The Legal Nature of Smart Contracts in a Perspective of Jordanian Civil Legislation

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Abstract: - This legal research explores the jurisprudential aspects of smart contracts in the context of Jordanian civil legislation. Smart contracts, which are digital programs based on blockchain technology, have emerged as a disruptive force with the potential to revolutionize traditional contractual relations. They autonomously execute binding agreements by adhering to pre-programmed instructions when specific conditions are met, thereby obviating the need for intermediaries. The growing global prominence of smart contracts makes their compatibility with and implications for the legal framework in Jordan an imperative subject of inquiry. Nevertheless, the integration of smart contracts into the existing legal framework presents distinctive challenges, especially within the milieu of Jordanian civil legislation. This research paper aims to conduct a comprehensive analysis of the stance of Jordanian civil legislation regarding smart contracts. By evaluating the compatibility between smart contracts and prevailing legal structures and an exploration of potential ramifications, this study contributes to the discussion concerning the convergence of technological innovation and legal frameworks within the Jordanian context. To achieve this goal, the study utilizes a descriptive, inductive, and analytical approach. The study concluded that the implementation of smart contracts presents legal challenges related to confirming digital mutual consent, aligning legal definitions with blockchain assets, and addressing enforceability concerns associated with self-execution. However, the study puts forth a range of recommendations, with the most significant being the development of mechanisms within smart contracts to confirm the mutual consent of contracting parties through the use of digital identity verification tools and electronic signatures.

Key-Words: - Blockchain technology, Smart contracts, Automation, Enforceability, Digital nature, Self-execution, Mutual consent.

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1 Introduction

The fourth industrial revolution, described by the fusion of technologies across biological, physical, and digital realms, has carried out transformative changes in various aspects of society, [1]. Key technologies like Internet of Things IoT, artificial intelligence AI, blockchain, and more have played important roles in shaping this revolution and impacting assorted areas of life, [2], [3]. With the ability to automate many aspects of contract execution and enforcement and eliminate the need for middlemen and third-party enforcement, smart contracts have the potential to completely transform the way we conduct business, [4]. Meanwhile, utilizing smart contracts presents

significant regulatory and legal challenges, particularly in light of Jordan's current civil legislation, [5], [6].

Upon conducting an in-depth review of the existing literature, it becomes evident that there is a dearth of research focusing on smart contracts within the framework of Jordanian legislation. The literature review identifies a scarcity of research specifically addressing smart contracts within the Jordanian legal context. Some aspects of smart contracts' alignment with existing Jordanian legal texts on contracts have explored, they primarily focus on the challenges introduced by the automated execution of smart contracts, [6]. However, there remains a notable gap in the comprehensive exploration of the legal and practical implications associated with smart contracts in Jordan, particularly regarding their compatibility with and impact on Jordanian civil legislation. Therefore, there is a need for further research to fill this gap and provide a thorough analysis of smart contracts within the Jordanian legal framework.

The adaptation of smart contracts within the framework of the Jordanian civil code is the fundamental research subject. The main goal of the study is to thoroughly examine how Jordanian civil legislation takes into account the legal nature of smart contracts in order to answer this question. This goal will be accomplished by thoroughly examining relevant legal statutes. This paper aims to elucidate the legal status and implications of smart contracts in Jordan's particular setting.

There will be two primary aspects to the research. The first part will be devoted to explaining the concept of smart contracts and examining their defining characteristics. The second part will examine the compatibility of smart contracts in relation to Jordanian civil legislation. The paper's conclusion will summarize the findings and recommendations.

2 Smart Contracts Concept

Smart contracts are a novel idea that has the ability to completely transform traditional contractual interactions in the quickly changing economic and technological landscape. By combining automation, blockchain technology, and legal agreements, smart contracts provide a novel means of facilitating, confirming, and enforcing contractual obligations without the need for middlemen, [7]. This section defines smart contracts and delves into their intricacies and examines their fundamental characteristics.

2.1 Defining Smart Contracts

Smart contracts have garnered significant attention in legal and academic circles due to their innovative nature and potential impact on various fields. Owing to the nascent nature of smart contracts, a singular comprehensive definition remains absent. Instead, the characterizations which have been engaged with have experienced proliferation, particularly given the diverse array of contract variants and their multifaceted implementations, [8].

