Is Law the Solution? Examining Legislative Impact on Smart Contract Adoption

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Abstract

Smart contracts, a technology underpinning for example cryptocurrencies, are self-verifying, self-executing, and tamper-resistant code-based programs. Their benefits include disintermediation, enhanced transparency, and greater transactional efficiency. Despite these advantages, adoption remains below optimal levels, particularly among non-technical users. Legislation clarifying smart contract legal status is a prominent proposed strategy to improve use. However, besides some U.S. state legislatures, lawmakers remain silent about smart contracts. This research thus investigates the research question: How does smart contract legislation in U.S. states affect user Intention to adopt smart contracts? Prior studies highlight a lack of legislative clarity and identify the Unified Theory of Acceptance and Use of Technology (UTAUT) as a suitable framework for analysing adoption behaviour. This research employs a quantitative survey across four U.S. states, comparing user Intention to adopt in those with and without smart contract legislation. The empirical survey is complemented by a doctrinal analysis of the Illinois Blockchain Technology Act, representing the common law approach. Findings indicate that while legislation is associated with a higher Intention to adopt smart contracts, the difference is not statistically significant. This stems from legislative shortcomings, such as the imposition of requirements that conflict with the technical design of smart contracts (e.g. mandating a “kill switch” in an immutable system). The research concludes that existing legal frameworks are insufficient to support widespread adoption, largely due to a limited understanding of the technology among lawmakers. Therefore, interdisciplinary insights should inform future legal reforms.

Keywords: smart contract, blockchain, Unified Theory of Acceptance and Use of Technology (UTAUT), Illinois Blockchain Technology Act

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List of abbreviations

AETA	Arizona Electronic Transactions Act
DeFi	Decentralized Finance
EE	Effort Expectancy
EU	European Union
FC	Facilitating Conditions
IBTA	Illinois Blockchain Technology Act
NFT	Non-fungible token
PE	Performance Expectancy
SC	Smart contract
SI	Social Influence
UTAUT	Unified Theory of Acceptance and Use of Technology

Is Law the Solution? Examining Legislative Impact on Smart Contract Adoption

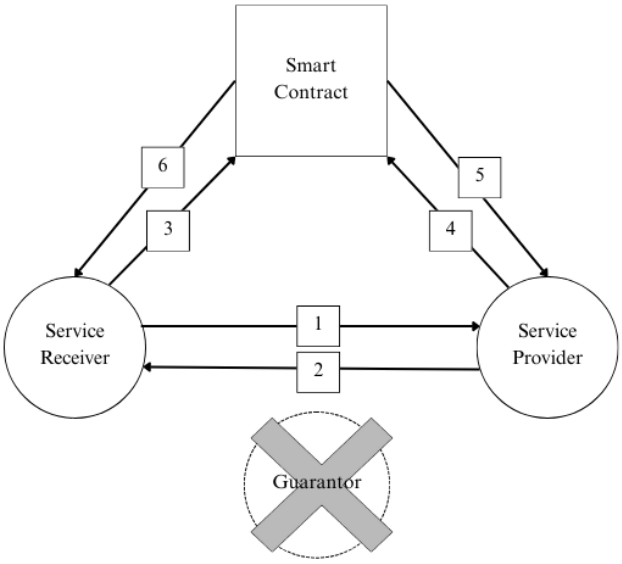
On 23 January 2025, U.S. President Donald Trump issued an executive order establishing a cryptocurrency working group, tasked with drafting the digital asset regulations (The White House, 2025). A month later, Trump posted on X that this initiative would include a digital currency stockpile, namely Bitcoin, Ethereum, XRP, Solana, and Cardano (Hunnicutt, 2025). Following the announcement, cryptocurrency value surged, with some reports noting a 10% market increase (Dee et al., 2025). These developments underscore the increasing economic significance of cryptocurrencies, despite persistent public scepticism about their safety and reliability (Faverio et al., 2024).

While buzzwords like cryptocurrency or Bitcoin dominate headlines, it is the underlying technology that deserves our attention. Behind every cryptocurrency transaction is a smart contract (De Caria, 2018, pp. 740-741), a self-verifying, self-executing, and tamper-resistant code-based program. Smart contracts take transactions as input, execute the corresponding code, and trigger the output events (Mohanta et al., 2018, p. 1).

Figure 1 illustrates a simplified smart contract process involving a service provider and service receiver (Delta Capita, n. d.). The flow begins with the service receiver sending a proposal (1), which is agreed upon (2) and implemented via a smart contract (3). The service provider completes the agreed-upon services (4), and the smart contract handles the transfer of funds (5). Finally, the smart contract is closed, and the remaining funds are returned (6). The guarantor is excluded, highlighting how smart contracts can eliminate the need for intermediaries.

Figure 1

Example smart contract use in service provision



Disintermediation is just one of many advantages[1]. First, smart contracts provide an alternative, trustless system for monetary transactions, traditionally based on trust (Nwachukwu, 2024). Instead of relying on fallible intermediaries, such as banks, in a trustless system, individuals hold and send their assets themselves. Disintermediation thus avoids the single-point-of-failure problem[2].

Second, when blockchain-based, smart contracts minimise the potential for manipulation of contractual clauses due to their high transparency (Icoadmin, 2023). Blockchain

[1] Although smart contracts are still predominantly used in the financial sector, their presence is expanding into various sectors, including supply chains, transportation, and construction (Hedera, n. d.). In supply chains, blockchain allows to track the process from raw materials and shipping all the way to the consumer. This information is tamper-proof and accessible to everyone, including consumers, within the network (Mohanta et al., 2018, p. 2).

[2] A single point of failure is defined as the part of a complex system whose failure would interrupt the entire system (da Silva & Moro, 2021, p. 3). In the case of banks, once a bank were to fail, no transactions could be made, and the bank's clients would be unable to access their funds. The single point of failure was at the heart of, for example, the 2008-2009 financial crisis. It comes as no surprise that the Bitcoin cryptocurrency network was launched in 2009 (Pinkerton, 2025).

technology is a distributed ledger technology (a decentralised, distributed database) consisting of nodes (blocks), where each node has a copy of the entire chain (Mohanta, 2018, p. 2). To add an extra block of grouped transactions, all network nodes must reach an agreement. Therefore, having a smart contract provides a single authoritative source of truth (Susnjara & Smalley, 2025). Third, smart contracts do not require the involvement of third parties or humans in the execution. Automation offers benefits such as cost reduction and higher processing speed (Susnjara & Smalley, 2025).

Despite these benefits, smart contract adoption remains limited. In 2023, only 25% of large enterprises had implemented smart contracts (Gartner, 2023, as cited in Rivera, 2024). From an economic perspective, the current rate of adoption suggests a market failure, as the potential social benefits likely outweigh the implementation costs. For instance, a study by Accenture and McLagan (2017) found that the ten largest global investment banks could reduce their operational costs by up to 30% through smart contracts by 2025. As such savings have not been realized, there may be structural barriers to smart contract adoption (Manohar, 2023).

An obstacle to enterprise adoption is low adoption by end-users. For example, Tony's Chocolonely, a Dutch chocolate producer, tested smart contracts in its supply chain (Tony Chocolonely, 2018). However, it abandoned the initiative due to challenges faced by non-technical users when adopting the technology (Davis, 2019). Therefore, for widespread impact, adoption must extend beyond early adopters to mainstream users (Levi & Lipton, 2018).

The limited adoption of smart contracts can be largely attributed to the absence of supporting infrastructure, particularly the lack of clear legal frameworks that govern their use and confer legal recognition (Cappiello, 2020, p. 14). While the term "smart contract" implies a functional similarity to traditional legal contracts, the legal framework governing smart contracts remains fragmented, leaving their legal recognition uncertain (Kasatkina, 2021, p. 202). Some protocols[3] support on-chain governance, where decisions are made through automated, code-based mechanisms and occur on the blockchain (Cappiello, 2020, p. 26). However, off-chain governance executed through existing legal systems, remains limited. No comprehensive blockchain or smart contract legislative framework exists (De Caria, 2018, p. 737). The legal ambiguity raises issues of enforceability, jurisdiction, and transparency (Maugeri, 2022, pp. 902-904). Some argue that regulation should target use cases rather than the general blockchain technology (De Caria, 2018, p. 738). Use-case regulation is also advisable from an innovation standpoint as it fosters continued technological advancement.

The presence and structure of legislation affect consumer perceptions. Arli et al. (2021, p. 83) found that users are more likely to trust cryptocurrencies if they are government-regulated. Therefore, regulating a crucial component such as smart contracts is expected to have an impact. Currently, the most notable legislative examples are the Arizona Smart Contract Bill (*Arizona Revised Statutes* § 44-7061, 2017)[4], Illinois Blockchain Technology Act (2020) or the UK Law Commission advice on 25 November 2021 (Kasatkina, 2021, pp. 208-209). Nevertheless, these laws vary in clarity and understandability, which may translate into distinct levels of consumer adoption and trust (Hughes, 2017, p. 28).

Given the economically inefficient adoption levels, this study investigates whether regulation can address the market failure. Because enterprise adoption depends on user uptake, this research poses the central research question: How does smart contract legislation in the U.S. states affect user Intention to adopt smart contracts?

