditional methods. This is advocated by the Kingdom of Saudi Arabia, aiming to make all transactions in a secure, risk-free digital environment.

2. Smart contracts executed through blockchain technology do not require intermediaries, making the cost low and reducing expenses, thus making contracts conducted through blockchain technology cost-effective.

3. Blockchain technology, for its full application and adoption within legal systems, requires specialized legal frameworks.

4. Saudi Arabia needs specialized legal frameworks due to significant legal challenges and issues facing the implementation of smart contracts.

5. Blockchain technology can be leveraged in various financial and banking services and diverse contracts.

6. There must be specific international standards to unify and regulate the use of blockchain technology and smart contracts, thus avoiding legal problems arising from the differences in laws between different countries.

7. Smart contracts encourage investment and facilitate the easy exchange of funds due to their ease of use, speed, and, most importantly, security.

8. Most of the legal issues associated with smart contracts integrated through blockchain technology arise from the decentralized nature of blockchain, which sometimes conflicts with certain traditional contract rules.

7: Research Recommendations

1. We appeal to the Saudi regulator to establish legal frameworks for the regulation of smart contracts integrated via blockchain technology, to facilitate their application within the national boundaries.

2. We urge the Saudi state to invest in blockchain technology, to conduct a variety of operations through this technology, maximizing its potential and benefits.

3. There should be numerous educational programs and workshops for students, professionals, and legal experts to educate them and enhance their knowledge of smart contracts and blockchain technology.

4. Participate in forums and courses discussing blockchain technology and smart contracts.

5. Attempt to utilize blockchain technology and smart contracts across all governmental and non-governmental entities.

6. Amend the current legal systems to establish a legal basis for smart contracts and blockchain technology.

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