Smart contracts, defined by a renowned computer scientist and cryptographer who first proposed them as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises", [9]. He introduced the concept of smart contracts and emphasized the digital nature of contracts, where agreements are written in code and executed automatically based on predefined conditions. This definition emphasize the automatic execution and programmatic functionalities of smart contracts. Removing intermediaries who traditionally act as "middlemen" and allowing contract processes to become much more automated. Some scholars defined a smart contract as "A computer program or code that allows the execution of predefined terms" [10], while others describe it as "a computer program which verifies and executes its terms upon the occurrence of predetermined events", [11].

These definitions highlight the question of what exactly a smart contract is, emphasizing how it is indeed nothing as abstracted from executable code which can auto-verify and enforce terms with reliance on certain events in the future. Smart contracts increase transparency and efficiencies in a multitude of use cases by executing contractual processes without human intervention, triggered based on predefined conditions.

Another definition notes a smart contract as "a piece of code which is stored on a Blockchain, triggered by Blockchain transactions, and which reads and writes data in that Blockchain database", [12]. The definition is simple and where emphasizes the fact that a smart contact mainly comprises of code part, stores all heterogeneous in a blockchain, interacts with the external world via executing transactions (login/[password) to iView', ins (via backend), reads data from blockchain database like we do DP operation & writes/updates new record into Data base as well. Smart contracts take advantage of these elements to program processes. build trustless systems, and do distributed applications. Another definition described smart contracts as "a software system that replaces human intermediaries, such as lawyers bankers. in contract facilitation and and enforcement", [13]. This definition emphasizes the ability of smart contracts to replace traditional intermediaries and automate processes for contracting purposes, while also discussing how smart contracts can provide a more efficient system in contractual arrangements. In the discussions on blockchain technology, a smart contract has been described as "a digital contract allowing terms contingent on decentralized consensus that are tamper-proof and typically self-enforcing through automated execution", [14]. This definition Points out the foundational characteristics of smart contracts as they are entirely digital, use a special way of making decisions together (decentralized), are super hard to mess with, have self-enforcing behavior, and can start working automatically. These features make smart contracts unique and enable more efficient, transparent, and secure contract execution in various domains.

Another definition described smart contracts as "a computer codes capable of running automatically based on specific conditions and prespecified functions, often stored and processed on a blockchain", [15].

All previous definitions provide valuable insights and understanding of smart contracts from various perspectives, and primarily focus on the digital nature of smart contracts, their ability to execute predefined terms, and the potential elimination of intermediaries. While the definitions provided by different authors capture essential characteristics of smart contracts, there is a need for a unified definition that encompasses both the technical execution and legal implications of smart contracts. Therefore, smart contracts could be defined as a self-executing computer program on a blockchain, designed operating to automatically enforce legally binding agreements. It is made up of coded instructions that, in the event that certain requirements are satisfied, validate, and carry out contractual obligations, eliminating the need for intermediaries.

2.2 Characteristics of Smart Contracts

Smart contracts exhibit a series of discerning traits that set them apart from other contracts, whether of a conventional or electronic nature. The ensuing enumeration expounds upon these distinctive attributes:

2.2.1 Digital & Conditional Nature

One of the salient attributes inherent to smart exclusive contracts is their execution via computational means, embodying symbols or codes that manifest the contractual obligations incumbent upon the involved parties, in anticipation of subsequent enforcement. The parties to the accord are ethereally tethered by a digital consensus. Therefore, smart contracts are devised to effectuate the contractual obligations, and they remain unconsummated should the prerequisites for execution remain unsatisfied, [16]. In another word, smart contracts exist purely in digital form, leveraging cryptographic techniques to ensure the security and integrity of the contract code and associated data, [17].

