

Model Changes and Regulatory Paths of Contractual Conduct in the Digital Era

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Abstract: The deep popularization of digital technologies has reshaped traditional civil transaction forms, rendering contractual conduct with brand-new characteristics, including online contracting, lightweight consensus, intelligent performance, and standardized clauses. New transaction modes such as algorithm-based contracting and smart contracts, as well as online standard contracts, keep emerging and greatly boost the efficiency of commercial transactions. On this basis, this paper focuses on discussing the model changes and regulatory paths of contractual conduct in the digital era, so as to provide theoretical references for protecting the legitimate rights and interests of civil subjects under the digital background.

Keywords: Contractual conduct; Regulation; Digital economy; Intelligent technology; Market transaction

Online publication: August 31, 2026

1. Introduction

The rapid iteration of the digital economy and the wide application of intelligent technologies have profoundly transformed the operational logic and behavioral paradigm of traditional civil and commercial transactions. As the core legal instrument for market transactions, contracts have undergone in-depth structural changes in their formation mechanism, manifestation, and performance modes. Online platform contracting, automatic algorithm matching, automatic smart contract performance, and standardized electronic clauses have gradually become mainstream transaction forms, presenting brand-new digital, automatic, programmed, and large-scale features^[1]. Against this backdrop, the institutional tension between the lag of traditional contract legal systems and the innovativeness of digital transactions has become increasingly prominent, giving rise to governance dilemmas such as ambiguous legal application, unclear rights and obligations of subjects, anomie of algorithm power, and insufficient protection of consumers. Therefore, sorting out the model changes and regulatory paths of contractual conduct in the digital era bears great practical significance.

2. Model changes of contractual conduct in the digital era

2.1. Breaking physical time-space constraints and realizing digital transformation

Under the framework of traditional civil transactions, contract contracting centers on face-to-face consultations and offline consensus communication between two or multiple parties, as well as signing paper documents, featuring strong certainty and perceptibility. With the full popularization of network information technology, digital platform carriers, and cloud transaction systems, contract forms have undergone fundamental structural changes, completely breaking the rigid physical time-space restrictions and taking on virtual, boundless, and round-the-clock digital characteristics ^[2]. On the one hand, contractual conduct in the digital era mainly takes online virtual space as the core carrier. Relying on platform-based and cloud-oriented transaction frameworks, contracting can be carried out across regions, time periods, and scenarios. Contracting parties can complete the whole process without physical contact, thoroughly eliminating geographical and temporal limits of traditional contracting venues.

On the other hand, it accommodates multi-subject, multi-scenario, and multi-type commercial transactions, enabling orderly small-sum, high-frequency, massive, and cross-regional large-scale transactions, and thoroughly altering the closed, static, and limited operation form of traditional contracting venues ^[3].

2.2. Shifting from paper carriers to electronic contracts

The comprehensive application of digital technologies has overturned the traditional paper-based contracting paradigm and driven the full transformation of contracting forms to electronic data and cloud storage. Electronic contracts, electronic signatures, data messages, and cloud documents have become core contracting carriers. For instance, the agreed content of contracts, rights and obligations clauses, and transaction agreements can be directly converted into identifiable, storable, and transmissible electronic data, breaking free from physical paper restrictions and boasting advantages of instant transmission, convenient storage, flexible iteration, and environmental efficiency ^[4].

Meanwhile, digital contract forms no longer fix transaction content via physical media. Instead, they adopt digital technologies such as data messages, electronic signatures, and trusted timestamps to fix and confirm contract content, making contract documents dynamic, transferable, and verifiable.

2.3. Realizing intelligent and automatic performance independent of manual operation

The traditional contract performance model centers on the paradigm of manual autonomous fulfillment by civil subjects; all stages of contract performance—such as process progression, obligation fulfillment, progress monitoring, settlement and delivery, and performance verification—are completed through the independent decision-making, manual operation, and offline execution by civil subjects; consequently, the performance process exhibits distinct characteristics of manual nature, autonomy, phased progression, and controllability ^[5]. In contrast, contract-related activities in the digital age are increasingly becoming intelligent; specifically, the intelligent performance model typically leverages the technical advantages of blockchain, intelligent algorithms, and automated programs to embed the rights and obligations stipulated in the contract, performance conditions, settlement standards, and delivery rules directly into an intelligent program system. When the preset performance conditions are met, the system can automatically trigger the performance process, autonomously completing core contract performance actions—including fund

settlement, delivery of subject matter, data transmission, and service provision—without requiring any manual intervention or autonomous operation from the parties involved.

3. Dilemmas brought by model changes of contractual conduct in the digital era

3.1. Prominent difficulty in verifying the authenticity of contract consensus

Most contract clauses are preset and standardized by platforms, and consensus is reached through programmed operations such as clicking confirmation, authorization, and default ticking. Civil subjects lack space to read clauses item by item, conduct independent negotiations, or make personalized revisions. Declarations of will mostly become formal consensus constructed by procedures rather than stemming from in-depth subjective cognition and voluntary game of parties. Meanwhile, current legal norms have not formed a unified system for reviewing the authenticity of programmed, implied, and algorithm-generated consensus, failing to effectively distinguish discrepancies between formal consent and true will, which leads to ambiguous confirmation of contract validity and insufficient authenticity^[6].