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[3] for example, Ethereum
[4] This Bill was passed and became Article 5 of the Arizona Electronic Transactions Act.

U.S. states offer a suitable testing ground. North America leads in global smart contract usage (Zoting, 2025), and several U.S. states have implemented pioneering legislation, with Arizona and Illinois being most developed. Regardless of presence or absence of smart contract legislation, all states operate under a shared federal framework.

The first subquestion investigates: How does smart contract legislation affect user Intention to adopt smart contracts in Arizona, Illinois, Nevada, and Minnesota? The selected states serve as a proxy for all U.S. states, as states both with and without legislation are included.

The second subquestion explores a specific smart contract legislation: To what extent does current smart contract legislation in the U.S. state of Illinois classify smart contracts as legal contracts? Focusing on a specific Illinois law, the research can draw insights about the legislative advantages and shortcomings.

Research aims and structure

This research sets to study the factors affecting user smart contract adoption. Namely, it examines the legal enforceability of smart contracts and their integration into traditional legal systems. It contributes to both the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003, pp. 446-455) and the broader debate on whether regulation facilitates user adoption of technology. The findings will assist lawmakers in designing legislative reforms which promote use of smart contracts and novel technologies.

The paper begins by introducing the interdisciplinary methodology. It then outlines the theoretical foundations of smart contracts, and technology adoption theories. The literature review provides an overview of the current state of the field, highlighting existing research gaps. The analysis first tackles empirical findings before advancing to the Illinois case study.

The central research question is answered in the discussion. The paper concludes with a summary of key findings, limitations and suggestions for future research.

Methodology

To achieve its aims, the research adopts an interdisciplinary methodology, integrating doctrinal legal analysis and empirical quantitative methods. To answer the first subquestion, a quantitative survey experiment was conducted to empirically assess the impact of smart contract legislation on consumer Intention to adopt the technology. Literature recognized the Illinois Blockchain Technology Act (IBTA) (2020) and the Article 5 of Arizona Electronic Transactions Act (AETA, 2017) as the most developed smart contract legislations (Jaspere, 2023; Kasatkina, 2021, 208-209). Therefore, four U.S. states were included in the study: Arizona and Illinois represent the treatment group, while Nevada and Minnesota serve as control states with limited or no such legislation (Jaspere, 2023). State selection was guided by the State Similarity Index (Jones, 2024), ensuring demographic and socio-economic comparability. Minnesota matched with Illinois, and Nevada with Arizona (Table 1).

Participants ($n = 100$, 25 per state) were recruited via the Prolific platform, where they received a monetary incentive. Those in the treatment group (T_1) were shown a summary of their state's smart contract legislation, while the control group (T_0) received a neutral description of smart contracts modelled after their matched state's legislation[5]. A manipulation check ensured treatment fidelity. Participants then completed a UTAUT-based questionnaire (Venkatesh et al., 2003, p. 460) measuring Intention to adopt smart contracts on continuous scale[6] together with four mediators. Demographic variables and prior experience

[5] Stimulus materials given to control group participants can be found in Appendix A.
[6] The Intention to adopt is measured in months until smart contract adoption. Therefore, the higher the value, the more delayed user engagement with smart contracts.

with smart contracts were recorded (see Table 2). Data was analysed in IBM SPSS using Pearson's correlation, regression, two-sample t-tests, and one-way ANOVA.

Table 1

State treatment assignment

U.S. state	Group
Arizona	Treatment (T_{1a})
Illinois	Treatment (T_{1b})
Minnesota	Control (T_{0b})
Nevada	Control (T_{0a})

Table 2

Overview of variables

	Variable
Independent Variable (IV)	Comprehensive legislation (Yes/No)
Dependent Variable (DV)	Intention to adopt smart contracts
Moderating Variable (MoV)	Experience with smart contracts
Mediating Variables (MeV)	Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions

The second subquestion was examined using the doctrinal method of legal research (Smits, 2017, pp. 5-6). This method seeks to systematically examine the principles, rules, and concepts underpinning a particular legal framework through the analysis of legislation, case law, and authoritative secondary legal sources. Commonly referred to as "black-letter law," it focuses on the relevant legal sources from an internal perspective, emphasising the values and logic inherent to the legal system itself (Hutchinson & Duncan, 2012, pp. 114-116). In this study, it was applied to analyse the Illinois Blockchain Technology Act (IBTA) (2020).

Interdisciplinarity

This study is inherently interdisciplinary. In exploring the definition of smart contracts, the research synthesised perspectives from both legal scholarship and computer science, reflecting the hybrid nature of the subject matter (Kasatkina, 2021, p. 204). The Unified Theory of Acceptance and Use of Technology (UTAUT), which guides the empirical component, incorporates economic, behavioural, and regulatory dimensions (Venkatesh et al., 2023, pp. 446-455). The literature review systematically combined contributions from both legal and economic domains, with findings interpreted through an integrated lens. In the main body, while the first subquestion's methodology was rooted in empirical economics, the findings formed a starting point for legal analysis. Accordingly, the discussion section serves as a convergence point, bringing together legal analysis and economic reasoning to offer a holistic understanding of smart contract adoption.

Theoretical framework

Smart contract

To fully understand the potential and limitations of smart contracts, their definition must first be established. As De Caria (2018, p. 732) notes, deriving appropriate legal obligations is only possible once the term is conceptualised. However, no authoritative definition exists. For example, while some sources indicate that only Ethereum operates on a smart contract basis (da Silva & Moro, 2021, p. 3), others stipulate that Bitcoin and Ethereum are simply different forms of smart contract (Fox, 2024; Wang et al., 2019, p. 11). Despite the lack of consensus, the literature broadly distinguished between two interpretations: a technical definition and a legal one (Kasatkina, 2021, p. 204).

From a technical perspective, smart contracts are not traditional legal contracts but rather self-executing programs that may or may not operate on blockchain networks (Levi & Lipton, 2018). They can function as complements (not substitutes) to traditional legal agreements by translating contractual terms into code that ensures automatic performance (De Caria, 2018, pp. 735-736). For legal validity and court enforcement, a corresponding traditional legal contract must exist. Mohanta et al. (2018, p. 1) define smart contracts as self-verifying, self-executing, and tamper-resistant programs which operate on blockchain.

This technical perspective is echoed by Nick Szabo, who originally conceptualised smart contracts in the 1990s, describing them as "a computer program that fulfils the provision of a contract" (Szabo, 1994, as cited in Kasatkina, 2021, p. 203).

Szabo's definition predates blockchain[7], suggesting that the core idea – automated performance – can exist independently of blockchain technology. He illustrates this with the example of a vending machine, which performs contractual terms automatically without intermediaries. This conception – smart contracts as event-driven code – is, for example, codified in Article 5 of the Arizona Electronic Transactions Act (AETA, 2017).

[7] The White Paper proposing blockchain and Bitcoin was only published by the mysterious Satoshi Nakamoto in 2008 (Gisonna & Kelly, 2025).

Conversely, the legal view regards smart contracts as alternatives to traditional legal contracts. In this view, legal actors can choose between paper-based contracts and smart contract-based contracts, relying on equal enforceability (Wang et al., 2019, p. 11). Here, the term “contract” is deliberately used in definitions to imply legal validity. Thus, creating both a traditional and smart contract akin to translating a contract into two languages with equal validity and enforceability (Kasatkina, 2021, p. 204). The Illinois Blockchain Technology Act (2020) reflects this position.

Despite these differing views, both perspectives agree that smart contracts consist of instructions written in code, which machines automatically execute (De Caria, 2018, p. 737). Once deployed, they act autonomously, executing predefined conditions without further human involvement (Mohanta et al., 2018, p. 1). Their inability to be modified after deployment (immutability) is a fundamental feature.

Due to their widespread use in cryptocurrency ecosystems, where blockchain is integral, the terms “smart contract” and “blockchain” are often used interchangeably in public discourse and academic literature (Levi & Lipton, 2018; Mohanta et al., 2018, pp. 1-2). Both the Arizona Smart Contract Bill (Arizona Revised Statutes § 44-7003, 2017) and the Illinois Blockchain Technology Act (2020) reinforce this association. Therefore, while this paper acknowledges that smart contracts and blockchain are conceptually distinct, they are often discussed jointly and occasionally used interchangeably. To clarify their similarities and differences, the following section provides a blockchain definition.

Blockchain

The European Central Bank defines blockchain as "a ledger[8] of all transactions, grouped in blocks, formulated with a (decentralised) virtual currency scheme" (European Central Bank, 2015, p. 33). It is a technology that enables maintaining and validating multiple copies of the same distributed database across the IT network, utilising computing and cryptography (De Caria, 2020, pp. 732-733). The blockchain database groups several records into a block, which is "chained" to the previous block using a cryptographic signature. The uniqueness is that anyone can inspect the database, while no single user can modify it. Unless there is a consensus throughout the entire network, new information cannot be attached ("chained"), and old information cannot be altered (Olivieri & Pasetto, 2023, pp. 1-2). This is because each user in the network ("node") has his copy of the entire database, and thus, to introduce changes, the record in each user's computer must be changed. Smart contracts may or may not operate using blockchain.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) provides a comprehensive framework for understanding the factors that influence an individual's decision to adopt and use new technologies. Developed by Venkatesh et al. (2003, pp. 446-447), the model synthesises elements from eight existing models on technology adoption and user behaviour to offer a unified explanation of user intentions and subsequent usage behaviour. UTAUT identifies four core constructs that shape users' behavioural intentions and usage: Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions.

