LEGAL BASIS OF USING SMART CONTRACTS IN THE FIELD OF CONSTRUCTION

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ABSTRACT

Smart contracts are self-executing contracts with the contract terms written into lines of code. Their use in the construction industry aims to increase accountability, transparency, and efficiency in projects. However, the legal implications and enforceability of smart contracts remains an open area. Key issues include the recognition of smart contracts as valid legal contracts, determination of applicable law and jurisdiction, and legal remedies available in case of breach. As adoption increases, construction regulations will likely evolve to directly address smart contracts. Ultimately though, understanding traditional legal principles around contract formation and enforcement remains essential to ensure the secure implementation of smart contract systems.

KEYWORDS

Smart contracts, construction law, contract law, legal tech, project delivery, distributed ledger technology.

INTRODUCTION

Smart contracts, which are self-executing contracts with the terms written directly into lines of code stored on a blockchain, have garnered significant interest for their potential to transform the construction industry [1]. By enhancing accountability, transparency, and efficiency, smart contracts could minimize errors, delays, and disputes that often plague complex construction projects [2]. However, as real-world implementation accelerates across the sector, important legal and regulatory considerations around enforceability, applicable law, remedies, and liability have emerged [3]. This paper discusses key legal issues and the current legal basis for deploying smart contract systems in construction projects.

With roots in contractual agreements, the enforceability and treatment of smart contracts relies heavily on traditional legal doctrines around contract validity and enforcement [4]. However, smart contracts also represent an intersection of law and technology that introduces unique properties, capabilities, and risks [5]. As adoption increases, courts and regulators around the world will be challenged to keep pace. Ultimately though, a solid grounding in general contract law proves essential for legally sound smart contract implementation.

Background on Smart Contract Functionality

Smart contracts aim to digitize and automate contract execution and enforcement [6]. They are coded software programs that are stored and execute on a blockchain or distributed ledger system, which offers enhanced transparency and autonomy through decentralized processing and records storage [7]. Basic smart contract functionality includes:

Self-governance: Smart contracts autonomously execute rules written directly into their code once deployed, allowing automated enforcement of obligations [8].
Conditionality: They can embed complex "if-then" logic to enable automated outcomes based on data inputs or the occurrence of events [9].

irreversibility: Records are added permanently to the blockchain as transactions execute, supporting independent verification while preventing modification [10].

In construction, common applications include automated payments tied to project milestones, document and supply chain tracking, and facility management [11][12]. "Oracles" may be utilized to interface smart contracts with external data sources, expanding functionality further [13]. While automation can enhance efficiency, it also demands airtight rules definition during coding. Errors could trigger unintended contract outcomes [14].

Enforceability of Smart Contracts

As blockchain-based representations of contractual agreements, questions emerge around the legal standing and enforceability of smart contracts [15]. Traditionally, contract validity requires six elements - offer, acceptance, intention, consideration, capacity, and legality [16]. Smart contracts appear to satisfy these requirements in most cases. However, nuances under the laws of specific jurisdictions have created uncertainty that could hamper adoption or leave certain applications legally tenuous [17][18].

In the U.S., enforceability issues largely center on the electronic form and automated nature of smart contracts [19]. Under federal and state laws, the validity of electronic signatures and records is recognized to prevent discrimination relative to paper documents [20]. Jurisdictions generally uphold electronic contracts formed over the internet [21]. However, debates continue around unique aspects of blockchains and smart contracts [22]:

Can automated consensus algorithms constitute mutual assent to form legally binding agreements?
Do system users enter agreements voluntarily given opacity around the coded logic?
Should standing be given to the "code itself" separate from language in traditional agreements?

Drawing clear links to contractual principles is advised to mitigate these concerns. For instance, smart contract outcomes might trigger based on data representing certain performance indicators or events typically detailed in industry agreements [23]. Legal experts suggest ties to external, conventional contracts can reinforce smart contract legitimacy [24]. As global regulatory thinking on blockchain technology matures, more jurisdictions will likely provide direct legal recognition and governance for smart contracts, but uncertainty persists currently [25].