Concurrently, the electronic configuration may find manifestation within smart contracts. encompassing digital assets including encrypted currencies, or digital representations of assets, the ownership of which is duly inscribed within the blockchain ledger. It is imperative to underline that the smart contract mandates the utilization of an electronic signature. concomitant with а dependence on encryption technology. On the other hand, smart contracts possess an inherent conditional character, wherein their execution hinges upon the fulfillment of a contractual condition. This signifies that the provisions encompassing the smart contract can be inscribed within a programming language, thereby grounding the contract's realization upon conditional data foundational which forms the basis for computation, [8]. However, a smart contract in its essence is reciprocal rights and obligations from both sides of the agreement. This annotation may include the use of conditions coded as "If / Then" statements to make it understandable by machines when transcribing it into computer language for a machine to execute. Accordingly, these conditions in the code are intended to ensure that only certain criteria have been met before any contractual provisions can be executed. [6].

Given that smart contracts are digital and conditional, correct execution conditions must exist and programming languages should be used for defining the criteria of their execution. To appreciate the specialty of smart contracts – and how they function within a digital frame – these attributes have to be understood.

2.2.2 Automation

Smart contracts are likened to procedures stored in relational database management systems. These contracts are scripts saved on the blockchain and when a transaction is sent to such contracts, they have their individual addresses. Consequently, once activated, smart contracts automatically perform as scheduled on all nodes, processing instructions included in the transactions that triggered them, [18]. To execute, this type of contract undergoes a number of steps, which include writing program code and then deploying it using a programming language like Solidity onto a blockchain network. Afterward, the terms and conditions for these contracts are filled into the program code thereby enabling a wide range of agreed-upon criteria such as payment amounts as well as delivery timelines, [19]. After being deployed, a smart contract will wait for certain triggering events to occur including the reception of specific data or passing time, [20].

Once an event takes place that triggers it, the smart contract itself automatically checks whether or not the stated contractual conditions came true by matching them with actual information contained under the blockchain network, [21]. If the agreement is correct, this means that if any particular preconditions were met by both parties in question, then they would be allowed to carry out their activities without hindrances, [19]. The immutability of smart contracts on blockchain considered as a significant feature of smart contracts ensures that the contract cannot be altered, this is vital for security and trust in the execution process, [22].

As a result, the ability to execute a smart contract through an event that is preprogrammed, uploading of smart contracts in encoded form in the blockchain, ability to check certain conditions in the contract automatically, and once the conditions in the contract have been fulfilled then it cannot be altered. This automation intrinsic to them expedites the contract's performance time, cutting down costs, as well as minimizing errors unlike traditional methods. The ability of smart contracts to take certain actions that are predetermined based on conditions written into code combined with their unchangeable nature after they have been deployed is what makes them secure and trustworthy in blockchain networks.

2.2.3 Formation

Smart contract formation has two main types based on how they're put into action: one where the smart contract is part of the original deal and another where it stands alone on the Blockchain platform, [6]. The first kind starts off like a regular contract between two parties but then turns into a document that checks the terms and carries them out right away. This change happens when a coder turns the contract's conditions into code and links them to the blockchain. The second kind though, runs between two parties on Blockchain through computer programs. It doesn't need any agreement beforehand setting up the whole contract relationship from start to finish, [3].

To wrap up, you can create smart contracts in two ways: as standalone agreements that run on the blockchain, or as add-ons that work alongside regular contracts. In the first case, a smart contract uses blockchain connections and code to package and automate the terms of a standard contract. The second type, however, involves running a full contract on the blockchain itself. This difference in how they're set up allows smart contracts to fit into various contract situations, either as independent deals within the blockchain system or as a way to improve traditional contracts.

2.2.4 Validity

Smart contracts, like traditional contracts, need to follow certain legal rules to be considered valid. They have to meet these requirements: First, offer and acceptance: One side needs to make a clear offer, and the other side needs to accept it, [6]. This can happen through code and programming languages to create a digital record of the offer and acceptance. Next, consideration: The parties must exchange something of value. This could be cryptocurrency digital assets or other valuable items. Third, intent to create legal relations: Both sides must want to create a legal relationship and be bound by the contract's terms. Also, capacity to contract: Both parties must be able to enter into a contract. For example, kids and people with mental illnesses might not be able to make a contract. Finally, compliance with relevant Acts: The smart contract must follow all applicable Acts and regulations, [23]. Moreover, apart from observing the legal criteria, much attention should be given to the technical side of the smart contract along with all the mentioned issues. Clarity and transparency are two of the main requirements. The code must not have any difficulty and must not be ambiguous in any way, and any potential errors or bugs, however minute, should be easily found out and corrected to ensure the contract works without problems as agreed to, [4].