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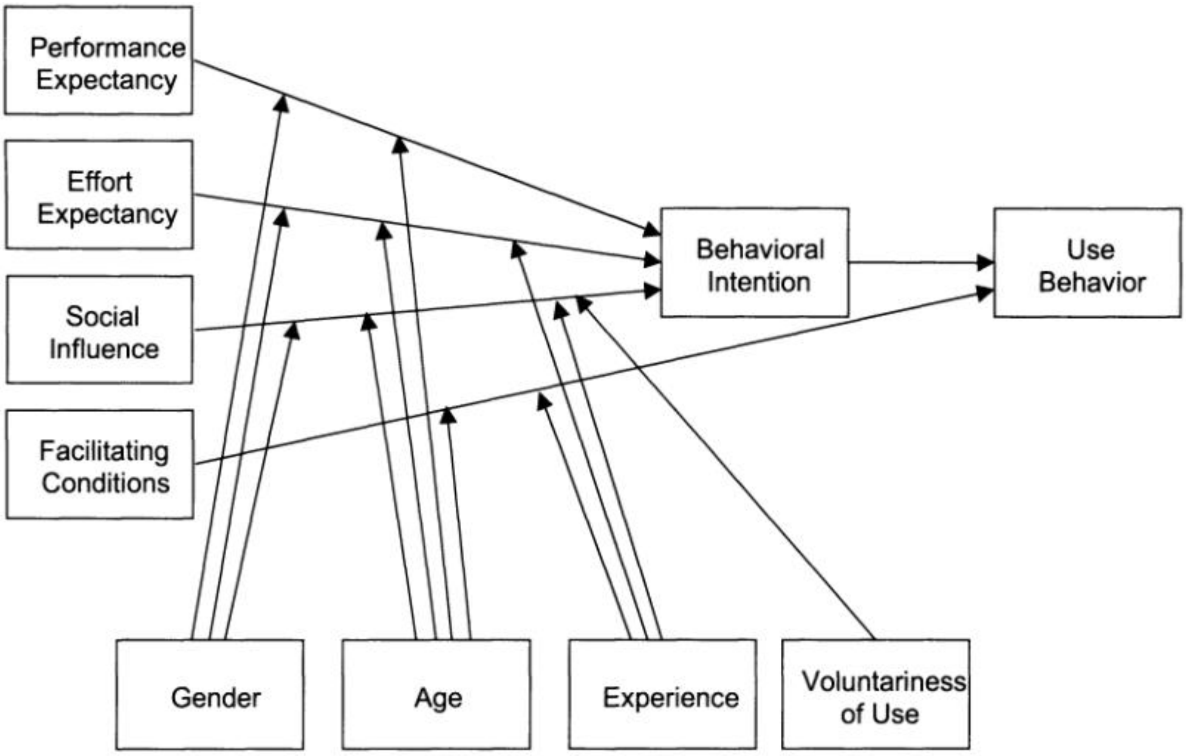
[8] book of records

Performance Expectancy[9] refers to the degree to which an individual believes that using a particular technology will provide benefits in terms of task performance or efficiency. In other words, users are more likely to adopt a technology if they perceive it as useful. Effort Expectancy[10] relates to the perceived ease of use. Technologies that are seen as complex or challenging to navigate tend to have lower adoption rates. Social Influence[11] captures the extent to which individuals perceive that important others, such as peers, supervisors, or societal norms, expect them to use the technology. Finally, Facilitating Conditions[12] represent the availability of resources and support that enable users to engage with the technology effectively. Facilitating Conditions may include technical help, infrastructure, law enforcement or training. Facilitating Conditions emphasise external factors that support the successful implementation and continued use of a program. The effect of the four UTAUT factors is moderated by gender, age, prior experience with the given technology, and the voluntariness of using the new system. Figure 2 illustrates a schematic representation of the UTAUT (Venkatesh et al., 2003, p. 447).

[9] An example survey item would be: "I would find the system useful in my job."
[10] An example survey item would be: "My interaction with the system would be clear and understandable."
[11] An example survey item would be: "People who influence my behaviour think that I should use the system."
[12] An example survey item would be: "I have the resources necessary to use the system."

Figure 2

Research model of UTAUT framework obtained from Venkatesh et al. (2003, p. 447)



In their paper, Venkatesh et al. (2003, p. 467) empirically validated the theory. They found that it performed better than eight original theories, such as the Theory of Planned Behaviour (Ajzen, 1991, p. 182) and the Diffusion of Innovations Theory (Rogers et al., 2014, pp. 1-3). The theory has since been tested numerous times using various technologies, such as Tax Software Systems, Biometric Authentication Systems, and E-Health services (Williams et al., 2015, p. 444). The four factors emerge consistently across technologies together with the four mediators. The limitation, however, is that the samples are overwhelmingly taken from either the U.S. or China, and thus, the universality of the findings across cultures remains unclear.

Literature review

Legislative approaches to smart contracts

The legal status of smart contracts is complex and challenging to grasp, as evidenced by the growing body of literature on the topic. Literature can be separated into three permeable groups. The first group of scholars (De Caria, 2018, p. 750; Kasatkina, 2021, p. 215) argues that existing legal frameworks are sufficiently agile to accommodate the challenges that smart contracts present. The second group (Casolari et al., 2023, p. 2; Kasatkina, 2021, p. 214) holds an opposing view, arguing that legislation targeting smart contracts specifically is necessary. The third scholarly group (Cappiello, 2020, p. 27); Olivieri & Pasetto, 2023, p. 4) positions itself between the two extremes.

Authors argued that current contract law can accommodate smart contracts (De Caria, 2018, pp. 746-749; Kasatkina, 2021, p. 215). While challenges exist in determining the legal status of such technologies, scholars insist that most legal questions can and should be addressed under current contract law provisions. This is partly because, even in the absence of specific regulation, smart contracts remain subject to general legal frameworks, such as those governing software.

Disparities exist even within this academic strand. De Caria (2018, p. 737) specifies that even if legislation were to be enacted, it should be at the international level due to blockchain’s borderless nature rather than at the level of individual countries. However, Kasatkina (2021, pp. 206-208) argues that common law may be more adaptable to smart contracts than civil law. Thus, since legal system differences occur at the country level, national legislatures should decide to legislate based on the nature of their system. While in common law systems, such as the U.S., freedom of contract symbolises an economic freedom to voluntarily engage in transactions without state interference, civil law views it more narrowly (p. 207). Common law also places no requirement on contracts to be negotiated in "good faith", as well as no duty to disclose (pp. 207-208). As the U.S. focuses on efficiency and minimal state intervention, common law may be more prepared to allow individuals to form contracts in any way, including solely through smart contracts (Maugeri, 2022, pp. 907-908); thus, legislation governing smart contracts may not be necessary.

On the other hand, scholars (Casolari et al., 2023, pp. 2-5; Kasatkina, 2021, pp. 206-208) have argued that specific legal frameworks, in addition to existing contract rules, should govern smart contracts. This is primarily true in civil law jurisdictions. For example, freedom of contract has a more consumer protection dimension, and hence, statutory regulation may interfere with commercial contracts to achieve substantive protection (Kasatkina, 2021, p. 207). Therefore, inserting mandatory user protection terms where meaningful consent cannot be obtained is permissible. This EU consumer-protective legal ethos, rooted in ordoliberalism and fairness, thus necessitates legislative efforts covering smart contracts (Maugeri, 2022, pp. 907-908). Similarly, the concept of good faith suggests that civil law places more emphasis on each party's duty to duly disclose relevant information during the pre-contractual stage (Kasatkina, 2021, p. 207).

A shortcoming of both research strands is the overgeneralisation of common and civil law and, thus, an ignorance of the differences that exist within them. Therefore, this research includes two common law jurisdictions: Arizona and Illinois. Relatedly, literature discusses findings without empirical references. Manifested effects are relevant since legislation shall not only be present but also well-aligned with the goals it aims to promote (Casolari et al., 2023, p. 2; Olivieri & Pasetto, 2023, p. 1).

The third intermediate research strand (Cappiello, 2020, p. 27; Olivieri & Pasetto, 2023, p. 4) is more nuanced by emphasising the need for hybrid approaches to smart contract governance. While current contractual frameworks may not need to be revolutionised considering smart contracts, adjustments are inevitable. Neither off-chain nor on-chain governance can exist in isolation, meaning that automation shall be combined with institutional oversight (Cappiello, 2020, p. 37). The approach balances efficiency and accountability by benefiting from both centralised and decentralised governance.

However, this hybrid approach is limited by the shortcomings of its components. For example, blockchain immutability may also mean that errors, bugs, and vulnerabilities become immutable, which could have consequences for consumer protection (Olivieri & Pasetto, 2023, p. 3). Thus, effective governance should integrate both legal enforcement mechanisms and technical safeguards, such as static analysis[13] before deployment.

