



SMART CONTRACTS: AN EMERGING TECHNO-LEGAL REVOLUTION

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ABSTRACT:

The advent of digital technologies has enabled new forms of contracting and made it easier to engage in transactions and commercial relationships. The term 'smart contract' is used to refer to a software programme which is often, but not necessarily, built on blockchain technology as a set of promises, specified in a digital form, including protocols within which the parties perform on these promises. Smart contracts provide automatic enforceability, execution and automation of business processes, financial instruments or legal documents. While some assume that smart contracts can be fully integrated into existing contract law, others predict that it will be the vanishing point of contract law. The inherent uniqueness and complexity of smart contracts makes it difficult to discern where and how they fit within the legal frameworks of traditional contract law. This paper will trace the evolution of smart contracts and explain the underlying technology. While analyzing the current legal status and regulatory framework of smart contracts, it will also shed light upon the application of traditional contract law principles, the potential for unauthorized practice of law, challenges in drafting and enforcing smart contract. Finally, the paper will try to bring out the advantages and impact of smart contracts in the near future.

INTRODUCTION:

Technology promises to replace slow and imprecise paper institutions with efficient, digitalized counterparts. Contract law is a frequent target of these hopes. The advent of digital technologies has enabled new forms of contracting and made it easier to engage in transactions and commercial relationships. One such recent development in the quest to replace traditional contract law is Smart Contract. Smart contracts are computer programs that can automatically execute the terms parties have agreed on to regulate their relations. They provide automatic enforceability, execution and automation of business processes, financial instruments or legal documents.

The aim of smart contract is to ensure the enforcement of agreement between the contracting parties by raising the costs of any breach by a prohibitive amount. It will revolutionize the way firms transact by facilitating autonomous negotiation with other parties thereby transforming our social and legal institutions. The inherent uniqueness and complexity of smart contracts makes it difficult to discern where and how they fit within the legal frameworks of traditional contract law. Therefore, it is necessary to recognize the critical features and fundamental set of legal issues that are integral to smart contracts.

MEANING OF SMART CONTRACTS:

The concept of smart contract was introduced by an American computer scientist and legal scholar **Nick Szabo** in 1996 as *“a set of promises, specified in digital form, including protocols within which the parties*



perform on these promises.”¹ Nick Szabos’ definition does not capture the difference between merely automated contracts, like vending machines, which are programmed with certain rules that can be included in a contract and respond to those rules. The difference is that smart contracts are addressed in a decentralized network that automates the performance, which can be the reason for it being called “smart”.

A Swiss computer scientist **Prof. Roger Wattenhofer** defined smart contracts as “*an agreement between two or more parties, encoded in such a way that the correct execution is guaranteed by the Blockchain.*”² However, a smart contract does not need a blockchain to function, but blockchain technology provides the security and accuracy needed for a platform to be able to more fully utilize smart contracts. Therefore it is standard to use blockchain, in particular Ethereum, as a decentralized execution platform that stores smart contracts.³ Thus the term ‘smart contract’ is used to refer to a software program which is often, but not necessarily, built on blockchain technology as a set of promises, specified in a digital form, including protocols within which the parties perform on these promises.

Smart contracts resemble “if-then” propositions, where, if Party A releases money into the blockchain, then the smart

contract will self execute to meet the obligation laid out in the contract. Coders write the terms of a smart contract in blockchain computer code rather than in English or another traditional language.⁴ No individual or program can override or change the ledger.⁵ Once the parties meet conditions as stated in the ledger, the contract executes automatically without interjection from a third party.⁶ Smart contracts must collect outside information using an external data feed since smart contracts often rely on facts outside of the blockchain to determine if parties have met their requisite obligations.⁷ Smart contracts use oracles to collect facts outside of the blockchain to help determine if the parties have met their obligations.⁸

EVOLUTION OF SMART CONTRACTS:

Variations of smart contracts, such as transaction processing systems that compute daily payments and receipts for financial institutions, have existed for decades. However, lack of requisite technology prevented widespread implementation. Prior to blockchain, smart contracts were computer programs that facilitated negotiation, verified and enforced performance on a centralized

¹ Nick Szabo, Smart Contracts: Building Blocks for Digital Markets, (13, July, 2019), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html.

² Roger Wattenhofer, The science of the Blockchain, 1st ed. Inverted Forest, p.87 (2016).

³ Ibrahim Bashir, Mastering Blockchain, 103 (2nd Ed. 2018).

