

# Intelligent Contracts and the Principle of Contractual Freedom: A Classical Legal Examination in the Era of Emerging Technologies

Jiahao Ni<sup>1,\*</sup>

<sup>1</sup>Department of sociology, University of Warwick, Coventry, United Kingdom

\* Corresponding author: ethan.ni@warwick.ac.uk

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**Abstract:** The development of smart contract technology has garnered widespread attention in the legal field. This study, rooted in the principle of contractual freedom, delves into the impact of smart contract technology on the expression of parties' free will and analyzes the challenges it poses to legal rules and practices. Through a comparative analysis of smart contracts and traditional contracts, this research reveals the advantages of smart contracts in terms of contract design, execution efficiency, and transparency. While smart contract technology brings innovative changes to contract law, it necessitates profound reflections within the legal community and legal practice on how to strike a balance between free will and technological developments.

**Keywords:** Smart Contracts; Principle of Contractual Freedom; Legal Rules; Free Will; Legal Applicability; Judicial Practice.

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## 1. Introduction

In the field of jurisprudence, the principle of contractual freedom has long been considered a fundamental and crucial tenet, playing a guiding role in facilitating the expression of the parties' free will in contractual relationships. However, with the rapid advancement of information technology, smart contract technology has gradually emerged as a noteworthy new tool in commercial transactions. The rise of this technology poses a fresh challenge to the theoretical framework of contract law, compelling legal scholars to reexamine the applicability of the principle of contractual freedom in the digital age[1]. This paper aims to delve into the intricate relationship between smart contracts and the principle of contractual freedom, further analyzing the impact of new technologies on shaping the expression of parties' free will and exploring the profound implications of this transformation for traditional legal rules and practices.

As the cornerstone of contract law, the principle of contractual freedom emphasizes the parties' discretionary power in contractual relationships, enabling them to freely select contract terms based on their needs and intentions. However, the advent of smart contract technology disrupts traditional modes of contract transactions by executing contract terms through program code, reducing the level of direct intervention by the parties. This paradigm shift raises questions about whether the principle of contractual freedom can retain its original significance in a digitized environment. Against this backdrop, an in-depth examination of the relationship between smart contracts and the principle of contractual freedom not only aids in understanding the legal system's strategies in the face of technological progress but also contributes valuable insights to the innovation of legal theory[2].

The introduction of smart contract technology represents not only a technological transformation but also involves the evolution of legal concepts and systems. With the widespread application of smart contracts in commercial agreements, the legal community urgently needs to carefully consider the challenges posed by this technology to the principle of

contractual freedom. Behind smart contracts, computer programs replace the linguistic expressions found in traditional contracts, and the execution of contract terms is completed without the need for human intervention[3]. This raises a crucial question: to what extent is the parties' free will adequately reflected, and can the balance of rights and obligations be maintained in this entirely new technological paradigm? A thorough exploration of this issue will contribute to our understanding of the potential impact of smart contracts on the principle of contractual freedom and provide guidance for adjusting legal frameworks to adapt to the digital economy era.

## 2. Contractual Freedom Principle and Smart Contracts

### 2.1. Modern Interpretation of the Principle of Contractual Freedom

The principle of contractual freedom, as the cornerstone of contract law, has traditionally been interpreted as granting parties extensive discretion in contractual relationships, allowing them to freely choose contract terms based on individual needs and intentions. However, in the context of the digital age, the interpretation of the principle of contractual freedom faces new tests and challenges. Modern interpretations must more keenly reflect the impact of technological developments on contractual relationships, especially in the emergence of smart contracts, which redefine the expression of parties' free will[4].

In traditional interpretations of the principle of contractual freedom, individual expression of intent was primarily realized through written contracts and verbal agreements. However, with the application of smart contract technology, the execution of contracts has gradually shifted from human control to computer program control. This introduces a new dimension to the principle of contractual freedom, necessitating a reexamination of the specific manifestation of parties' free will in the digital age. Modern interpretations should not only focus on the expression of intent during the contract drafting phase but also carefully consider the

dynamic adjustments of contract terms and changes in influence during the execution of smart contracts[5].

In this new context, modern interpretations of the principle of contractual freedom need to place greater emphasis on individuals' understanding of and right to information regarding smart contract technology. The ability of parties to accurately comprehend the meaning of contract terms and the specific mechanisms of smart contract execution directly affects their autonomy and the manifestation of true intent in contractual relationships. Therefore, modern interpretations should address whether parties can still fully express their true intentions in contracts in the digital era and ensure that smart contract technology does not become a source of information asymmetry, weakening the substantive protection of the principle of contractual freedom.