A legal concern arising from the hybrid approach is the extent to which blockchain technologies, in general, may transform legal dispute resolution (Ortolani, 2019, p. 19). Due to its disruptive potential, systems must be in place to ensure that parties are unable to bypass the recognition and enforcement procedures, thereby marginalising the courts[14].

UTAUT framework in blockchain technology

However, understanding the broader impact of smart contracts and blockchain technologies, beyond legal and technical challenges, also requires examining the behavioural dimension of its use. While literature studying smart contracts directly is lacking, authors (Chen et al., 2022, p. 8) have validated that psychological states are a prerequisite for engaging with cryptocurrencies, which involve smart contracts. Several models for

[13] Static analysis (static code analysis) is a method of debugging a computer programme through code examination without actual execution of the program (Gillis, 2020).
[14] See, for example, the Tezos project case (*In re Tezos Securities Litigation*, 2018).

technology adoption exist, yet as already discussed, the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003, pp. 446-455) is most appropriate.

The UTAUT model has been repeatedly validated (Oshlyansky et al., 2007, p. 3) and is relevant in many smart contract-related contexts, especially in cryptocurrency (Chen et al., 2022, p. 9; Ebizie et al., 2022, pp. 31-32), metaverse (Lee & Kim, 2022, p. 629), or adoption of blockchain more broadly (Pieters et al., 2021, p. 2-3).

The four UTAUT factors emerge with different significance across cryptocurrency adoption studies. In Malaysia, the adoption of cryptocurrency in digital business transactions was primarily determined by UTAUT Social Influence (Chen et al., 2022, p. 8). Higher customer satisfaction was generated by the availability of cryptocurrency use (UTAUT Facilitating Conditions). Among Nigerian university fintech entrepreneurs, Effort Expectancy and Performance Expectancy had a significant effect on cryptocurrency adoption (Ebizie et al., 2022, p. 32). Due to the use of very niche and already knowledgeable samples, the findings from cryptocurrency adoption tend not to apply to the general population of potential users.

In the context of metaverse[15], the UTAUT model showed that Performance Expectancy, Effort Expectancy and Social Influence significantly increase satisfaction, usage intention and purchase intention (Lee & Kim, 2022, p. 629). The participants were asked to complete a questionnaire validating the UTAUT framework after engaging with a metaverse platform in a laboratory. Social Influence was the strongest predictor. As the authors study the metaverse, a space inherently created for human engagement, this finding is intuitive.

[15] The metaverse is a permanent, immersive mixed-reality world where people and objects can interact synchronously and live beyond the limitations of time and space using immersion-supporting devices (Lee & Kim, 2022, p. 614). The metaverse enables the seamless integration of the real world with a virtual one. Real-world or cryptocurrency is frequently used to conduct transactions in the metaverse. Smart contracts govern these transactions.

Facilitating Conditions had no significant effect on user satisfaction, which is notable for this research given that legislation falls within this category. A limitation of the metaverse research is the cross-sectional design, as participants may not have had sufficient time to familiarise themselves with the platform and shape clear preferences in the moment. Additionally, measuring adoption using intent as a proxy for actual behaviour may yield inaccurate results. Present research also faces the proxy challenge, as most participants are expected to experience their first encounter with smart contracts.

Lastly, research indicates that blockchain adoption by non-experts (conceptualised as users and consumers) is most strongly influenced by hedonic motivation, followed by UTAUT Performance Expectancy and Social Influence (Pieters et al., 2021, pp. 14-15). Effort Expectancy does not appear to be significant, indicating that the technical difficulty of blockchain technology is not a predictor of user adoption. The research relies on a revised UTAUT2 model of acceptance and use, which extends the original framework by adding an intrinsic motivation dimension to the extrinsic motivation, such as Performance Expectancy. Like many studies on emerging technologies, the existing literature is constrained by sample bias, as it tends to overrepresent university-educated individuals. For instance, Pieters et al. (2021, p. 9) report that 92% of their sample holds at least a bachelor's degree.

Research gap

Despite the growing body of scholarship on smart contracts, several research gaps persist. First, while some authors (De Caria, 2018, p. 750) argue that current contract rules are sufficient, others (Cappiello, 2020, p. 37) suggest hybrid approaches that combine automation and institutional oversight. Thus, the legal accommodation of smart contracts remains unclear. Second, although comparative analyses (Kasatkina, 2021, pp. 206-208) distinguish between civil and common law approaches, the differences are discussed in the abstract without providing concrete legislative examples. Third, the literature shows minimal engagement with how specific smart contract legislations manifest in the real world, namely in consumer adoption of the technology. This is particularly relevant due to issues such as ambiguity in legislative drafting, compliance challenges and lawmakers' technological illiteracy. Fourth, there is a lack of solid understanding regarding which factor from the UTAUT model significantly influences smart contract adoption (Ebizie et al., 2022, pp. 33-34; Kim & Lee, 2022, pp. 629-631; Pieters et al., 2021, pp. 13-14). Fifth, as previous studies examining smart contracts and blockchain adoption under UTAUT rely on niche, academically skewed samples, their generalizability is limited.

This study aims to address the identified research gaps. First, it examines the legal accommodation of smart contracts using the Illinois Blockchain Technology Act (2020) as a concrete case, allowing for a more grounded assessment of their equivalence to traditional contracts. Second, the research examines whether smart contracts satisfy common law contracts requirements, providing a basis for future comparative studies with civil law frameworks, such as the EU Data Act (2023). Third, the manifested effects of existing smart contract legislations are studied, contributing to a more nuanced understanding of how differing legal environments influence technology adoption. Finally, the empirical component broadens the scope of existing UTAUT-based studies by surveying a demographically diverse, non-exclusively academic sample, offering new insights into public perceptions of legislation and its effect on consumer willingness to adopt smart contracts.

Hypotheses

Based on the literature review, hypotheses for quantitative analysis emerge. As legislation clarifies legal status of smart contracts, the more legislation, the more consumers should be willing to adopt smart contracts (Ebizie et al., 2022, p. 29).

H1: The presence of smart contract legislation increases consumer Intention to adopt smart contracts.

Following the UTAUT framework (Venkatesh et al., 2003, p. 447), the literature indicates that the adoption of blockchain technologies is mediated to varying degrees by Facilitating Conditions, Performance Expectancy, Effort Expectancy and Social Influence (Pieters et al., 2021, p. 9; Lee & Kim, 2022, pp. 629-631). Thus, these factors are hypothesized to mediate the relationship between legislation and smart contract adoption.

H2a: Performance Expectancy is a significant predictors of user Intention to adopt smart contracts.

H2b: Effort Expectancy is a significant predictors of user Intention to adopt smart contracts.

H2c: Social Influence is a significant predictors of user Intention to adopt smart contracts.

H2d: Facilitating Conditions are significant predictors of user Intention to adopt smart contracts.

As established by Venkatesh et al. (2003, pp. 454-455) and supported by numerous subsequent replications (Oshlyansky et al., 2007, p. 3; Williams et al., 2015, pp. 445-449) of the UTAUT framework, prior experience with a given technology constitutes a key moderating variable that significantly influences the strength and direction of the relationship between the four core constructs and an individual's Intention to adopt the technology. Accordingly, similar moderating effects are anticipated in the present study.

H3a: Prior experience with smart contracts moderates the relationship between Performance Expectancy and Intention to adopt smart contracts.

H3b: Prior experience with smart contracts moderates the relationship between Effort Expectancy and Intention to adopt smart contracts.

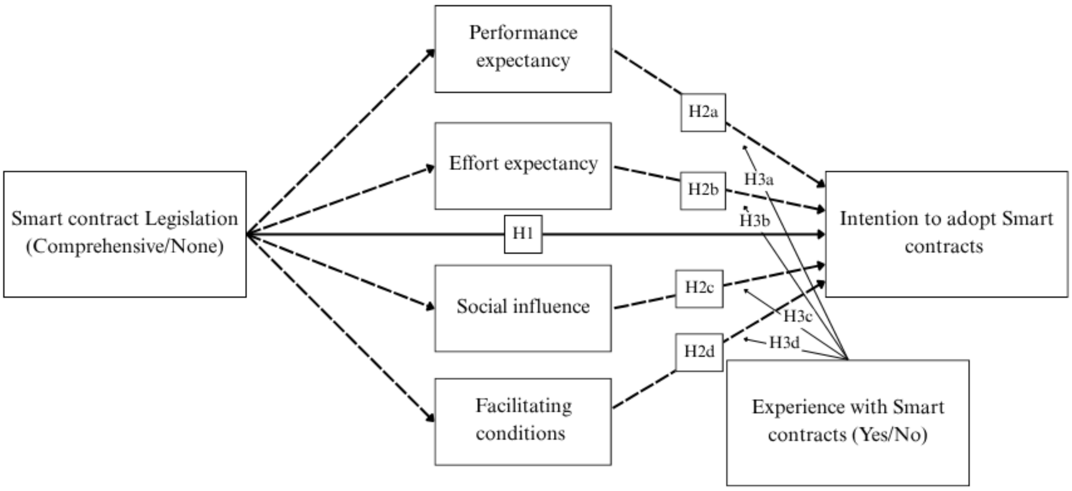
H3c: Prior experience with smart contracts moderates the relationship between Social Influence and Intention to adopt smart contracts.