3.2. Aggravated information asymmetry

In digital transaction scenarios, contract clauses are lengthy, complex, highly professional, and multi-layered, raising the information identification and cognitive threshold for ordinary contracting parties. On the one hand, standard clauses are usually concealed and presented in nested links. A large number of rights, exemptions, and liability limitations are embedded in secondary pages, privacy agreements, and service rules, breaking the centralized and explicit display mode of traditional paper contracts and making it hard to implement regulatory standards of prominent reminders^[7]. On the other hand, the instant nature of digital transactions prevents parties from fully reading and comprehending massive standard clauses. Formal “click to agree” cannot achieve substantive informed consent, rendering the regulation of standard clauses a mere formality.

3.3. Imperfect normative system for electronic contracts

The generation, storage, transmission, and modification of electronic contract evidence all rely on technical procedures, and their authenticity verification demands professional technical inspection. Traditional judicial experience and criteria for evidence examination cannot adapt to digital evidence forms, resulting in inconsistent admissibility standards and vague authenticity presumption rules^[8]. In addition, the existing civil procedure evidence rules lack a sound system for electronic contracts. Digital transactions are fragmented, small, and frequent, giving rise to numerous contract disputes with scattered records and incomplete transaction chains, which further raises the difficulty of right relief.

4. Regulatory paths of contractual conduct in the digital era

4.1. Establish a validity rule system for digital consensus to protect users’ right of independent decision-making

Relevant authorities should systematically expand and normatively update the criteria for determining express declarations of intent, the requirements for validity, and the framework for assessing defects, thereby facilitating the adaptive evolution of the principle of private law autonomy from traditional individual

autonomy to digital procedural autonomy ^[9]. First, a differentiated and hierarchical review system for the validity of digital consensuses should be established, setting distinct validity determination standards tailored to various forms of digital consensus—such as platform-prescribed clauses, algorithmic matching of intent, batch-click consent, and silent authorization confirmation.

Secondly, it is essential to clarify the effective elements of procedural consent, define the legal validity of users' implied confirmation and passive consent, and establish a seamless legal connection between formal consent and substantive intent. Finally, it is necessary to construct a systematic remedy framework for defects in digital intention; specifically, by addressing new types of intentional defects prevalent in digital contexts—such as unreviewed consent, insufficient cognition, and passive contracting—this framework should refine the criteria for identifying major misinterpretation, standard-form contract defects, and false intention; it should also enhance the regulatory system governing the revocation, modification, and invalidation of digital contracts, thereby safeguarding the autonomous decision-making rights of civil subjects during the digital contracting process ^[10].

4.2. Optimize electronic evidence rules to improve data authenticity

To address the judicial adaptation challenges posed by electronic data evidence—such as its susceptibility to destruction or tampering, difficulty in authentication, and difficulty in providing supporting proof—it is essential to systematically optimize the rules governing electronic contract evidence and enhance the verification of the authenticity of electronic data, thereby safeguarding the legitimate rights and interests of all parties involved.

First, it is necessary to unify the judicial admissibility standards for electronic contracts, electronic signatures, trusted timestamps, and cloud-based transaction records; clarify the review criteria for the authenticity, legality, and relevance of electronic data; establish presumptive rules for electronic evidence tailored to digital transactions; and grant presumptive validity to electronic contracts that comply with technical compliance standards ^[11].

Secondly, by introducing digital evidence preservation technologies such as blockchain-based evidence storage, timestamping for permanent fixation, and cloud-based notarization, officials can establish a comprehensive evidence preservation mechanism for transaction data—one that ensures full-process retention, real-time fixation, and immutability—thereby addressing the practical challenges associated with fragmented digital transaction evidence—namely, its tendency to be easily lost or difficult to secure—and providing stable evidentiary support for small-amount, high-frequency, and large-volume fragmented digital disputes.

Third, the evidentiary rules for digital contract disputes should be restructured by leveraging the principle of balancing evidentiary capacity, thereby establishing the burden of proof advantage for the platform's data holder, and clarifying the platform's evidentiary obligations regarding original transaction data, algorithm operation records, and contract formation and performance logs ^[12].

4.3. Standardize electronic contract clauses and promote fairness in transactions

Currently, for electronic contracts in the digital age to completely replace traditional paper-based contracts, it is essential to refine the rules governing the prompting, disclosure, review, and validity determination of digital clauses; to rectify the imbalance in transactional positions between platforms and ordinary users; and

to achieve a profound upgrade from formal fairness to substantive fairness in digital contract transactions. On one hand, this involves reshaping the information disclosure obligations and special prompting obligations of digital platforms, establishing the principle of explicit display for digital standard-form clauses, clarifying the standards for platforms to provide mandatory and prominent prompts regarding exemption clauses, liability limitation clauses, risk clauses, and special rights allocation clauses, regulating the applicable boundaries of linked, nested, and collapsible clauses, and prohibiting the use of page hierarchy, reading barriers, or operational inertia to circumvent or indirectly deprive users of their right to informed review^[13].

