

# Technological Innovation and Contract Law Protection: A Jurisprudential Analysis of Risk Allocation

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## Abstract

**Innovation in science and technology has brought about significant benefits to economic and social development, while simultaneously posing challenges to the legal system. As a core component of the legal framework, contract law faces the challenge of adapting to the uncertainties of technological innovation in the allocation of risks, as well as protecting the rights and interests of all parties within the complex network of multi-party cooperation. Consequently, a jurisprudential analysis of the relationship between technological innovation and contract law protection from the perspective of risk allocation has become increasingly important. The findings of the study suggest that lawmakers should fully consider the particularities of technological innovation in the development of contract law, focusing on issues of technological uncertainty and ethical boundaries, to ensure comprehensive and balanced protection of the rights and interests of innovators within the legal framework.**

## Keywords

**Technological Innovation; Contractual Law Protection; Risk Allocation; Jurisprudential Analysis; Technological Uncertainty.**

## 1. Introduction

The rapid development of technological innovation has not only shaped the global economic landscape but also brought profound transformations to society. With the continuous emergence of technological innovation projects, their applications in fields such as business, healthcare, and communications have become increasingly widespread, serving as a significant engine for societal progress. However, the unique nature of technological innovation has also prompted reflection and adjustment within the legal system. Against this backdrop, contract law, as one of the core elements of the legal system, should adapt to and address the challenges posed by technological innovation.

The uncertainty inherent in technological innovation highlights the deficiencies in the legal system's approach to risk allocation. Due to the high complexity and evolving nature of technology, innovators often find it difficult to predict the success of projects, introducing significant uncertainty into the risks associated with contract fulfillment. This uncertainty encompasses not only technological risks but also the adaptability of business models and the protection of intellectual property rights. Therefore, contract law needs to be more flexible in addressing various levels of uncertainty during the risk allocation process to safeguard the rights and interests of innovators[1].

Technological innovation involves a complex network of multi-party cooperation, where the relationships of rights and responsibilities among contracting parties are intricately intertwined. In innovation projects, the cooperative relationships between different entities encompass both technological collaboration and the sharing of commercial interests and risk distribution. Contract law must protect the rights of all parties while ensuring the effective

operation of the overall collaboration. Thus, a deep understanding of the jurisprudential foundations of contract law in the context of multi-party cooperation is of urgent practical significance for constructing a contract law system in the field of technological innovation.

Technological innovation brings about not only changes at the technological level but also challenges to traditional legal concepts. Traditional contract law often struggles to encompass the unique legal issues arising from emerging technological innovations, such as ethical and legal boundary issues in fields like artificial intelligence and biotechnology. Therefore, the research context should focus on the jurisprudential thinking of contract law in the face of legal challenges posed by technological innovation, to better adapt to the ever-changing technological environment.

## 2. Types of Risks in Technological Innovation

### 2.1. Legal Challenges of Technological Uncertainty

In the early stages of technological innovation, technological uncertainty poses serious and complex legal challenges to contract law. The risks associated with the development phase of technology lead to difficulties in fulfilling contractual obligations regarding technological feasibility. During this phase, innovation projects are often plagued by uncertainty regarding the technical solutions, making it difficult for contracting parties to determine specific technological directions and feasibility at an early stage. This creates complications in contract performance, as the lack of a definitive technological foundation makes it challenging for both parties to clarify the standards and methods for fulfillment, leading to legal ambiguities in the execution of contracts[2].

The legal challenge of intellectual property (IP) protection is also particularly significant during the technological development phase. In innovation projects, protecting the emerging new technologies, methods, or discoveries is crucial. However, in the early stages of technology, these rights are often difficult to define accurately. While contract parties strive to ensure that IP rights are not infringed upon, they also face uncertainty regarding the future ownership of these rights, which can lead to difficulties in contract interpretation and performance.

The role of contract law is particularly critical in defining the responsibilities and obligations of the innovating entity. First, contract law plays a guiding and regulatory role in clarifying responsibilities. In the context of technological uncertainty, it is challenging for contract parties to foresee the specific trajectory of technological development; thus, the function of contract law in clearly defining responsibilities becomes even more important.

Another significant legal challenge faced by innovating entities under technological uncertainty is the interpretation and performance of contracts. As technology evolves, both parties may need to interpret and adjust the contract due to adjustments in the technical solutions or the resolution of technical challenges.

### 2.2. Legal Challenges Brought by Business Model Innovation

Business model innovation presents complex and challenging legal issues for contract law. Firstly, in terms of business cooperation and profit distribution, the design of contracts between the innovating entity and its partners becomes a key focal point. During the process of business model innovation, both parties may need to adjust the existing contractual structure to accommodate new commercial cooperation requirements.

Secondly, the agreement on the sharing of commercial benefits upon successful innovation touches the core of the business model and also raises legal challenges for contract law. In business cooperation, contract parties need to clarify the mechanisms for sharing commercial benefits after successful innovation, including but not limited to revenue distribution and intellectual property sharing.