In the end, like traditional contracts, a smart contract meets certain requirements in order to be legally valid. The prerequisites include making an offer and getting an acceptance, consideration, the intention to create a legal relationship, capacity to contract, and compliance with the applicable Acts. In order to provide a clear digital record of contract formation, it is necessary to transform these conditions into the digital domain by means of code and programming languages. In addition, the technological resilience of the smart contract is equally important which requires precise execution of the parties' intentions, clear and unambiguous and coding, and strict mistake detection rectification procedures. In the field of digital technology, to establish legally binding smart contracts, there is a need for a smooth integration of technical precision and legal requirements.

2.2.5 Enforceability

Smart contracts' self-execution and selfenforcement abilities are unique since no outside interference is required. The terms and conditions of the contract launch immediately once the set conditions have been met, thus making it reliable and efficient when it comes to the contract's performance, [2]. On this premise, the mode of implementation is structured, by the belief that algorithms in smart contracts act independently of people. In most cases, the programmer writes the terms in a programming language and then implements those into the blockchain platform, which develops and embodies an entirely automated and executable form based on certain stipulated conditions that the involved contracting entities had agreed upon in the contract [6].

In summary, the distinctive enforceability aspect of smart contracts, underscores their ability to self-execute and self-enforce upon the satisfaction of predefined conditions. This selfexecution mechanism eliminates the need for thirdparty involvement, ensuring an efficient and trustworthy contract fulfillment process. The automated nature of smart contracts, guided by computer algorithms and coded provisions, guarantees autonomy without human intervention.

3 The Compatibility of Smart Contracts with Jordanian Civil Legislation

Following the elucidation of the concept of smart contracts and their legal characteristics, a deduction has been arrived at, namely, that a smart contract is a digital representation and self-executing and tamper-resistant computer program run on blockchain platforms that automatically enforces and it is of legally binding agreements, entail a set of coded instructions that facilitate, verify, or execute contractual obligations when predefined conditions are met without the need for intermediaries.

In light of this definition, a question arises: Is a smart contract to be classified as an electronic contract or a conventional contract? Addressing this query mandates a delineation of electronic and traditional contracts. Although the Jordanian legislator has not explicitly stipulated a definitive explication for electronic contracts within the Jordanian Electronic Transaction Act No15. Of 2015, Article 2 of the Act categorizes transactions as "any procedure executed between two or more parties resulting in an obligation upon one party or a reciprocal obligation among multiple parties, regardless of whether said procedure pertains to commercial, civil, or governmental domains". From this characterization, it becomes apparent that the determination of a contract's electronic nature hinges upon the medium through which the contract was formulated or executed. Should the parties undertake the inception of a contractual commitment through electronic modalities, such a transaction attains classification as an electronic contract, [6].

Meanwhile, within Article 87 of the Jordanian Civil Cod No. 43 of 1976, the traditional contract is defined as: "The convergence of an offer extended by one of the two contracting parties with the acceptance by the other and their agreement in a way that proves its effect on the contracted thing upon and results in the commitment of each of them to what he owes to the other". The provided definition encapsulates the fundamental essence of a traditional contract, stipulating that a valid agreement is achieved through the convergence of an offer made by one contracting party and the acceptance thereof by the other party. This convergence, substantiated by their mutual agreement, renders the contract effective and establishes their commitment to fulfilling their respective obligations.

In relation to the definition of an electronic contract, as elucidated in the prior context, the article underscores the concept of mutual agreement as pivotal in contract formation. The electronic contract definition, while emphasizing the role of electronic means in contract initiation, aligns with the traditional contract's requirement of offer and acceptance. Both the traditional contract under the civil code and the electronic contract definition underscore the significance of the parties' mutual intent to be bound, whether through traditional or electronic channels, in establishing legally enforceable obligations.