⁴ Reggie O’Shields, Smart Contracts: Legal Agreements for the Blockchain, 21 N.C. Banking Inst. 181 (2017)

⁵ *Id.* at 180

⁶ Scott A. McKinney et al., Smart Contracts, Blockchain, and the Next Frontier of Transactional Law, 13 Wash. J.L. Tech. & Arts 313, 317 (2018).

⁷ Kevin Werbach & Nicolas Cornell, Contracts Ex Machina, 67 Duke L.J. 330(2017).

⁸ *Id.*



server.⁹ Long before Nick Szabo, financial institutions used a form of pre-blockchain smart contracts that eased bookkeeping transactions and option contracts by implementing computer code. Some other examples of pre-blockchain smart contracts include telecom providers locking phones and vehicle manufacturers incorporating automated speed limitations.

The concept of smart contracts has taken on new relevance and possibilities with the advent of bitcoin and its underlying technology called blockchain which allows smart contracts to use their full potential for automation. First proposed in 2008, the Bitcoin protocol was a successful experiment in the mass usage of decentralized ledgers, which forms an important basis of smart contracts.¹⁰ The proliferation of decentralized ledgers led to a new discussion of using technology to enforce agreements between individuals without recourse to third parties. New companies and protocols have aggregated the essential code to write smart contracts. This code exists apart from the Bitcoin ecosystem. These new companies are building an ecosystem for experimentation with implementation of smart contracts¹¹

The first blockchain to enable the creation and deployment of sophisticated smart contracts was the Ethereum blockchain.¹² It

was proposed by Russian-Canadian programmer Vitalik Buterin in 2013 and went live in July 2015. It has its own coding language called Solidity. Using Ethereum, anyone can write, store, and execute small computer programs via a blockchain-based network. These computer programs are executed by multiple parties on the Ethereum network and thus have the capability to operate autonomously and independent of the control of any individual party.

APPLICATIONS OF SMART CONTRACTS:

Smart contracts are advantageous because they force parties to honour their original agreements. Smart contracts cause the risk of a breach to be more expensive for the breaching party, nearly eliminating the possibility of a breach.¹³ Avoiding breach altogether reduces the amount parties would spend to oversee enforcement and to litigate a costly dispute.¹⁴

Smart contracts that operate using blockchain technology will likely have a profound influence on various industries.¹⁵ In the legal field, smart contracts can drastically shorten litigation settlement times and mitigate risk for the user.¹⁶ Insurance industries can increase efficiency by implementing smart contracts to automate policy agreements.¹⁷ It

⁹ Primavera De Filippi & Samer Hassan, Blockchain Technology as a Regulatory Technology: From Code Is Law to Law Is Code, *First Monday* (Dec. 5, 2016), <https://firstmonday.org/ojs/index.php/fm/article/view/7113/5657>.

¹⁰ Max Raskin, Realm of the Coin: Bitcoin and Civil Procedure, 20 *FORDHAM J. CORP. & FIN. L.* 969, 971 (2015).

¹¹ Vitalik Buterin, Ethereum: A Next-Generation Cryptocurrency and Decentralized Application Platform, *BITCOIN MAGAZINE* (Jan. 24, 2014), [https://bitcoinmagazine.com/articles/ethereum-next-](https://bitcoinmagazine.com/articles/ethereum-next-generation-cryptocurrency-decentralized-application-platform-1390528211)

[generation-cryptocurrency-decentralized-application-platform-1390528211\[https://perma.cc/DJQ8-NB7P\]](https://perma.cc/DJQ8-NB7P)

¹² Massimo Bartoletti and Livio Pompianu. An Empirical Analysis of Smart Contracts: Platforms, Applications and Design Patterns (2017), <https://arxiv.org/pdf/1703.06322.pdf>.

¹³ Jeremy M. Sklaroff, Smart Contracts and the Cost of Inflexibility, 166 *U. Pa. L. Rev.* 263, 279 (2017)

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*



allows the insurance policy holder to file a claim, which is then validated automatically by the codes written into the blockchain network. The validation involves assessing claims to verify their legitimacy then automatically executing the terms of the contract. Insurance companies can eliminate the risk of compensating fraudulent claims since the records of the claim are unbiased reviewed based on decentralization of the ledgers. Governmental entities might improve processes if they used smart contracts to manage title recordings, social services, and e-voting.¹⁸ Further, consumers and utility companies can benefit from smart contract use in automatic bill-paying by debiting an account based on predetermined conditions.¹⁹ In manufacturing, smart contracts can replace slow and expensive supply chain processes.²⁰

LEGAL ISSUES WITH SMART CONTRACTS:

i. Traditional Application Under Contract Law:

Courts and policymakers have not assessed the full potential of smart contracts, making it difficult to place them within a regulatory scheme.²¹ No court has provided guidance for the enforceability of smart contracts, nor has there been a smart contract market with standardized practices established. The absence of authority and direction causes conflicting views about the enforceability of

smart contracts. While some assume that smart contracts can be fully integrated into existing contract law, others predict that it will be the vanishing point of traditional contract law.