In the context of market changes and their relation to competition law, the role of contract law in adjusting to market transformations is particularly crucial. Innovations in business models often come with adjustments to market structures, which may lead to legal issues in contract performance. Additionally, business model innovation may encroach upon the domain of competition law. Contract law should promote the development of business model innovation within a compliant framework by establishing a connection between its jurisprudential principles and those of competition law[3].

### **3. The Intersection of Technological Uncertainty and Contract Design**

#### **3.1. The Concept of Technological Uncertainty**

Technological uncertainty, a central concept in the field of technological innovation, plays a crucial role in contract design. Initially, it is essential to clarify the concept of technological uncertainty. This refers to the phenomenon where, due to the complexity, novelty, and unpredictability of the external environment in the technological domain, it is impossible to accurately predict the direction, speed, and ultimate outcome of technological development at the initial stage. This concept encompasses various unknown factors in technology research and development, including but not limited to the feasibility, reliability, and market acceptance of the technology.

The essence of technological uncertainty lies in the dynamic and unpredictable nature of the technological field, which makes it difficult for contract parties to determine the specific technological characteristics and outcomes of a project in advance. The sources of this uncertainty can include rapid changes in the technological field, unknown technological challenges, and shifts in market demand, among other factors. The presence of technological uncertainty poses additional challenges for contract design in technological innovation projects, requiring flexibility and comprehensive consideration within the contract.

From a jurisprudential perspective, technological uncertainty triggers profound reflection on the basic principles of contract law. The principle of freedom of contract requires that contract parties enjoy autonomy within the contract, but the existence of technological uncertainty means that both parties cannot fully understand the entire picture of future technological development when entering into a contract. This necessitates that contract design fully considers the flexibility and adjustability of the contract to adapt to changes brought about by technological uncertainty.

Furthermore, the principle of fair trade becomes particularly important in the context of technological uncertainty. Both parties should participate equally and enjoy the benefits of the contract, but technological uncertainty may lead to one party facing greater risks during contract performance. In contract design, the principle of fair trade is needed to ensure an equal distribution of rights and obligations between the contract parties when facing technological uncertainty, preventing one party from bearing an excessive risk due to uncertainty.

Under the concept of technological uncertainty, contract design must pursue a balance that ensures both the autonomy of contract parties and consideration of the potential uneven distribution of risks due to technological uncertainty. A profound understanding of the concept of technological uncertainty is crucial for contract design in the field of technological innovation, helping to establish a more flexible and adaptable contract mechanism to facilitate the smooth progress of technological innovation.

#### **3.2. Risk Management in Contract Design**

Risk management in contract design is particularly important when facing technological uncertainty. Firstly, risk management needs to fully consider the characteristics of technological uncertainty, which means that in technological innovation projects, due to the

complexity and unpredictability of technology, there are unknown technological challenges and variables. In contract design, risk management for technological uncertainty requires a thorough understanding and assessment of the project's technological characteristics, identifying and defining potential risks through clear contract terms.

Secondly, risk management needs to reduce disputes that may arise from technological uncertainty through the clarity and transparency of the contract. Clear and explicit terms in contract design help all parties to have a consistent understanding of the contract content, especially in situations with high technological uncertainty. Specific and clear agreements can effectively avoid disputes between the parties regarding technical issues. Transparent contract design not only enhances the willingness of all parties to fulfill the contract but also helps to reduce the occurrence of contract disputes[4].

Flexibility is an important consideration in risk management. Technological uncertainty often comes with changes in technology and adjustments in the direction of innovation. Therefore, contract design should have sufficient flexibility to adjust and modify the contract according to the actual situation during the performance of the contract. By establishing a flexible adjustment mechanism within the contract, contract parties can better adapt to the changes brought about by technological uncertainty, mitigating difficulties in contract performance due to unclear technological directions.

In risk management, both parties should jointly bear the uncertainty of technological innovation projects. Through contract design, a reasonable risk-sharing mechanism can be established, allowing both parties to have clear responsibilities and obligations when facing technological uncertainty. This involves the balance of contract terms, ensuring that no party suffers excessive losses due to technological uncertainty, nor is one party unduly favored, thereby ensuring the fairness and stability of the contractual relationship.

## **4. Legal Mechanisms for Protecting Innovators**

### **4.1. Protection of Innovators' Rights under Technological Uncertainty**

Under the technological uncertainty of scientific innovation, contract law plays a vital role as a legal mechanism for protecting the rights of innovators. Initially, during the technological development phase, contract law provides a safeguard for the feasibility of technology through contractual stipulations. The clear definition and regulation of rights and responsibilities in the technological development process not only help to prevent potential technological risks but also offer a legal framework for innovators, ensuring that their rights are not infringed upon during the innovation process.