H3d: Prior experience with smart contracts moderates the relationship between Facilitating Conditions and Intention to adopt smart contracts.

Figure 3 presents the conceptual model underpinning the quantitative component of this study. The model is grounded in the UTAUT framework developed by Venkatesh et al. (2003, pp. 446-455). The specific research context is reflected in the inclusion of smart contract legislation as an independent variable. The four core constructs of the UTAUT model serve as mediating variables that transmit the effect of the independent variable on the dependent outcome, Intention to adopt smart contracts. Prior experience with the technology is hypothesised to moderate the strength and direction of these mediating relationships.

Figure 3

Conceptual model



Empirical Analysis

Data Cleaning and Preparation

The data collection yielded 98 responses instead of the expected 100 due to a miscommunication with the data collection platform. Four participants were removed for failing the attention check, and two participants were excluded for providing implausibly extreme responses[16]. One participant fell into both groups. No missing values or implausible demographic data were present. The final dataset contained 93 valid responses.

Sample Characteristics

The final sample was relatively balanced by gender, with 48 male participants (51.6%) and 45 female participants (48.4%). The average participant age was 41.35 years

[16] e.g., an Intention to adopt smart contracts in 10,000 months

(SD = 13.56). Prior to the survey, 63.4% of respondents had no experience with smart contracts. Three states (Arizona, Minnesota, and Nevada) had 23 respondents, while Illinois had 24.

Mean Analysis

Each UTAUT factor was aggregated into a composite variable by averaging the relevant item responses[17]. Similarly, the dependent variable, Intention to adopt smart contracts, was calculated as the average of three items designed to assess behavioural intention. The participants were, for example, asked: "I intend to use smart contracts in the next [participant answer] months". Therefore, higher scores indicate a lower Intention to adopt smart contracts. Descriptive statistics revealed that the overall mean Intention score was M = 8.66 (SD = 9.60) on a continuous scale. Composite scores for the factor variables were as follows: Performance Expectancy M = 3.58, SD = 1.04, Effort Expectancy M = 3.74, SD = 0.88, Social Influence M = 3.22, SD = 1.14, and Facilitating Conditions M = 3.37, SD = 0.79.

Correlations

Table 3 (Appendix B) presents the means, standard deviations, and Pearson correlation coefficients among the variables. A weak negative correlation exists between Age and Performance Expectancy ($r = -.211$; $p < 0.05$), Social Influence ($r = -.233$, $p < 0.05$), and Facilitating Conditions ($r = -.295$, $p < 0.01$). The correlation between SC experience and Performance Expectancy ($r = -.312$, $p < 0.01$), Effort Expectancy ($r = -.400$, $p < 0.01$), Social Influence ($r = -.333$, $p < 0.01$), Facilitating Conditions ($r = -.295$, $p < 0.01$) is moderate and

[17] The responses were measured on a five-point Likert scale, where 1 stands for "completely disagree" and 5 indicates "completely agree". Therefore, the higher the score, the greater the presence of the mediator, for example Performance Expectancy (expect high level of performance).

negative. Treatment has a weak negative correlation with SC experience ($r = -.215$, $p < 0.05$) and a weak positive correlation with Facilitating Conditions ($r = .222$, $p < 0.05$).

The correlations among UTAUT elements are strong. Performance Expectancy positively correlates with Facilitating Conditions ($r = .633$, $p < 0.01$), Social Influence ($r = .851$, $p < 0.01$) and Effort Expectancy ($r = .663$, $p < 0.01$). Facilitating Conditions are positively correlated with Effort Expectancy ($r = .651$, $p < 0.01$) and Social Influence ($r = .749$, $p < 0.01$). Finally, Effort Expectancy is strongly positively associated with Social Influence ($r = .659$, $p < 0.01$). Since the correlation between Performance Expectancy and Social influence is slightly larger than 0.85, there is a possible issue of multicollinearity. However, as the extent of this excess is marginal and the threshold is grounded in convention rather than a strict theoretical or statistical imperative, the issue does not necessitate correction. Notably, Table 3 does not present any significant correlations related to Intention to adopt smart contracts[18].

Factor Analysis

Each of the four core constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT)[19] was measured using four questions developed by Venkatesh et al. (2003, p. 460) scored on a five-point Likert scale. In Table 4 (Appendix C), an exploratory factor analysis using principal component extraction and Varimax rotation validated the structure of the items. Contrary to the original UTAUT structure, items from Performance Expectancy and Social Influence loaded onto a single factor. This overlap suggests that participants may conceptually associate ease of task accomplishment with external encouragement, especially in unfamiliar domains such as smart contracts. These findings are consistent with the collinearity risk discovered in Table 3.

[18] “Intention composite”
[19] Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions

Effort Expectancy items loaded cleanly on a separate factor. All but one Facilitating Conditions item did the same, with the system compatibility item forming its own factor. Despite partial divergence from the expected UTAUT model, the original Venkatesh et al.'s (2003, p. 447) four-factor structure was retained for analysis.

Mediation and Moderation analysis

A mediation analysis was conducted to examine the effects of the four UTAUT constructs – Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) – as mediators, and smart contract (SC) experience as a moderator, on participants' Intention to adopt smart contracts. The overall model predicting adoption intention was not statistically significant, $R^2 = .184$, $F(11, 81) = 1.665$, $p = .097$, indicating that the predictors collectively did not explain a significant proportion of the variance in intention. This is supported by correlations in Table 3.

However, two individual mediators showed statistically significant effects. Performance Expectancy had a significant positive effect on adoption intention ($b = 5.01$, $SE = 1.92$, $t = 2.60$, $p = .009$), while Social Influence had a significant negative effect ($b = -3.94$, $SE = 1.91$, $t = -2.06$, $p = .042$). Since higher values of the intention variable reflect adoption further in the future, these results suggest that greater perceived usefulness of smart contracts (higher PE) is associated with delayed adoption, whereas stronger social pressure (higher SI) is associated with more immediate adoption.

Subsequent models explored the moderation of these effects by SC experience at the state level. The model with Performance Expectancy as the outcome was significant, $R^2 = .258$, $F(7, 85) = 4.22$, $p < .01$. A significant interaction effect was found between state and experience: at equal levels of experience, the effect of Performance Expectancy on Intention to adopt was significantly different between Arizona and Illinois (*b* = -1.29, *SE* = .57, *t* = -2.28, $p < .05$). This indicates that the way Performance Expectancy influences intention varies depending on the legislative context, with Illinois participants showing a weaker link between perceived usefulness and adoption compared to Arizona.

The model with Social Influence as the outcome was likewise significant, $R^2 = .264$, $F(7, 85) = 4.35$, $p < .01$. A significant interaction effect between state and experience was observed for Illinois and Arizona (*b* = -1.34, *SE* = .62, *t* = -2.16, $p < .05$), suggesting that at comparable experience levels, social pressure leads to an earlier adoption in Illinois relative to Arizona.

Independent Samples t-tests

Independent samples t-tests were conducted to compare the Intention to adopt smart contracts between treated and control groups. First, the difference between Treated[20] and Control[21] groups was tested. The equal variance assumption was met (Levene's test $p > .05$). While, as expected, participants from Treated states (M = 8.31, SD = 9.24) indicated that they would adopt smart contracts sooner than their Control counterparts (M = 9.02, SD = 10.05), the difference in means was not statistically significant, $t(91) = -0.358$, $p = .721$.

Second, the Treated state of Arizona (M = 6.33, SD = 4.23) was compared to its matched Control Nevada (M = 8.75, SD = 11.76). Arizona had a stronger Intention to adopt than Nevada. Levene's test suggested unequal variances ($p < .05$). The difference in mean adoption intention between Arizona and Nevada was not statistically significant, $t(44) = -0.93$, $p = .361$.

[20] Arizona and Illinois combined
[21] Minnesota and Nevada combined

Lastly, a comparison of Illinois (M = 10.19, SD = 12.08) and Minnesota (M = 9.29, SD = 8.27) yields surprising results, as the average number of months during which the participant intends to use the legislation is higher in Illinois than in Minnesota. The finding suggests that legislation worsens adoption rates. The mean variances were assumed to be equal (Levene's test, $p = .212$). However, the difference between the actual means was again not statistically significant, $t(45) = 0.30$, $p = 0.767$.

One-Way ANOVA

The t-tests were complemented by a one-way ANOVA analysis, with the U.S. state serving as the independent variable. Again, the overall model was not statistically significant $F(3, 89) = 0.681$, $p = .566$. Post-hoc comparisons using Scheffe's tests confirmed the absence of significant pairwise differences.