Furthermore, modern interpretations also need to examine issues in smart contract execution from the perspective of legal responsibility. In traditional contract models, parties have clear legal responsibilities for the performance and breach of contracts. However, in the context of smart contracts, due to their automatic execution nature, the discussion of whether parties bear equal legal responsibility for the integrity and accuracy of the contract is worth exploring[6]. Modern interpretations should strive to clarify the legal responsibilities of parties in smart contracts, ensuring that the legal system provides thorough and precise regulations for potential issues that may arise during the execution of smart contracts.

## **2.2. A Comparison between Smart Contracts and Traditional Contracts**

Traditional contracts have historically relied on written expressions and verbal agreements among individuals, while smart contracts utilize programming code to automatically execute contract terms, ushering in a new paradigm for contract transactions. The comparison between these two forms of contracts not only aids in understanding the positioning of smart contracts within the legal framework but also reveals new features that may emerge in contractual relationships in the digital age.

Firstly, smart contracts eliminate direct human intervention during execution by automatically enforcing contract terms through program code. In contrast, the fulfillment of traditional contracts typically requires parties to personally fulfill contractual obligations or undergo supervision by third-party institutions. This difference gives smart contracts a significant advantage in terms of execution efficiency and accuracy. However, it also raises concerns regarding the substantive protection of the principle of contractual freedom in the digital age, specifically how the true intentions of parties can be ensured in the absence of human intervention.

Secondly, the execution process of smart contracts is more transparent and traceable. Since contract terms exist in code form, the execution history of smart contracts can be clearly recorded, enhancing traceability in the process of contract fulfillment. Comparatively, the fulfillment of traditional contracts may be more prone to disputes due to the relatively cumbersome recording and tracking of information. However, this also introduces a new challenge – how to protect sensitive information during the execution of contracts, preventing privacy breaches and data misuse[7].

Additionally, the execution of smart contracts typically relies on digital technological infrastructure, requiring parties to have a certain level of technical proficiency. In contrast,

traditional contracts are more flexible and not constrained by technological proficiency. This raises concerns about the digital divide, where some parties may face unequal treatment due to insufficient technical capabilities. Therefore, in the comparison, it is necessary to consider how to achieve inclusivity in the principle of contractual freedom in the digital economy era, ensuring that technological development does not become a factor of social exclusion within the legal system.

## **3. Impact of Smart Contracts on the Expression of Free Will**

### **3.1. Manifestation of Free Will in Smart Contracts**

Free will, as the core concept of the principle of contractual freedom, traditionally emphasizes the autonomy of parties in contractual relationships and the expression of their free will. However, the emergence of smart contracts raises new questions and challenges regarding the concrete manifestation of free will in the digital age.

Smart contracts provide more flexible options for contract design, enabling parties to comprehensively express their free will. Smart contracts, written in program code, allow parties to flexibly set conditions, execution mechanisms, and agreement methods, providing individuals with a more personalized and practical space for contract choices. This increased flexibility allows parties to express their true intentions more precisely, aligning with the personalized and diversified contractual needs of the digital era.

The automatic execution mechanism of smart contracts offers parties a more efficient way to fulfill contracts, reducing the possibility of human intervention. With the support of digital technology, smart contracts can automatically execute contract terms under preset conditions, eliminating the risks of human negligence or breach. This provides parties with a more stable and reliable trading environment, enhancing the substantive protection of their free will and allowing them to focus more on the actual purpose and business transactions of the contract.

However, the manifestation of free will in smart contracts also comes with some new challenges. The automatic nature of smart contract execution may lead to insufficient understanding of contract details by parties, resulting in a realization of restricted rights when unfavorable terms are discovered post facto. Additionally, the writing and comprehension of smart contracts require a certain level of technical knowledge, potentially exacerbating the digital divide and affecting the equal expression of free will in contracts.

The manifestation of free will in smart contracts not only reflects more efficient and personalized contract design but also involves requirements for technological literacy and contract information transparency. In the digital age, the legal community needs to deeply consider how to balance the convenience of smart contracts with the substantive protection of the expression of free will, ensuring that parties can still fully manifest their true intentions in a smart contract environment, free from the influence of technological factors and information asymmetry.

