Exploring the Fundamentals of Smart Contracts & Blockchain: A Comprehensive Review & Analysis

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ABSTRACT

Smart contracts have the potential to significantly reduce transaction costs and improve contract efficiency in India. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. This means that they can automatically enforce the terms of the agreement, eliminating the need for intermediaries and reducing transaction costs. In India, where the legal system can be slow and cumbersome, smart contracts can provide a faster and more efficient way to execute agreements. Moreover, smart contracts can improve contract efficiency by providing greater transparency and reducing the potential for fraud. Since smart contracts are stored on a blockchain, which is a decentralized and tamper-proof ledger, all parties involved in the transaction can have access to the same information, making it easier to verify the authenticity of the agreement and reduce the likelihood of disputes. However, it is important to note that there are still challenges that need to be addressed, such as ensuring the security and privacy of sensitive information stored on the blockchain, and ensuring that smart contracts are legally enforceable in India. This paper is aimed at providing guidance in understanding the recent advancements and fundamentals of smart contracts & Blockchain. First, we present the basics of smart contracts and blockchain functions; Secondly, how smart contracts work, unique application scenarios, benefits, limitations, and finally, we describe their legal status in India. This paper examines and explains the technical, legal, and economic significance of these smart contracts. In essence, the research conducted for this paper is a study of the position and applicability of smart contracts in the existing purview of Contract Law.

INTRODUCTION

The concept of contracts came up with the emergence of industrial revolution & also when people started trading with each other. With the development of civilization, people started realising that they need an enhanced system for performing the activity that can facilitate the exchange and transaction in more efficient manner. The previous system in the absence of contract law lacks formal mechanism and the condition between two parties that were trading with each other were not properly enforced. However, the advent of contract system in India led to the ideal development of the society at large since the binding promises and contractual obligations led to proper growth of Industrial system.

It is a well-known philosophy that society should evolve with time; and with this passage of time the concept of e-contracts came up and we can say that it is going to be a new normal for people. Before moving further, it should be made clear that what exactly e-contract denotes. E-contracts are the contracts that are paperless contract and such contract are formed in course exchange by mails, telephonic conversation and Faxes. Since the transactions that is made by using online is increasing day by day so it is not possible to form physical contract every time, therefore to make the transaction easier and more convenient the concept of E-contact is there, in such contracts the person who is on the one side has pre-fixed term and the user or the other party have only one option to accept the same. The need for E-contract came up with the increasing demand and growing transaction between individuals.

The concept of E-contract has taken further development and the more enhance concept of smart contract have come into picture. The smart contracts are kind of self-executed contracts in which terms are already stored into the computer system using the blockchain technology and once the pre-fixed condition is triggering such type of contract itself comes into picture. The operator at one side generally fixes the term in the program where on happening of such term the contract itself come into existence and to give the authenticity to such type of contract the blockchain technology has been used. The growing prospect of business and globalization led to the intensive use of technology and one of the advents of technology is the smart contract.

When we look into the laws and provision relating to such smart contact there are no such provisions under Indian laws relating to smart contract so it is need of the time to study about such contracts and look into the feasibility of such contract as such contracts are being signed between the party at large scale, so it is important to look how such contract will be feasible and what can be effect of such contract on the existing laws. The laws are continuously changing with time and in India the Telecom Regulatory Authority of India released a notification in 2018 the term was briefly defined.

SMART CONTRACTS: CONCEPTS AND EXECUTION

The smart contract is such type of contract where the term of the agreement is pre-defined and the same is directly incorporated in the line of code that is fixed in the system. In such of contract the action is triggered on the happening of the term that is fixed by one party. The code is contained in the block chain system and such block contain the terms of the agreement. In the realm of smart contracts, the contractual terms are embedded within the code itself. This empowers the contract to interpret, verify, and autonomously execute transactions in alignment with these predefined terms. A concrete example of this can be seen in the context of a rental agreement. Utilizing smart contracts, a landlord-tenant rental agreement can come into play contract where the tenant is obligated to make online payments to the landlord. Upon successful completion of the payment and receipt confirmation, the landlord will release the key to the rented property. This system operates on the basis of the "If-Then" principle, ensuring that all involved parties on the blockchain witness and validate the transaction. By adhering to this

principle, the landlord can be certain of receiving payment only when the key is released, while the tenant can be assured of obtaining the key solely upon fulfilling the payment requirement.