Hypotheses

Table 5

Hypotheses conclusions

Hypothesis	Accepted/Rejected
H1: The presence of smart contract legislation increases consumer Intention to adopt smart contracts.	Rejected
H2a: Performance Expectancy is a significant predictor of user Intention to adopt smart contracts.	Accepted
H2b: Effort Expectancy is a significant predictor of user Intention to adopt smart contracts.	Rejected

Hypothesis	Accepted/Rejected
H2c: Social Influence is a significant predictor of user Intention to adopt smart contracts.	Accepted
H2d: Facilitating Conditions are significant predictors of user Intention to adopt smart contracts.	Rejected
H3a: Prior experience with smart contracts moderates the relationship between Performance Expectancy and Intention to adopt smart contracts.	Partially accepted
H3b: Prior experience with smart contracts moderates the relationship between Effort Expectancy and Intention to adopt smart contracts.	Rejected
H3c: Prior experience with smart contracts moderates the relationship between Social Influence and Intention to adopt smart contracts.	Partially accepted
H3d: Prior experience with smart contracts moderates the relationship between Facilitating Conditions and Intention to adopt smart contracts.	Rejected

Conclusion

The empirical analysis revealed that the presence of smart contract legislation does not exert a statistically significant influence on users' Intention to adopt smart contracts. However, two UTAUT predictors, Performance Expectancy and Social Influence, were found to significantly affect adoption intention. While the observed relationship between Social Influence and earlier adoption aligns with existing literature (Lee & Kim, 2022, p. 629), the finding that higher Performance Expectancy corresponds with delayed adoption is counterintuitive and merits further investigation. Moreover, at comparable levels of prior smart contract experience, significant differences emerged between Arizona and Illinois in how both Performance Expectancy and Social Influence shape adoption intentions. Given that both states have smart contract legislation, these discrepancies may be attributable to differences in legislative framing. Consequently, the following section analyses the Illinois Blockchain Technology Act to identify specific underlying legislative elements.

Doctrinal Analysis

Illinois Blockchain Technology Act

There is a consensus that the Illinois Blockchain Technology Act (2020), which came into force on 1 January 2020, codifies the validity of smart contracts and blockchain more broadly (Hagan, 2020, p. 8; Hunton Andrews Kurth LLP, 2020). The legislation sets out foundational definitions in Section 5, including “blockchain”, “electronic record”, and “smart contract”. Under the Act definition, a smart contract “means a contract stored as an electronic record which is verified by the use of a blockchain". The Act operationalises blockchain as "an electronic record created by the use of a decentralised method by multiple parties to verify and store a digital record of transactions which is secured by the use of a cryptographic hash of previous transaction information".

While offering statutory definitions is necessary, the complex and evolving concept of smart contracts cannot be effectively contained in a single-sentence definition. The definitional complexity was demonstrated in the Theoretical Framework section by highlighting the tensions between the two main definitions: technical and legal (Kasatkina, 2021, p. 204). Since the academic literature was not able to find an authoritative working definition of the smart contract concept, a single-sentence definition in the Illinois Act must inherently omit definitional nuances (Fox, 2024). Nonetheless, by characterising a smart contract explicitly as a "contract", the Act signals its potential to generate legally binding rights and obligations in line with the legal interpretation of smart contracts[22].

Legal effects and admissibility

Sections 5 (Definitions) and 10 (Permitted use of blockchain) jointly establish that a smart contract can function as a legal contract. Section 10(a) is the Act's most pivotal provision. It stipulates that a smart contract, record or signature may not be denied legal effects “solely because a blockchain was used to create, store, or verify the smart contract, record or signature”. This provision aims to reduce uncertainty caused by fragmented legislation and supports the recognition of blockchain-based agreements as enforceable legal contracts (Hagan, 2020, p. 8; BCAS, 2020).

The legislation follows to 10(b) to provide specifications of smart contract use in proceedings as evidence. The wording of Section 10(b) mirrors that of 10(a). The difference is that while part (a) focuses on enforceability broadly, part (b) emphasises evidence in proceedings specifically. The distinction exists since even non-enforceable (smart) contracts may still serve as evidence of an agreement; an unsigned contract may serve as evidence of intent (BCAS, 2020). Section 10 does not further specify individual elements of a common law contract and how they may be satisfied using a smart contract. However, to thoroughly ascertain whether smart contracts function as legal contracts in Illinois, governed by common law, it is indispensable and provided below.

[22] [1]The recent *SEC v. Ripple Labs* (2024) case illustrates the impact of definitional ambiguity. as the classification of blockchain-based tokens remained unresolved. At issue was whether blockchain-based tokens (NFTs) should be classified as securities or commodities, a distinction with compliance implications exceeding USD 260 billion for the DeFi sector (Katen, 2025). The settlement (negotiated by the parties instead of a court-issued verdict) left open questions about compliance obligations and highlighted how legal definitions can shape market viability (SEC, 2025). Drawing a parallel to the Illinois Act, defining smart contract as a contract or code shapes the development of the industry in the state.

In common law, a contract is considered a promise confirmed by a counter-provision (Beale et al., 2019, pp. 96-99). The contractual elements in common law are an offer, acceptance, consideration, and intention to create legal relations (Beale et al., 2019, pp. 88-90).

The common law offer requirement is satisfied in smart contracts through a webpage containing a proposal to conclude a contract, accompanied by a link to the program code (Kasatkina, 2021, p. 211). This proposal is signed using the offeror's private key. All the proposed terms are publicly posted on the blockchain ledger to elicit acceptance. Following an offer, the acceptance of a smart contract occurs through an electronic message signed with the acceptor’s private key (p. 211). Therefore, smart contracts meet both the offer and acceptance requirements. The only shortcoming in the pre-contractual stage relates to the technical impossibility to propose counteroffers (p. 211). Users may either accept a public offer using their private key or create a new public offer, which any party may accept. The issuance of offers is thus akin to take-it-or-leave-it contracts (pp. 210-212).

After the initial contractual stage, smart contracts can generally satisfy the doctrine of consideration, which requires a nominal exchange of value (Beale et al., 2019, p. 90). This value exchange is often met in smart contracts through the transfer of digital assets. Since the value exchanged need not to be proportionate, sufficient consideration is typically present. However, since not all smart contracts involve value transfers, legal recognition may still depend on specific context.

Smart contracts can also meet the last requirement of intention to create legal relations since consideration can be indicative of such an intention (Kasatkina, 2021, p. 213). The intention is inferred based on the actions taken, in this case, the acceptance of the posted offer using one's private key. Therefore, all essential contractual elements can, in principle, be fulfilled through the use of smart contracts (p. 213). This functional equivalence likely underpins the IBTA's classification of smart contracts as analogous to traditional contracts in Sections 5 and 10.

Having established their *prima facie* equivalence, the Illinois Blockchain Technology Act outlines specific provisions addressing unique smart contract features (Kasatkina, 2021, p. 214). Section 10(b) encourages the courts to examine the fulfilment of the contractual requirements on a case-by-case basis rather than rejecting them outright. Individual evaluation provides greater legal certainty for both contracting parties and legal professionals since, if smart contracts meet the traditional contractual conditions, they are enforceable (Bulacan, 2020). Sections 10(c) and (d) further strengthen this by recognising the validity of a blockchain submission where a written record and signature are mandated. Thus, smart contracts are set to fulfil the "best evidence rule", stating that the best available evidence must be used in litigation (BCAS, 2020).

Section 10(d) also provides that where the law requires a signature, a blockchain submission may suffice to demonstrate a person's intent to provide a signature. Arguably, the law aims to address situations where technical issues, such as bugs and cyberattacks, occur (Olivieri & Pasetto, 2023, p. 3). However, this intention may be technically difficult to prove, as unless a complete transaction occurs, it does not get registered in the network. Therefore, future jurisprudence shall clarify the strength of leverage provided by this provision.

Limitations on blockchain use

While the previous section outlines where smart contracts can seamlessly function like traditional contracts, the IBTA also highlights key limitations where this equivalence breaks down. According to Section 15, there are certain cases where blockchain may not be employed. This further differentiates smart contracts from their traditional counterparts.

First, IBTA Section 15(a) provides for consumer protection. It mandates that any blockchain-based agreement must allow all parties or other entitled persons to retain and reproduce the contract or other record accurately. In case of failure to meet this standard, the entire smart contract may be denied legal effect (Hunton Andrews Kurth LLP, 2020). This restriction ensures mandatory transparency, allowing the weaker party, typically the acceptor, always to be aware of the contractual terms. Additionally, the provision allows access for legal counsels as well as courts, auditing agencies and others.

Section 15(a) interacts with and is strengthened by Section 15(c), which prohibits inhibiting another's ability to retrieve information contained in a blockchain. Where such conduct is detected, the smart contract may only be enforceable by the inhibited party and never the inhibitor. The provision does not specify the degree of intention required or whether both fraud and mistake are included. Thus, only future jurisprudence will decide whether parties acting in good faith still qualify as inhibitors under 15(c). Both Sections 15(a) and (c) protect the weaker non-drafting party by ensuring one cannot be forced to uphold terms he was not able to replicate or did not intend to accept. This replicates the standards of traditional contracts, with an added emphasis on contract retention and reproduction, as this is an extra challenge stemming from the blockchain nature.

Second, under Section 15, certain contracts may never be concluded solely using blockchain, especially where other legislation mandates specific contract forms. Section 15(b) specifies that where a law other than the Act specifies transmission, communication, or formatting, these requirements of the other law are not met using blockchain technology. The provision does not prohibit the use of blockchain at large; it only specifies that it cannot independently meet the requirements. Blockchain must be complemented by other techniques as necessary in given circumstances. The need for both forms follows the technical definition of a smart contract as developed in the Theoretical Framework.