### **3.2. Technical Constraints and Free Will**

As smart contract technology continues to develop, its impact on shaping the expression of free will extends beyond

providing convenience and efficient contract execution. It also comes with a series of technical constraints that may have profound implications for the free will of parties.

Firstly, the writing and execution of smart contracts typically depend on specific digital technological infrastructure. For parties lacking the corresponding technical capabilities or unable to access advanced technology, their expression of free will is constrained by technological barriers. This technical limitation may exacerbate the digital divide, causing some individuals to face exclusion due to an inability to adapt or access relevant technology, threatening the equal manifestation of the principle of contractual freedom.

Secondly, the execution of smart contracts is subject to the limitations of the code logic adopted during its writing. Once a smart contract is written, its execution process is usually automated and cannot be flexibly adjusted based on specific circumstances. This limits the freedom of parties during the contract execution process, as they cannot adapt to unforeseen situations, potentially affecting the comprehensive expression of free will[8].

On the other hand, the code logic of smart contracts may be imperfect or ambiguous, leading to a misalignment between the execution results and the true intentions of parties. The complexity of technology and the uncertainty of future changes may result in code vulnerabilities or errors, negatively impacting the accurate expression of free will. When parties interact with smart contracts, they need to have sufficient confidence in the accuracy of the code logic to ensure that their true intentions are accurately reflected in the contract terms.

While smart contracts enhance the efficiency of contract execution, they also pose challenges in terms of technical limitations that may impact the free will of parties. Addressing these issues requires the establishment of corresponding safeguards within the legal framework to ensure that smart contract technology, while promoting the principle of contractual freedom, does not become a medium for restricting free will.

## **4. Summary**

### **4.1. Challenges of Smart Contracts to Legal Rules**

#### **4.1.1. Issues of Legal Applicability**

With the widespread application of smart contracts, challenges to legal rules manifest in various aspects, with one core issue being the legal applicability. The traditional legal framework may not necessarily fully adapt to the unique nature of smart contracts, introducing new complexities in defining the rights and obligations of parties.

The automatic nature of smart contract execution may prompt a reevaluation of legal responsibilities. Traditional contract law emphasizes clear legal responsibilities of parties for contract performance and breach. However, when smart contracts automatically execute through program code, the definition of responsibility becomes more ambiguous. Therefore, the issue of legal applicability involves how to clearly define the legal responsibilities of all parties during the execution of smart contracts and how to balance the automatic execution of technology with the legal obligations of parties within the legal framework.

Smart contracts may involve multiple jurisdictions, complicating the determination of legal applicability. Due to the digital nature of smart contracts, their execution may span

different countries and regions, involving the application of different legal systems. In-depth research is needed on the legal applicability of international smart contracts to ensure that legal systems can effectively address complex legal issues that may arise in the globalized digital economy.

Additionally, smart contracts may trigger a reexamination of the elements required for contract formation. In traditional contracts, the establishment of a contract typically requires elements such as lawful intent, clear terms, and legal objects. The execution of smart contracts relies on program code, introducing new considerations for the legal validity of contract formation. In this context, the issue of legal applicability needs to reassess the legitimacy standards for contract formation to ensure the full recognition of contractual relationships in the digital era.

#### **4.1.2. Legal Status of Smart Contracts**

The rise of smart contracts raises questions about their legal status within the legal system. This issue involves the positioning of smart contracts in the legal framework, their relationship with traditional contracts, and how the law adapts to the legal challenges posed by this emerging technology.

The legal status of smart contracts involves whether they can be considered legally valid contracts. Since smart contracts typically take a digital form, their execution relies on programming code rather than traditional written or verbal expressions. The legal system needs to consider how to confirm the legality of smart contracts and how to provide legal recognition to issues that may arise during their execution. Establishing the legal status requires a comprehensive consideration of the interactive impact of technology, law, and contractual principles to ensure that smart contracts have clear legal efficacy within the legal framework.

The relationship between smart contracts and traditional contracts needs clarification. The emergence of smart contracts does not imply the loss of legal effectiveness for traditional contracts; both may coexist on different levels. The legal system needs to clearly specify the mutual relationship between smart contracts and traditional contracts and determine which form of contract should take precedence in specific situations. This involves a deep understanding of the legal interaction between smart contracts and traditional contracts to avoid duplication and contradictions within the legal system[9].