In the other way we can say that smart contract is just a computer program that can automatically be executed between the party without need of any human intervention and at the same time it facilitates the business transaction by reducing the paper work and saving the time to be taken to complete a physical contract. There is various entity all around the world who are using these smart contracts as this is helping them to execute a as many contracts they want and that too without much human interference. The information technology is growing rapidly and with the help of IT sector such type of software is also easily available and that too at the affordable rate so the scope of such type of contract is also increasing at very fast.

The contact that is formed via deployment of the software stand in the legal system and presently it is treated as same to the contract that is formed in physical form. There is no special legislature to govern smart contract, so the prospect of Indian contact act applies to such type of contracts. A special term used in the field of smart contract is executed contract which refer to successful completion of agreement that is encoded in a programmed manner, so once an agreement is converted into a smart contract it is termed as 'executed contract'.

Formation of smart contract

Now after understanding what exactly smart contract is, we need to look into the formation of smart contract-

- **A predefined object is decided-** Under this a pre-defined term of the contract that is to be formed by the parties is fixed and after that the further process of forming a term of the contract is stated. It is very essential for the parties to fix a pre-defined object so as to come to know the limitation of the contact that is expected to come into existence.
- **Enabling of the computer program-** The program that is to use for the formation of smart contract will be programmed with such input that is fixed by the party so that the condition that is fixed once complied by the other party automatically contract will come into picture.
- **Formation of contract-** Once the condition that is fixed by the party and the same is enabled into a program the last step is just to fulfil the condition that is fixed by the party and once that condition is completed the contract come into existence.

FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY

Blockchain technology is one of the type of data structure. It contains the chains of different block and each block contains data. The mechanism is fixed in such a way that each block is connected to each other which together form a digital chain. The block has its own data and each block contains a hash code that helps that block to relate it from other block. Every data that is stored in the block is stored in every system that is connected to the series of blocks and any change made in any block has to be validated in the system connected to that block. It is not

easy to change the data that is stored in the block as the particular code is required to change the data this is done to maintain the authenticity of data.

To understand in much better way, we need to look the participant that play major role-

- **User of Blockchain Network**- These are the person who have permission to join the network and have transaction with another participant who are there in the network. These are the person one who play an important role in whole transaction.

- **Regulators of Blockchain-** The regulator in the blockchain is one who manage the whole blockchain network and oversee the activity of the chain system.

- **Operator of Blockchain-** The operator of blockchain have special permission monitor, create and manage the whole blockchain network.

- **Certificating authority-** These are the authorities one who provide the certification to the blockchain network and maintain a common standard that are required for blockchain network to operate.

  There are two types of blockchain network the first one is Public blockchain network and the other is Private blockchain network. In the public network it uses the computer that are connected to public internet to validate the transaction on the other hand when we look into the private transaction it is made of computer network that have special permission with limited number of users that have been provided special key.

SMART CONTRACT WITH RESPECT TO INDIAN LAWS

When we look into the Indian laws there is no as such provision with respect to smart contract as still it needs legal determination; however, we can analyse the working of smart contract with the present laws to look into the validity of the same.

Before we start looking into Indian contact act and smart contract it is important to mention that the most of the Indian laws have the common law origin and in the common law that is prevalent in United Kingdom have a report named Taskforce report which argue in favour of giving the validity to the smart contract under the common law system, this shows that if it can be applicable in United Kingdom the same can be done in Indian law as well. On the other hand, e-contract have the validity as per sec 10-A of IT Act but there is difference between smart contract and E-contract, so now the question arise can we validate the smart contract under Indian legal system.

Moving forward, when we examine the essentials of a contract under Section 10 of the India Contract Act, the first condition is that there should be an offer and acceptance in order to form a contract. Section 2(a) of the Indian Contract Act, 1872, talks about the offer, and Section 2(b) talks about acceptance. The primary objective of these two clauses is that there should be an intent to form a contract on the part of both parties. Here, it is relevant to mention that there is no prohibition on showing such intent through a message, and if the intent is

shown through a message, the offer or acceptance will be treated as complete. Now, when we consider the formation of a smart contract, the offer can be treated as made when the machine-encoded message is displayed on the screen, and the acceptance comes when the same is agreed upon by the user. It is relevant to mention that acceptance can be done in many ways, such as by clicking on the same or by making payment, or something else. The intent behind putting this condition is that the one who is putting forth the offer must make the same clear to the offeree, and the acceptance must be done in the manner prescribed by the offeror. So, overall, the condition of offer and acceptance is satisfied when it comes to a smart contract.