The Illinois law continues to outline use areas where the use of blockchain alone may never be sufficient to fulfil the notice or acknowledgement aspects in Section 15(d) and (e). These areas for example include credit and rental agreements for the primary residence of natural persons or cancellation or termination by a public utility.

Section 15(f) solidifies the protection of consumers (as already advanced in 15(a), (d), and (e)) and non-technical users in particular by making the limitations non-waivable through agreement (i.e., the expression of will), thereby making it a mandatory provision. There are two narrow exceptions. First, Section 15(f)(1) allows the deployment of blockchain in situations forbidden by Section 15(a) in cases where other legislation allows the variation of the record by the mutual assent of all parties. Second, under Section 15(f)(2), the requirements provided by other laws for using mailing services may be varied upon agreement and thus replaced by blockchain-based records.

Exclusion of local governments

While Section 15 of the Illinois Blockchain Technology Act imposes limitations on smart contract users, Section 20 enacts restrictions for local governments. Namely, local governments may not legislate on blockchain. The ban includes banning local taxes, permits, or other requirements related to the use of smart contracts and blockchain by both natural and legal persons. The provision attempts to harmonise legal treatments across the state while minimising compliance costs associated with blockchain use, thus fostering economic efficiency and further smart contract adoption (Bulacan, 2020). However, while this resolves conflicts on the state level, jurisdictional and regulatory conflicts remain between the state and federal level, as illustrated in the ongoing litigation case *Kentucky et al. v. SEC* (2024).

Further, the Act encourages blockchain use by explicitly allowing local governments to perform their duties using blockchain and smart contracts (Hunton Andrews Kurth LLP, 2020), provided they comply with the Act. Given the extensive discussion of prohibited uses of blockchain in Section 15, Section 20 may conflict with it, as a significant portion of local government duties, such as the provision of public utilities, falls under Section 15 restrictions.

Legal lacunae

Despite being the most comprehensive smart contract and blockchain legislation in the United States, the IBTA leaves several key issues unresolved. First**,** it fails to deal with the technical rigidity of smart contracts effectively. This means that once deployed, mistakes in the code cannot be removed. While the legislation does not explicitly address the situation, some (Bulacan, 2020) argue that the issue is indirectly addressed through provisions that allow the court to void the agreement (Section 10).

Second, the Act fails to specify legal and other remedies. For example, while the court is allowed to void an agreement, no guidance is given on how to reverse such a transaction on a distributed ledger. The Illinois Digital Property Protection and Law Enforcement Act (IDPPLE) (2023) partly addressed this legal lacuna. However, the bill was rejected partly because it would have made blockchain virtually unworkable in Illinois (Crim, 2023).

Third, the IBTA fails to address the issue of jurisdiction. Given blockchain's borderless nature and pseudonymous users, questions concerning the applicable legal framework and competent authority are likely to emerge (Bulacan, 2020). The absence of clarifying provisions contributes to legal uncertainty and poses challenges to the enforceability of disputes arising from smart contracts.

Lastly, there are issues related to the environment and security which could and should have been addressed by the Illinois Act (Hagan, 2020). The deployment of smart contracts consumes vast amounts of energy, predominantly from fossil fuels (MacRae, 2025). Blockchain-based applications are also susceptible to hacking attacks, such as 51 percent attacks[23], eclipse attacks[24]. While there have been attempts to address these shortcomings through an amendment of the Illinois Blockchain Technology Act, the latest attempt (in the form of the Illinois House Bill 4347) was rejected in January 2025.

Conclusion

The Illinois Blockchain Technology Act represents a significant step towards recognising smart contracts and blockchain in law by providing a degree of certainty and user protection. However, some shortcomings may hinder the broader adoption of the technology, including limited practical effectiveness, unclear jurisdiction, and inadequate technological understanding. Further refinement, possibly through federal or international regulations, will be essential to fully grasp and address the legal challenges associated with blockchain technologies.

Discussion

Legislative Impact on Consumer Adoption

The first subquestion studying legislative impact on smart contract adoption was explored through quantitative analysis. States with smart contract legislation exhibited lower mean scores for adoption intention[25], suggesting a greater willingness to adopt the technology

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[23] As the name suggests, a 51 percent attack is an attack on the blockchain by an entity or group controlling more than 50% of the network (Investopedia Team, 2024). This control allows attackers to prevent the conclusion of new transactions by interrupting the creation of new blocks. This type of attack is unlikely in large blockchain networks, such as Bitcoin or Ethereum, but occurs frequently in smaller networks.

[24] Eclipse attacks are a type of cyberattack in which the hacker creates an artificial environment around a node or user, allowing the attacker to manipulate the node into taking a wrongful action (Cryptopedia Staff, 2022). The manipulation can result, for example, in illegitimate transaction confirmations. The magnitude of the impact depends on the underlying network's structure. These attacks are sporadic as the decentralisation of blockchain actively intends to preclude them.

[25] The intention was measured by the number of months it would take participants to adopt smart contracts. Therefore, a lower value indicates a stronger willingness to adopt.

compared to states with no legislation. This result aligns with the prediction that knowing smart contracts are legally enforceable makes consumers more willing to use them (Hughes, 2017, p. 3). However, no significant relationship exists between the presence of legislation and participants' Intention to adopt smart contracts. Therefore, the UTAUT framework may be insufficient to fully capture the key drivers of smart contract adoption.

Among matched comparisons, participants in Arizona (with legislation) were slightly more willing to adopt smart contracts than those in Nevada (without legislation). The reverse was true for Illinois (with legislation) and Minnesota (without legislation). Neither difference was significant. Arizona's brief legislation (AETA, 2017) may have made smart contracts more accessible, whereas Illinois' more technical and extensive law may have deterred users by overwhelming them (Hughes, 2017, p. 28).

The mediation analysis confirmed a difference between Arizona and Illinois, despite sharing the same legislative status. When controlling for equal level of prior experience with smart contracts, the influence of Performance Expectancy and Social Influence on Intention to adopt differed significantly: individuals in Illinois are more likely to adopt smart contracts earlier than those in Arizona.

However, this finding is challenging to interpret. It contrasts with the unadjusted averages, which show that Arizona participants are generally more willing to adopt smart contracts sooner than those in Illinois. These conflicting findings suggests that overly complex legal frameworks might reduce consumer confidence rather than enhance it. Future doctrinal analysis of the Arizona law may shed light on the legislative differences.

Several factors may explain the insignificant findings. First, the complexity of smart contract technology may deter non-technical users regardless of legal protections. However, literature does not support this explanation (Pieters et al., 2021, p. 14). Second, the appeal of technologies like smart contracts tends to be strongest in contexts where they address a specific problem, such as the absence of reliable financial intermediaries (Sitorus et al., 2016, p. 5). In the United States, where trust in government institutions and financial service providers remains relatively high, few citizens feel compelled to seek decentralised alternatives (De Zúñiga et al., 2019, pp. 244-246). By contrast, in countries such as Brazil, Argentina, or Nigeria, where corruption, economic instability, and severe inflation are prevalent, blockchain-based technologies offer a more attractive solution, prompting greater adoption (Avalanche, 2025; Ebizie et al., 2022, p. 26). The generally limited need for smart contracts may result in consistently low adoption levels, regardless of legislative efforts.

Under the assumption that ambiguity in the legal effects of smart contracts explains their overall adoption rates, legislative clarity must be addressed. Since existing laws appear to have minimal impact, the second subquestion explores whether the legislation is so ambiguous or insufficiently operationalized that their presence produces outcomes comparable to their absence.

Legal classification of smart contracts

The second subquestion studied the legal accommodation of smart contracts in Illinois, namely through the Illinois Blockchain Technology Act. The Illinois Act largely positions smart contracts on par with traditional contracts. Section 5 defines a smart contract as a “contract” signalling legal recognition. Section 10(a) further ensures that smart contracts cannot be denied legal effect solely because of their digital nature, while Section 10(b) permits their use as admissible evidence. These provisions mirror the treatment of traditional contracts, which likewise are not denied legal validity outright but are assessed on a case-by-case basis, just as smart contracts should. While smart contracts may still be declared invalid, this is only in situations where traditional contracts would be equally void, as the contractual requirements were not met. The Act, for example, mandates accessibility of contract terms for all parties (Section 15), a consumer protection provision that accounts for the technical barriers inherent to smart contracts. It can be comparable to contract form requirements that exist in certain situations, such as land transfers (Maugeri, 2022, p. 905). The specification is a positive development, as it accommodates the particularities of smart contracts in contract law.

However, notable limitations persist, and the Illinois Act does not consistently accommodate smart contracts as fully equivalent to legal contracts. The Act's definition restricts smart contracts to blockchain-based implementations, excluding those using other infrastructures (Mohanta et al., 2018, p. 1). This exclusion reintroduces the question of smart contract legality in many cases. Moreover, the Act omits guidance on contract termination and voiding, traditionally two fundamental elements of contract law (Beale et al., 2019, p. 98). Despite the identified shortcomings, the Illinois legislation demonstrates a clear intent to integrate smart contracts into the legal framework, albeit imperfectly.