Some analysts characterize smart contracts as an alternative to legally enforceable contracts. Traditional contracts implicate future performance by creating an obligation for one or more parties. Smart contracts do not create a future obligation because once the parties activate the smart contract the parties have no entitlements beyond those written in code. The code executes robotically without any consideration of other factors. Proponents of this analysis believe that the smart contract does not create any contractual obligation.²² Smart contract does not give rise to a legal bond between the parties. Even if there is some kind of “bond”, which all the parties to it share, it relates to a technical bond of a party with blockchain platform of Smart contract. Therefore, this theory claims that smart contracts are developing in a technical universe not yet touched by the legal realm.

Others contend that smart contracts simply fit into the existing legal doctrines that govern traditional contract law. Acceptance and consideration are both confirmed through act of performance of the self-executing smart contract. If the contract executes, it meets the requisite elements of offer, acceptance, and

¹⁸ *Id.*

¹⁹ J. Travis Laster & Marcel T. Rosner, Distributed Stock Ledgers and Delaware Law, 73 Bus. L. 319, 321 (2018)

²⁰ J. Dax Hansen et al., More Legal Aspects of Smart Contract Applications 3 (2018), <https://www.perkinscoie.com/images/content/1/9/v3/199672/2018-More-Legal-Aspects-of-Smart-Contract-Applications-White-Pa.pdf>

²¹ Akub J. Szczerbowski, Place of Smart Contracts in Civil Law. A Few Comments on Form and Interpretation, in Proceedings of the 12th Annual International Scientific Conference: New Trends, 335 (2017)

²² Alexander Savelyev, Contract Law 2.0: Smart Contracts as the Beginning of the End of Classic Contract Law, 26 Info. & Comm. L. 116, 128 (2017).



consideration; if the contract does not execute, there is no legally binding contract, only an offer. Therefore, smart contracts do not require external interpretation and intervention with regard to contractual obligation. However, this theory also limits the potential future use of smart contracts by assuming all smart contracts ought to operate like traditional contracts.²³

Because of this varying treatment and their legal status smart contracts requires more technical regulation than those currently in place. Software builders should express regulation in the code language they draft, progressively turning law into code. Coders can insert law into a smart contract as parameters that would require smart contracts to follow existing law in order to execute. The coded rules omit the possibility that legal safeguards might invalidate the contract as a result of failure to comply with specific formalities.²⁴ This idea of “regulatory coding” provides additional regulatory certainty and lowers the costs of supervision and enforcement.²⁵

ii. Questions of Liability:

Ideally, coders write the smart contract so that it will perfectly execute the intentions of the parties. But users of smart contracts

should not assume coders writing the contract are faultless. A coder could make an error, or an operator could bug the code with a virus that misinforms the smart contract. A hacker could identify vulnerability in the smart contract and use the vulnerability for their benefit. This situation already occurred when the first Decentralized Autonomous Organization, launched by the Ethereum founder to serve as an investment fund, raised \$150 million before hackers exploited a vulnerability in the software, permitting them to take \$55 million worth of cryptocurrency.²⁶

To avoid misallocation of liability of a smart contract parties should allocate risk in a prior agreement or in the smart contract itself.²⁷ The way the parties allocate risk will depend on whether the contracting parties or a third party attribute to the coding error.²⁸ This prior agreement would allow the parties to introduce extrinsic evidence²⁹ to determine the intent if there were a dispute over the intended function of the code without the mistake.³⁰ This proposition is analogous to traditional contract law, which supports the court’s consideration of evidence of surrounding circumstances to determine the

²³ Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 *Duke L.J.* 348 (2017).

²⁴ Primavera De Filippi & Samer Hassan, *Blockchain Technology as a Regulatory Technology: From Code Is Law to Law Is Code*, *First Monday* (Dec. 5, 2016), <https://firstmonday.org/ojs/index.php/fm/article/view/7113/5657>

²⁵ Wulf A. Kaal & Craig Calcaterra, *Crypto Transaction Dispute Resolution*, 73 *Bus. Law.* 109, 140 (2017)

²⁶ *Not-So-Clever Contracts*, *The Economist* (July 30, 2016), <http://www.economist.com/news/business/>

21702758-time-being-least-human-judgment-stillbetter-bet-cold-hearted

²⁷ Eliza Mik, *Smart Contracts: Terminology, Technical Limitations and Real World Complexity*, 9 *L., Innovation & Tech.* 269, 279 (2017).