The consideration is a must for a valid contract, and as per Indian law, an agreement made without consideration is void and holds no value in the eyes of the law. It is also relevant to mention this consideration should have value in the eyes of the law. Now, when we examine the same in the context of smart contracts, an examination of the terms or code will enable us to understand the consideration aspect of such contracts.

In a smart contract, consideration is generally in the form of money or services to be paid upon the occurrence of a specified event. For example, in a smart contract between a user of a site and the site operator, it is accepted that once the user opts for the services of the site operator, it will lead to automatic deduction of money from the user's account, which will be treated as valid consideration. Based on the above example and the study of the Indian Contract Act, it can be clearly deduced that there is no specific way mentioned in the Indian Contract Act for consideration, and consideration can be observed in smart contracts as well.

The legal intension of the parties one who are entering into the agreement is necessary to form a contract. Now when we look how smart contract come into existence, we get to know that the coded information is displayed to the person and most of the smart contract are commercial nature, the acceptance is done either by entering private key or digital signature that is assigned by the authority. Now it is general presumption the commercial or business contract are legal and if one party is offering the same by way of computer code and other is acceptance it by using private key it is assumed that the same must be having legal intend. So, this condition of contract can be satisfied. However, it cannot be surely said that each agreement must have legal intend but most of it are having legal intend.

Mutual assent is important for valid contract and mutual assent is also termed as consensus ad idem. In the era where technology is growing rapidly and with the advent of same the scope of smart contract is also growing, so the two party who have access to technology having the terms that is coded is clear and unambiguous will have consensus ad idem since both parties will have clear understanding of the terms. So, in any contract that is formed in which the terms are clear and have no ambiguity will form the Mutual assent of the parties to contract.

The above discussion of the fulfilment of basic requirement of the contract lead to conclusion that the smart contract can be termed valid as per the essential condition of the contract under Indian contract act, however it is just an analysis and legislative intent with respect to the same is pending. The landmark case of B2C2 Ltd v. Quoine Ltd [1]in which the Singapore International commercial court held in favour of self-executing automatic contract as legal and final decision was in favour of B2C2 Company, here in this case court held that the

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[1] B2C2 Ltd. v. Quoine Pte Ltd., [2019] SGHC(I) 3

agreement that is made via automatic trading platform is valid contact and other observation was made that the common law principle will be applicable on such type of contract. This judgement will play a potential impact of the validity of the smart contract in India in the coming days.

CONCLUSION

Analysing the validity of smart contracts within the framework of the Contract Act is a complex task that demands meticulous examination. We must not allow smart contracts to operate under laissez-faire regulation, potentially harming the interests of contracting parties. Throughout this discussion, we have identified various pitfalls, such as opportunities for money laundering, digital theft, and the potential for illegal contracts involving physical crimes like "hit" contracts. These pitfalls can have a detrimental impact on society, underscoring the need for some form of state regulation. From a legal standpoint, smart contracts can be viewed as meeting the essential criteria of a valid contract, making them amenable to regulation similar to traditional contracts. However, the greater challenge lies in delving into their enforceability and the legal implications that may arise as a result. Our perspective is based on a comprehensive analysis of smart contracts, which, in practice, necessitates a deep dive into their interaction with existing laws like the IT Act, Evidence Act, and the Code of Civil Procedure. Based on our analysis, we contend that certain procedural aspects of the law require reform. These reforms should address issues such as the decentralization of licensing for digital records, accommodating the distributed nature of smart contracts in devising dispute resolution mechanisms, and the appointment of court-appointed experts to interpret and clarify coded contracts, among other things. In principle, we assert that the Contract Act already allows room for smart contracts as valid contracts, eliminating the necessity for dedicated legislation. One key strength of smart contracts, as elucidated in this article, is their technical robustness in reducing the need for human intervention. They have the capability to minimize litigation by self-correcting deviations through automated execution. We emphasize the significant potential of smart contracts for the Indian economy and stress the importance of learning from jurisdictions that have taken legislative and judicial measures to validate smart contracts as fully functional agreements enforceable in a court of law.