Main Findings and Implications

Drawing on the answers to the two subquestions, we may answer the main research question: How does smart contract legislation in the U.S. states affect consumer Intention to adopt smart contracts? The analysis suggests that smart contract-specific legislation in the U.S. states does not have a clear or consistent impact on consumer Intention to adopt the technology. While legislation may theoretically offer clarity, this effect may not translate into perceived clarity and thus increased user adoption. Users may also derive their adoption decisions from other sources.

This study also partially supports the UTAUT model in the context of smart contracts. Effort Expectancy and Facilitating Conditions largely formed into coherent factors.

Performance Expectancy and Social Influence loaded into a single factor, indicating conceptual overlap. This overlap reflects the idea that if others use a technology and encourage its adoption, it is likely effective.

The two overlapping factors (Performance Expectancy and Social Influence) were the only significant predictors of the Intention to adopt smart contracts. This suggests that social dynamics and perceived utility play a central role in shaping adoption decisions. Policymakers should therefore design regulatory frameworks that reinforce the perceived utility of smart contracts and promote their normalization among target user groups.

Conclusion

This research contributes to the broader discourse on how best to regulate emerging technologies. The findings can be interpreted in two principal ways. One interpretation suggests that any regulatory efforts are ineffective, as they have little measurable impact on consumer adoption. Alternatively, existing legislative frameworks may be misaligned with users' needs, either due to the misrepresentation of the underlying technology or the failure to communicate its legal implications clearly.

Based on the findings, this study supports the latter view that current laws must be improved to facilitate the adoption of new technologies. Effective regulation of innovation requires not only legal certainty, but also technological literacy, a virtue lacking in the analysed laws. As new technologies emerge at an unprecedented pace, it is vital for the legislator to have a stronger understanding of the technical aspects. Without such appreciation, lawmakers cannot effectively create laws achieving their intended goals. The results of this study also demonstrate that a law cannot exist in isolation but shall interact with other disciplines, such as economics or computer science.

This study acknowledges several limitations. First, although the exploratory factor analysis suggested a partial divergence from the original UTAUT framework, the empirical analysis proceeded with the unaltered UTAUT model. This may have biased the results as the tested constructs were not fully present in the dataset. Employing the extended UTAUT2 model may have been more appropriate.

Next, to provide a targeted doctrinal analysis, only the Illinois Blockchain Technology Act was scrutinised. Similarly, only four U.S. states were used in the empirical analysis to draw conclusions applicable to the entirety of the United States. Future studies could thus extend the doctrinal analysis to more legislations, especially that of Arizona. Similarly, a broader sample across all U.S. states would make the empirical conclusions more accurate. The research design could be strengthened by conducting comparable research in EU Member States to enhance understanding of how civil law differs from the U.S. common law approach. Such comparative insights are particularly relevant in the European context, where regulation is often criticised for hindering innovation (Berriault, 2024). Finally, given the emerging and unconventional nature of the industry and subject matter, peer-reviewed academic literature and case law are scarce. Consequently, the quality of source material should be improved in the future.

The key takeaway from the foregoing research is that mere legal recognition is not enough. Legislative design and user communication matter in widespread smart contract adoption. Existing laws are insufficient and may hinder efficiency gains promised by smart contracts. This issue cannot be overlooked, especially in light of Amara's Law, which observes that "we tend to overestimate technology in the short run and underestimate in the long run" (Amara, n.d., in Levi & Lipton, 2018). Therefore, now is the most appropriate time for policymakers to increase efforts to promote smart contract adoption before their potential benefits are further delayed.

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Appendix A: Stimulus material

Minnesota

The text was modelled after the Illinois Blockchain Technology Act.

What is a Blockchain?

A blockchain is a digital system for storing information across a **decentralised network** of participants. Each data entry is linked to the previous one using **cryptographic techniques,** creating a secure and tamper-resistant sequence of records. Once recorded, data becomes difficult to alter retroactively, ensuring the integrity of the stored information.

What is a Cryptographic Hash?

A cryptographic hash is a mathematical function that transforms any input into a fixed-length string of characters. Even small changes in the original input produce a completely different output. This property allows users to **verify** whether data has been changed or remains intact.

What is a Smart Contract?

A smart contract is a **self-executing** digital program stored on a blockchain. It carries out predefined instructions **automatically when specific conditions are met**. These programs do not require human intervention once deployed, and they often facilitate exchanges of data, services, or digital assets.

What is an Electronic Record?

An electronic record refers to any piece of information that is created, transmitted, or stored using **digital systems**. This includes data held in files, cloud storage, or blockchain systems, and it remains accessible in a structured and retrievable format.

How Are These Technologies Used?

Blockchain-based technologies are used to **maintain accurate transaction records, automate interactions** between systems, and **preserve the authenticity** of data. Their distributed nature and use of cryptographic methods make them especially valuable in contexts where information integrity and transparency are important.

Nevada

The text was modelled after Article 5 of the Arizona Electronic Transactions Act.

What Is Blockchain Technology?

Blockchain technology is a form of distributed ledger technology (DLT) in which data is stored across multiple nodes in a **decentralised network**. Each node maintains a synchronised copy of the ledger, and data is recorded in blocks that are **cryptographically linked** in sequential order. Once a block is validated and added to the chain, its contents become immutable. This structure ensures data integrity, transparency, and resistance to unauthorised modifications.

What Is a Smart Contract?

A smart contract is an **event-driven software program** that operates on a blockchain. It maintains a persistent state and can **trigger predefined actions automatically when specific conditions are met**. Smart contracts are capable of controlling digital assets, executing transactions, and recording outcomes without the need for external intervention. Once deployed, the logic of a smart contract is executed uniformly across the network, enabling **trustless automation**.

How Is Information Secured in a Blockchain?

Information on a blockchain is secured using **cryptographic hashing and consensus mechanisms**. Data entered into the ledger is grouped into blocks, each containing a cryptographic reference to the previous block. This chaining of blocks creates a **secure historical record.** Participants who input or control the data retain access to the stored content and can verify its integrity over time. However, the distributed nature of the system means that no single entity has unilateral control over the data once it is committed.

What Makes Blockchain Trustworthy?

Blockchain systems derive trust from their **decentralised structure, consensus protocols** (such as proof of work or proof of stake), and **cryptographic safeguards**. Transactions must be validated by the network before being finalised, and the resulting audit trail is **tamper-resistant and publicly verifiable** (in public blockchains). This makes the technology suitable for applications where traceability, durability, and data security are critical.

Appendix B : Correlation table

Table 3

Variable Correlations

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1. Age	41.355	13.560								
2. SC experience	1.63	.484	.101							
3. Intention composite	8.660	9.604	.132	.123						
4. Performance Expectancy	3.583	1.038	-.211*	-.312**	.044					
5. Effort Expectancy	3.745	.881	-.165	-.400**	.046	.663**				
6. Social Influence	3.220	1.145	-.233*	-.333**	-.116	.851**	.659**			
7. Facilitating Conditions	3.371	.786	-.295**	-.361**	-.181	.633**	.651**	.749**		
8. Treatment (Legislation)	0.505	.503	-.049	-.215*	-.038	.168	.141	.191	.222*	
9. Gender	1.48	.502	.201	.154	-.113	-.026	-.135	-.027	-.074	.011

Note. **Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). SC Experience: 1 = Some experience, 2 = No experience; Gender: 1 = Male, 2 = Female*

Appendix C: Factor analysis table

Table 4

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Performance Expectancy and Social Influence				
PE[26]: Using smart contracts enables me to accomplish tasks more quickly.	.894			
PE: I would find smart contracts useful in my job.	.840			
PE: Using smart contracts increases my productivity.	.826			
SI[27]: People who are important to me think that I should use the system.	.755			
SI: The senior management of my organisation has been helpful in the use of smart contracts.	.736			
SI: In general, my organisation has supported the use of smart contracts.	.671		.542	
SI: People who influence my behaviour think that I should use smart contracts.	.622		.471	
PE: If I use smart contracts, I will increase my chances of getting a raise.	.508	.489		

[26] PE refers to Venkatesh et al.'s (2003, pp. 447-450) Performance Expectancy
[27] SI refers to Venkatesh et al.'s (2003, pp. 451-453) Social Influence.

Effort expectancy				
EE[28]: Learning to operate smart contracts is easy for me.		.848		
EE: I would find smart contracts easy to use.		.835		
EE: It would be easy for me to become skilful at using smart contracts.		.797		
EE: My interaction with smart contracts would be clear and understandable.	.503	.635		
Facilitating conditions				
FC[29]: I have the resources necessary to use smart contracts.			.758	
FC: I have the knowledge necessary to use smart contracts.		.625	.629	
FC: A specific person (or group) would be available for assistance with smart contract difficulties.	.482		.594	
Compatibility				
FC: Smart contracts are not compatible with other systems I use.				.953

Note. Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

[28] EE refers to Venkatesh et al.'s (2003, pp. 450-451) Effort Expectancy.

[29] FC refers to Venkatesh et al.'s (2003, pp. 453-455) Facilitating Conditions.