²⁸ *Id.*

²⁹ *Black’s Law Dictionary* (10th ed. 2014) defining extrinsic evidence as “evidence relating to a contract but not appearing on the face of the contract because it comes from other sources, such as statements between the parties or the circumstances surrounding the agreement”

³⁰ Dickson C. Chin, *Smart Code and Smart Contracts*, in *Blockchain for Business Lawyer*, 110 (2018)



parties' intent.³¹ This would limit the need to resolve matters in court and could help facilitate innovative responses in light of the complexity of a new market.³²

iii. Financial Crimes Enforcement Challenges:

Smart contracts may also present special challenges with regard to compliance with anti-terrorism laws and money laundering rules.³³ These rules typically require participants in financial transactions to know and verify the identity of counterparties and report "suspicious activity" to law enforcement³⁴ or prohibit transfers of funds to proscribed persons.³⁵ Since smart contracts are designed to be self-executing without human intervention, users of these smart contracts must build a control that allows them to comply with these laws by verifying identities and blocking unlawful transfers and transactions.

iv. Data Protection:

As the global market of smart contracts and blockchain platforms grow, law will have to solve new issues like Data Protection. It will be crucial to resolve the possible difficulty of identifying the person in charge of processing the personal and sensitive data that is included in the smart contracts, as well as to solve the potential risks of inadvertently making international data transfers through nodes of the blockchain platform without complying with the legal requirements.³⁶

REGULATORY FRAMEWORK FOR SMART CONTRACTS:

In the United States, 47 states in 1999 adopted the Uniform Electronic Transactions Act (UETA). The UETA regulates e-contracts, records and signatures etc. It says that the e-contracts are valid and the use of a digital signature will be deemed valid for providing consent. In 2017, Arizona has passed special regulations recognising the blockchain technology. Vermont and Nevada followed by passing laws recognising smart contracts and their execution through blockchain technology.

There is no clarity regarding how the smart contracts shall be codified in the Indian Law. With regard to position of smart contracts in India it will be regulated by the Indian Contract Act, 1872, the IT Act, 2000 and the Indian Evidence Act, 1872 since there is no any other specific regulation. The most common questions amongst the legal fraternity involve the status of cryptocurrency being undefined in any law, and the questions of their taxations.

Further challenges are provided by the IT Act does allow contracts to be validated by the use of digital signatures. The IT Act, 2000 puts a limitation on obtaining these digital signatures, and provides that they can only be obtained through a government designated certifying authority as per Section 35 of that act. This does not help the cause of smart contracts where a hash key is used as unique

³¹ *Ultra Res., Inc. v. Hartman*, 2015 WY 40, ¶ 56, 346 P.3d 880, 889–900 (2015)

³² *Supra* note 28 at 115

³³ Trevor I. Kiviatt, *Beyond Bitcoin: Issues in Regulating Blockchain Transactions*, 65 *DUKE L.J.* 569, 589–594 (2015).

³⁴ *Financial Recordkeeping and Reporting of Currency and Foreign Transactions Act*, 31 U.S.C. § 5311

(2015) (declaration of purpose); *Due Diligence Requirements*, 31 C.F.R. §§ 1010.220, 1020.600 (2016)

³⁵ 31 C.F.R. § 501 (2016)

³⁶ Pablo Sanz Bayón, *Key Legal Issues Surrounding Smart Contract Applications*, *KLRI Journal of Law and Legislation*, Vol. 9, Issue No. 1, p.86 (2019)



identifier and authenticator produced by the blockchain technology to validate a smart contract.³⁷

This disparity is also extended to the Indian Evidence Act, Section 85B which states that an electronic agreement would be considered valid only if it has been authenticated with a digital signature. These two legal checkpoints not only corrupt the authentication process in blockchain through hash-key generation but also disallow any admissibility in the court as evidence.³⁸

CONCLUSION:

The new data-driven economy has led to the rise of innovative technologies like Blockchain and smart contracts. They have the potential to transform financial markets. However, smart contracts in the commercial realm are at a nascent stage. Assuming the technology is widely adopted, smart contracts will need to meet many of the same legal standards as traditional paper agreements. Proper technical regulation will render adequate clarity to reach the level of understanding necessary to frame a legislative policy that is truly adapted to face the legal problems that smart contracts phenomenon will face in the near future.

³⁷ Anirudha Bhatnagar, Smart Contract In The Indian Crucible, 19 June 2018, <http://www.mondaq.com/india/x/711102/fin+tech/Smart+Contract+In+The+Indian+Crucible>

³⁸ *Id.*