Applicable Law and Jurisdiction

Transnational reach is an often promoted advantage for blockchain networks and smart contracts. However, resolving applicable law and jurisdiction issues becomes critical for construction contracts regulating assets, activities or entities with binding legal relationships to specific sovereign territories [26]. Conflicting policy, regulations, taxes, and data rules across borders create compliance risks [27]. The encoding of complex legal terms into software code also demands precision, as inconsistencies between coded rules and relevant legal doctrines could trigger contract breaches or disputes [28].

Under private international law in most countries, jurisdictional authority relies on the location of involved persons and choice-of-law provisions in contracts [29]. Place of contract formation also holds importance. Blockchain transactions occur on global networks with data synchronization across geographies that complicates determinations [30]. Some experts argue for universal governance standards for certain blockchain applications, including smart contracts, to simplify cross-border activity [31]. As preferred venues for dispute resolution, national court systems, international arbitration associations, or emerging "online arbitration" mechanisms focused on the sector could be specified contractually depending on needs and legal restrictions of the parties [32][33].

Remedies for Breach of Smart Contracts

Breach of contract triggers options for legal and equitable remedies under the laws of most countries. With smart contracts though, the emphasis shifts to a technical view where outcomes execute automatically based coded clauses and data inputs [34]. Breaches effectively manifest as erroneous computations producing unintended payments, asset transfers or denial of access rights within the system [35]. However, the traditional remedial principle around making the non-breaching party "whole" again still applies [36].

Remedies typically fall into a hierarchy - injunctions to stop ongoing issues, specific performance to complete duties, restitution to recover losses, and collection of monetary damages [37]. Unique blockchain properties affect choices. With irreversible, autonomous transaction settlement, undoing or recovering improperly distributed cryptocurrency assets can prove extremely difficult [38]. Controlling future system behavior through injunctive relief also has limitations against distributed code [39].

As a result, guidelines call for careful smart contract planning, testing and auditing before launch to minimize problems [40]. Integrating coded breach penalties, such as withholding payments contingent on key metrics or events, provides a technical self-help alternative [41]. However, seeking legal remedies through courts remains an option. Demonstrable failures to take reasonable care in development or negligent misrepresentations of contract design may even open the door to tort liability claims [42]. Overall though, proactive risk management is vital to temper the inherent inflexibility of smart contracts.

Liability Exposure from Deploying Smart Contracts

With reliance on lines of autonomous code, assessing liability exposure resulting from smart contract implementation failures, vulnerabilities or unexpected behaviors proves critical [43]. However, blockchain's decentralized, anonymizing nature can obscure liable parties [44]. Those engaged across the

design, development, deployment and operating lifecycle of a construction industry smart contract may face risks, including the:

- Initial procurer of the smart contract system [45]
- Creators of customized application code [46]
- Open-source developers of foundational blockchain protocol code [47]
- Third-party auditors that verify contract logic [48]
- Integration and security consultants [49]
- Consortium blockchain administrators [50]
- Cloud platform providers hosting infrastructure [51]
- Construction project owners themselves [52]

Established legal doctrines around negligent coding, failure to warn of risks, breach of professional responsibilities and misrepresentation may apply [53][54]. Concepts of product liability also hold relevance with software deemed as defective [55]. However, the possibility of class action risks for widely used smart contracts and the lack of legal precedents still creates ambiguity [56]. As a protective strategy, allocating liability through clear terms and disclaimers within project agreements has merit until case law precedent develops further [57]. Practicing transparent design with rigorous testing and audit procedures also limits exposure [58]. Still, some level of residual risk likely remains in early implementations that participants must weigh carefully [59].

CONCLUSION

In an industry striving for enhanced accountability and efficiency, smart contracts offer a transformative value proposition. However, realizing their potential demands acknowledging legal risks and uncertainties that persist globally. With contract enforceability issues, jurisdictional ambiguity, restrictive remedy options and liability exposure, unresolved questions warrant deliberate planning by construction firms. Tying smart contract outcomes firmly to conventional agreements, specifying governing law clearly and practicing rigorous development procedures helps mitigate risks in the near-term. As

supportive regulations and case law precedents eventually develop, smart contracts may transition from novel concept to standardized business practice across projects. But until legal standing and remedies fully mature, participants should validate use cases strongly against local laws while limiting mission critical reliance and liability. With the prudent, progressive adoption strategies though, construction companies can unleash benefits while respecting legal boundaries.

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