As gleaned from the aforementioned discussion, it becomes evident that both traditional and electronic contracts necessitate the satisfaction of certain prerequisites to attain the classification of legally recognized contracts. Consequently, these stipulated prerequisites must similarly be fulfilled within the realm of smart contracts to attribute them with analogous categorization. Therefore, these criteria and their harmonization within the context of smart contracts will be identified as follows:

3.1 Mutual Consent

Contract formation is concluded by linking the offer with acceptance, signifying the will's convergence of the contracting parties in a manner that proves its effect on the contract upon. The existence of mutual consent or the convergence of

the two wills is the basic pillar of the contract, but the convergence of these two wills alone is not sufficient for the validity of this mutual consent, although it is sufficient for the existence of the contract. However, the validity of mutual consent requires that each of the contract parties enunciates their intent in accordance with the legal requisites, whether personally manner or through authorized representation, [24]. Furthermore, additional prerequisites exist that are imperative for the validation of mutual consent. These prerequisites encompass the requirement that the intent of both contract parties originates from individuals possessing full legal capacity to engage in contractual or legal undertakings since the capacity of parties is a fundamental aspect of contract law that pertains to the legal ability of individuals or entities to enter into binding agreements. It refers to their competence and eligibility to understand the terms of a contract and assume the obligations and rights associated with it. However, understanding the capacity of parties is essential for ensuring fairness, upholding the integrity of contracts, and protecting the rights and interests of all involved parties, [25]. Moreover, it is essential that no incapacitating factors, such as mental disorders, mental incapacity, imprudence, or heedlessness, cast doubt upon their capacity. Likewise, their will must remain untainted by defects of consent, such as compulsion, fraud, grave deception, or mistake, [26].

Mutual consent is regarded as a foundational element for contractual validity, wherein the Jordanian Civil Cod No. 43 of 1976 stipulates that valid consent must originate from a party possessing complete legal capacity, free from any defect of consent. Such authentic consent should be procured solely from an individual possessing a comprehension of their statements. In instances where a deficiency in this capacity becomes apparent, the avenue exists to petition for either rectification or nullification of the contract, [27].

Derived from the foregoing and returning to the realm of smart contracts, it becomes evident that the distinctive attributes inherent to smart contracts pose a quandary when it comes to validating the contractual parties' legal capacity. Unlike traditional contracts, where parties can assess each other's

capacity through direct interactions. Smart contracts rely on the authority granted to an account on the blockchain, this poses a real problem as it does not provide a comprehensive solution for verifying age, capacity, and the ability to contract. To solve this issue, there is a need to integrate a technological solution of a kind of Digital Identity of the involved parties in the smart contracts that can qualify them in terms of their age, capacity, and contractual capacity. This challenge can be solved using digital identification methods and e-signatures when they are integrated into smart contract solutions to fulfill the legal requirements of consensus. That mechanism would help ensure that all the participants are legally capable and adequately protected when engaging in smart contract transactions that are inevitably based on trust and confidence. The creation and integration of this technological solution would improve the accuracy of the smart contracts while minimizing the risks that come with the lack of capacity verification.

3.2 Subject Matter of Contract

One of the prerequisites for the validity of a contract, whether in the realm of electronic or traditional contracts, is the presence of the subject matter that engenders the contractual consequences, which is the performance that the obligor undertakes to do, [28]. The Jordanian Civil Cod No. 43 of 1976 mandates that the subject matter should be existent or possible to exist, in addition to being specific or capable of being appointed. Finally, the subject matter should be lawful and not in contravention of public order or morality. Meanwhile, within the context of smart contracts, the subject matter possesses the existent or potential to exist, rendering this requisite attainable.

Concerning the subject matter of being specific or potential for designation, smart contracts typically achieve execution within the confines of a blockchain platform. Often, the very substance of the contract is notably absent from the contract record itself. Instead, the particulars encompassing delineation, character, classification, its and valuation are expressly articulated within the software algorithm unveiled upon the blockchain This configuration engenders platform. the contract's implementation through the alignment of the contractual conditions, [11].