On the other hand, it is essential to establish standardized regulatory rules for dynamic standard-form contracts by clarifying the conditions under which platform unilateral updates, algorithmic adjustments, or backend modifications of contractual terms shall take effect; establishing a principle whereby the effectiveness of such updates is centered on user informed consent; and prohibiting platforms from unilaterally forcing changes to contract contents. Only through these measures can the inherent information asymmetry and power imbalance inherent in digital transactions be mitigated, the efficiency and fairness of digital transactions be balanced, and a regulated, orderly, fair, and just transactional order for digital standard-form contracts be established.

4.4. Improve the legal system of electronic contracts to secure transaction safety

Digital contracts are digital and intelligent legal instruments operated mainly via internet platforms. Their drafting, storage, and circulation are completed virtually between contracting parties^[14]. The formulation and application of electronic contracts rely on a sound legal system as the fundamental support. Therefore, a specialized legal framework for electronic contracts shall be systematically improved to realize legal governance of digital transactions. Specifically, based on the Civil Code Contract Part and Electronic Signature Law, systematically supplement basic rules regarding the legal status, formal elements, and validity of electronic contracts, clarify the legal standing of new forms such as data messages and online consensus, and equalize the legal effect of electronic and paper contracts.

Besides, digital platforms act as core hubs of contract transactions, storing personal information, transaction data, and consensus records generated during full-cycle contracting and performance. Authorities shall formulate legal mechanisms for information protection, strictly define platforms' boundaries for collecting, storing, and using user data, strengthen account management, and prevent unauthorized access to confidential privacy data^[15].

Most importantly, detailed liability and punishment systems for platform privacy infringement shall be formulated, clarifying fault liabilities and compensation standards for privacy damages caused by platform management loopholes and technical defects, so as to build a solid legal shield for privacy security in digital contract transactions.

5. Conclusion

In summary, contractual conduct has undergone profound transformations in the digital era, with electronic contracts becoming the mainstream trend. Strategies including establishing validity rules for digital consensus, optimizing electronic evidence rules, standardizing electronic clauses, and perfecting electronic contract legal systems can effectively remedy defects of traditional contract laws, regulate digital transaction order, and protect civil subjects' legitimate rights, thus promoting the digital transformation of contract legal institutions.

Funding

Scientific Research Project of Shenzhen University of Polytechnic “Research on Innovative Theories and Implementation Paths of Contract Interpretation in the Digital-Age Context” (Project No.: 6023310015S)

Disclosure statement

The author declares no conflict of interest.

References

- [1] Yang B, 2025, Institutional Dilemmas and Solutions of Contract Consensus in the Digital Age. *Journal of Comparative Law*, 2025(3): 208–222.
- [2] Zheng YF, 2025, Research on the Public Domain of Copyright under Digital Technology, thesis, Yantai University.
- [3] Hua CG, 2025, Research on Laborers’ Privacy Protection in the Digital Era, thesis, Jiangxi University of Finance and Economics.
- [4] Gu NN, 2025, Judicial Determination of the Validity of Laborers’ Advance Termination of Labor Contracts, thesis, Guizhou University of Finance and Economics.
- [5] Ma QS, 2025, Legal Issues Arising from Enterprises’ Unilateral Modification of Labor Contracts, thesis, Guizhou University of Finance and Economics.
- [6] Gong YC, Lin X, 2024, Determination of the Reminder Obligation of Standard Clauses under Multi-scenario Electronic Contracts. *People’s Judicature*, 2024(30): 48–50 + 55.
- [7] Xue DY, 2024, Research on Information Construction of Enterprise Contract Management. *China Management Informationization*, 27(19): 100–102.
- [8] Chen ZL, 2024, Analysis of Legal Issues of Electronic Contracts in Digital Economy. *Economic Research Guide*, 2024(18): 148–151.
- [9] Liu ZY, Zhang J, Wang CZ, 2024, Electronic Secure Cloud Storage System Based on Blockchain Technology. *Techniques of Automation and Applications*, 43(9): 105–108.
- [10] Jia K, Zhang Y, 2024, Paths to Optimize Enterprise Contract Management Under Digital Transformation. *Agriculture Development and Finance*, 2024(9): 85–87.
- [11] Liu YH, 2024, New Contract Issues and Legal Application in the Digital Context. *Legal Vision*, 2024(24): 40–42.
- [12] Dai H, 2024, Research on Consensus Issues of Online Standard Form Contracts, thesis, Nanjing University of Information Science and Technology.
- [13] Li Z, 2024, Brief Analysis of Legal Problems of Electronic Contracts in Digital Economy. *Hebei Enterprises*, 2024(6): 143–145.
- [14] Shang WT, 2022, Digital Contract Management of Airlines in the Digital Era. *Modern Enterprises*, 2022(2): 17–18.
- [15] Pan YS, 2021, On the Validity of Electronic Contracts Signed by Minors, thesis, Minzu University of China.

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