Moreover, the legal status of smart contracts is also related to their technological characteristics during the execution process. Smart contracts typically achieve automatic execution, presenting significant differences in fulfillment compared to traditional contracts. The legal system needs to consider how to provide clear legal grounds for the automatic execution of smart contracts within legal rules while safeguarding the rights and obligations of parties during technological execution.

## **5. Summary**

### **5.1. Judicial Interpretation and Application**

The rise of smart contracts poses new challenges to legal practice, with judicial interpretation and application becoming a crucial focal point. Traditional contract interpretation and application usually rely on understanding written documents and applying legal principles, whereas smart contracts often exist in the form of programming code, requiring judges to consider novel methods of interpretation

and application.

### 5.1.1. Technical Background Requirements for Judges

The code logic of smart contracts may demand judges to possess a certain level of technical background for full comprehension. In the process of judicial interpretation and application, judges may need an in-depth understanding of how smart contracts are written, executed mechanisms, and the technical details involved. This raises the bar for the technical literacy of traditional judges, necessitating legal systems to adapt to the need for judges' training and technical support in the digital age.

### 5.1.2. Challenges in Judicial Interpretation

The automatic execution feature of smart contracts may introduce new challenges to judicial interpretation. Traditional contract disputes typically involve issues of intention and breach, while smart contracts' automatic execution may lead to deeper disputes involving the accuracy of code logic and potential vulnerabilities. In judicial interpretation, judges need to review the contract's execution history and code logic to better understand the nature of contract disputes, challenging traditional courtroom procedures and judge interpretation methods[10].

### 5.1.3. Cross-Border Nature of Smart Contracts

Smart contracts may have a cross-border nature, involving the application of laws from different jurisdictions. In judicial interpretation and application, judges may need to coordinate the differences between different legal systems to ensure a unified interpretation and application of smart contracts. This requires active international cooperation and the formulation of legal norms.

## 5.2. Case Analysis

In 2019, the Hangzhou Internet Court handled the first case in China applying blockchain smart contract technology. The case involved a dispute between a plaintiff, a company from Shenzhen, and the defendant over a network shopping contract. The parties signed a "User Lease and Service Agreement" through an e-commerce platform, specifying terms such as the value of the goods, rent, and the handling of breaches. The defendant defaulted on subsequent payments after paying the initial rent. According to the contract terms, the plaintiff declared the lease relationship transformed into a sales relationship and demanded the remaining payment for the goods and a penalty for the breach.

The key point in the court's ruling was the full life-cycle on-chain notarization of the smart contract. Every step of the transaction, including ordering, signing, delivery, and overdue payments, was automatically notarized on the judicial blockchain, ensuring the reliability of electronic data. The court ultimately affirmed the legality and validity of the "User Lease and Service Agreement," ruling that the defendant should continue to fulfill the obligation to pay for the products and the penalty for breach.

This case illustrates the application of smart contracts in judicial practice. The automatic execution and on-chain notarization of smart contracts provide a transparent and reliable resolution mechanism for both parties and an efficient adjudication tool for the court. This case not only showcases the potential of smart contract technology in the legal domain but also highlights technological issues that need consideration in future judicial interpretation and application, such as the legality of code and the relationship between automatic contract execution and legal provisions.

## 6. Conclusion

The emergence of smart contract technology prompts new considerations in contract law. Through a comparison of smart contracts with traditional contracts, unique advantages in contract design, execution efficiency, and transparency become evident. However, this new technology also brings forth a series of challenges in legal theory and legal practice.

In exploring the impact of smart contracts on the expression of free will, we discussed their flexibility in contract design and the convenience of automatic execution. While smart contracts provide more autonomy to parties, technical limitations may simultaneously have negative effects on free will. In the challenges of legal rules, we emphasized the issue of legal applicability, emphasizing the importance of on-chain notarization in resolving legal disputes. The latest case analysis demonstrates the potential of smart contracts in judicial practice, addressing e-commerce disputes and pointing out future technological issues in judicial interpretation and application.

Smart contract technology brings unprecedented innovation to contract law. However, in embracing this development in legal technology, serious consideration is needed to safeguard the expression of parties' free will and ensure that the technical features of smart contracts do not negatively impact the principle of contract freedom. Simultaneously, legal systems must adapt to the demands of the digital age, continually refine regulations to govern the application of smart contracts, and provide necessary technical training and support for judges.

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