The condition of subject matter and adherence to public order and morality stand as a pivotal requisite within the realm of smart contracts. This importance is underpinned by the fundamental nature of the subject matter within the blockchain system, primarily rooted in financial concepts and monetary transactions. Initially, the notion of legality may have borne less significance, given the financial orientation; however, is considered today a very important issue. The concept of the subject matter within a contract becomes entwined with the legality contingent upon public order, a facet that varies across jurisdictions and legal frameworks. This variation contributes to the intricate nature of legality and public order considerations. Also, the question of legal qualifies the location of these contracts, transferring them from the world of digital space to the space of a national state. Whereas such determination is possible within single nation-states, the differences among the countries, combined with the existence of the networked world, intensifies the issues related to the use of national legal systems where these considerations are realized in the sphere of blockchain software, [27].

In order to solve this problem, it is necessary to introduce a clear and widely recognized worldwide regulation that would define the requirements for subject matter and compliance with the law in smart contracts. This framework should have a practices universal code of about the appropriateness of the content and its relevance to the objectives of maintaining law and morality. Furthermore, regulatory bodies and legal experts from various jurisdictions should collaborate to develop guidelines that strike a balance between global interconnectedness and national sovereignty. In addition, leveraging emerging technologies such as cross-jurisdictional blockchain networks and decentralized arbitration mechanisms could aid in determined standards. enforcing the These technologies can provide a platform for dispute resolution that respects both the global nature of smart contracts and the sovereignty of individual nations.

3.3 Cause

The cause constitutes the third foundational element in the formation of a contract, analogous to the subject matter underlying an obligation. Just as an obligation rests upon a subject matter, it must equally rest upon a cause. The cause represents the rationale for the inception of the legal bond and the genuine impetus behind it, [24].

The Jordanian Civil Cod No. 43 of 1976 stipulates the essential requirement for the legality of the cause, which must be existing, valid, permissible, and in accordance with public order and morals. Failure to adhere to these conditions renders the contract void.

Simultaneously, the matter of cause stands as a relative consideration, shaped by the notion of legality as determined by the principles of public order within each distinct sovereign legal framework. Consequently, this aspect may exhibit variations across jurisdictions, [27]. What is deemed lawful cause in Jordanian law might not align with the legality standard in British law or other Western jurisdictions. For instance, the debt arising from gambling is deemed illegitimate under Jordanian law due to its illegal nature, rendering it void of legal standing. Conversely, Italian law recognizes and upholds such debts as valid and lawful. This raises a new question concerning the question of governing law and competent jurisdiction where this has to be placed within the confined space of the nodes' circle of the blockchain platform, [27]. To expand on this, it can be seen that transactions in smart contracts cross national borders, making this concept of relativity apparent where there exists no agreed governing law or jurisdiction that may be invoked to resolve disputes that arise and enforce the contract terms. [29] This platform has a built-in electronic consensual arbitration system that is an integrated part of smart contracts to address the issues of dispute instead of referring to third-party intermediaries. This process is often carried out by miners. Although these miners are skilled at resolving conflicts inside the system, they frequently don't have a thorough understanding of the complex legal aspects related to enforcement. This inherent scenario prompts a shift from conventional judicial systems toward an alternative framework underpinned by juridical programming, [27].

One approach could be to incorporate a clause within the smart contract that explicitly states the governing law and jurisdiction in the event of a dispute. This clause would specify the legal framework under which the contract will be interpreted and enforced, providing parties with a predetermined mechanism to address conflicts. Therefore, determining jurisdictions for smart contracts on blockchain platforms necessitates a multidisciplinary approach that addresses both legal and technical aspects. By incorporating jurisdictional clauses and exploring decentralized arbitration mechanisms, it's possible to strike a balance between the global nature of blockchain technology and the need for legal clarity and enforcement.

3.4 Formality

As previously indicated, both conventional and electronic contracts necessitate the presence of specific elements to attain the classification of legally recognized contracts, commonly referred to as the "fundamental elements of the contract." However, an additional requirement must also be satisfied, and its absence may result in the

nullification of the contract. This requirement pertains to formalities in contracts, whereby the law may mandate a particular form for the completion of contract formation. The contract remains incomplete unless this prescribed form is adhered to, otherwise the contract is deemed to be void as it is stated in the Jordanian Civil Cod No. 43 of 1976. In specific contracts, the inclusion of formalities serves the purpose of informing the parties involved about the importance of the obligation they intend to conclude and ensures that the content is made known to third parties. Contractual formality is considered an integral element of public order: therefore, failure to adhere to it leads to the invalidation of the contract or renders the action ineffective and unprovable, [30]. For instance, the obligatory registration of immovable property with the Land and Survey department serves as a prerequisite for the property's marketability in Jordan. However, based on the Land Dispute Settlement Act No.40 of 1952, failure to register the sale of the property with the relevant authority leads to the invalidation of the sales contract. It is noteworthy that this formality holds essential significance in the context of public order considerations.

The formality of contracts poses a clear challenge with regard to the use of smart contracts. This challenge appears clearly when applying Article 3, Paragraph B/3 of the Jordanian Electronic Transactions Act No.15 of 2015 on smart contracts. While smart contracts can potentially represent movable properties, the dematerialization of immovable properties is legally challenging. This is because issues concerning immovable properties deal with sovereign powers of the state and the extant legal framework on the registration and transfer of property rights does not allow for the use of smart contracts easily, [31].

Introducing programs in specific departments to employ blockchain verification in the contracts might be useful for handling the issues with smart contract formalities, including transactions of immovable property. Thus, by creating such systems it is possible to easily integrate blockchain technology into the administrative processes and the current legal systems. Such programs could delineate that certain events occurred, for example, contractual obligations or property transfers, and associate the evidence to the specific property records within the jurisdiction in a system that would automatically integrate by interaction with blockchain networks. In this regard, we could state that through this integration departments would get from the blockchain unalterable and checked information with the existence of the transaction or act connecting it with the property. With the help of such programs put into practice, the certainty of performance is enhanced together with contract security, not to mention the lessening of administrative formalities. It is a correct transition to associate blockchain with present legal systems and it might be a reference for other countries that have problems with the incorporation of smart contracts into the national legal environment.

When analyzing the components of contract formation namely, mutual consent, subject matter, cause, and formality, the study established challenges and offered solutions to the theme of smart contracts. Meanwhile, while focusing on the peculiarities of smart contracts as well as highlighting the important role of the consent issue of the parties in traditional contracts, especially in the aspect of the legal capacity confirmation, the analysis was conducted. In terms of the subject matter, the study acknowledged that in order to guarantee legal compliance and avoid disputes between different jurisdictions, smart contracts must be synchronized with generally recognized global standards. An analysis of the cause made clear how relative legality is, highlighting the necessity of predefined controlling legislation and jurisdiction in smart contracts. The formality debate highlighted the importance of formality in both electronic and traditional contracts, which poses a significant obstacle for smart contracts.

The study essentially promotes a multidisciplinary strategy that strikes a balance between legal clarity, enforcement procedures, and technology improvements.

4 Conclusion

This study has produced a number of conclusions and recommendations, including the following:

4.1 Findings

1. Smart contracts are described as blockchainbased digital programs that, when certain criteria are met, autonomously carry out legally binding agreements by adhering to pre-coded instructions, resulting in intermediary-free procedures.

2. Smart contracts exhibit a unique digital nature, emphasizing precise execution conditions and programming languages, and they provide two distinct forms of implementation.

3. The automation of smart contracts, selfexecution, reliability, and security are eliminating intermediaries, saving time and costs, and reducing errors.

4. In the digital domain, smart contracts made legally binding require a technical specificity where the intentions of the parties are programmed, and the principles of a traditional contract are modified through code.

5. Coding accuracy is extremely important when it comes to the enforceability of smart contracts.

6. The utilization of smart contracts created legal problems over the confirmation of digital mutual consent, subject matter, cause, and formality among the parties involved.

4.2 Recommendations

1. Adapting the definitions of law to include blockchain-based assets, such as cryptocurrencies, to make digital assets compatible with the existing legal frameworks.

2. Forming tools within smart contracts that would ensure mutual consent of the contracting parties by means of electronic signatures and digital identity verification tools.

3. Set up an all-inclusive and worldwide accepted mechanism through which the subject matter and legal compliance in the smart contracts will be aligned with public order and morality.

4. It is advisable to include a clause that clearly states the governing law and jurisdiction to avoid disputes.

5. Implement a mechanism within the relevant departments to verify contracts that require registration and use blockchain-powered verification to ensure authenticity.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the authors used QUILLBOT TOOL in order to improve the readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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