At this level, the protection of technological feasibility stipulated by contract law extends beyond the mere realization of technology to include the design and protection mechanisms for intellectual property within contracts. By clarifying contractual terms regarding the ownership, use, and transfer of intellectual property, innovators can more confidently protect their unique innovative outcomes during the technological development process. This not only reflects the legal wisdom of contract law in regulating intellectual property relations but also provides innovators with legal means to ensure their innovative outcomes are fully protected under an uncertain technological environment.

Contract law plays a significant role in defining and mitigating the responsibilities of innovators. Through the legal mechanisms based on jurisprudential principles for defining responsibilities, contract law provides a clear framework of legal responsibilities for innovators. In the context of technological uncertainty, the clarity of contract law helps to avoid disputes that may arise from ambiguous responsibilities, providing a foundation for all parties to have a clearer understanding of their rights and obligations within the contractual relationship[5].

Moreover, the principles of contract interpretation and performance under technological uncertainty are also important legal tools for protecting the rights of innovators. Contract law, when facing technological uncertainty, ensures consensus among parties on the interpretation of contract terms through the flexible application of contract interpretation principles, reducing disputes that may arise due to technological uncertainty. Contract law emphasizes the principles of good faith and cooperation among contract parties, encouraging joint efforts to overcome technological challenges and ensure the smooth fulfillment of contracts.

#### **4.2. Protection of Innovators' Rights under Business Model Innovation**

In the context of business model innovation, contract law plays a key role as a legal mechanism for protecting the rights of innovators. Firstly, the principles of contract design between innovators and their partners are crucial in coordinating with contract law. Contract law provides a legal framework for building cooperative relationships by stipulating basic principles of contracts, such as the principle of free will and the principle of equal negotiation. This framework aims to ensure equal treatment and full protection of rights for both parties in business cooperation[6].

On this basis, the contractual agreement on the sharing of commercial benefits upon successful innovation becomes a core issue in business model innovation. Contract law supports the free agreement principle of contracts, allowing innovators and partners to clearly define the distribution of commercial benefits within the contract. This flexibility helps both parties to establish practical business cooperation models based on the specific circumstances of the project while ensuring fairness and equity in the contractual agreement, protecting the rights of innovators in business cooperation.

Secondly, contract law plays a key role in adjusting and protecting the rights of innovators in the face of market changes. As the market environment continues to evolve, the rights of innovators face new challenges. Contract law provides a legal basis for adjusting the rights of innovators in the face of market changes through its provisions on contract interpretation principles and contractual performance obligations. The flexibility of contract law allows parties to make适度 adjustments to the contract under changing market conditions to ensure a balanced and maintained relationship of rights between both parties[7].

Additionally, the issue of competition law compliance for innovative projects is also an aspect that cannot be overlooked in business model innovation. The combination of contract law and competition law ensures that innovators act legally and compliantly in a competitive environment by regulating competitive behaviors in business cooperation. This combination provides legal constraints for business model innovation, enabling innovators to operate effectively within the dual frameworks of contract law and competition law, safeguarding their fair rights in market competition.

#### **4.3. Protection of Innovators' Rights at the Intersection of Ethics and Legal Boundaries**

At the intersection of ethics and legal boundaries, contract law appears as a complex and critical legal framework for protecting the rights of innovators. Firstly, the role of contract law in addressing ethical issues involves the social, moral, and human value aspects that innovative activities may touch upon. In this context, contract law is not only a regulation of contractual relationships but also an important platform for jurisprudential thinking on ethical issues.

The jurisprudential thinking of contract law on ethical issues is reflected in the emphasis on principles such as fairness and good faith in contracts. During the formation and performance of contracts, innovators and partners should follow the principles advocated by contract law to ensure equality and relative balance of rights among all parties in cooperation. Especially in situations involving ethical issues, contract law should provide more specific and clear

regulations for contractual relationships through the principles of contract interpretation, adapting to the complexity and diversity of ethical values[8].

Balancing legal boundary issues with the rights of innovators becomes another significant challenge for contract law. Innovative projects often operate in the gray areas of the law, potentially touching the boundaries of the legal system. In this context, contract law needs to have certain adjustment mechanisms to address potential legal boundary issues in innovative projects. These adjustment mechanisms should be based on jurisprudential principles to ensure a balance between the rights of innovators, the public interest of society, and the integrity of the legal system in handling legal boundary issues[9].

## 5. Case Analysis

### 5.1. Typical Case

In the case of Kunshan Yitian Intelligent Technology Co., Ltd. v. Nanchang Demando Technology Co., Ltd. (Supreme People's Court of China, Civil Final No. 709, 2022), the Supreme Court held that although the contract in question was named "Technical Development (Cooperation) Contract," the nature of the contract should be determined based on the rights and obligations stipulated in the contract, rather than the name itself, and the applicable laws and regulations should be applied accordingly.

The main point of contention in this case was the inconsistency between the name of the contract and its substantive content. Despite the contract being titled "Technical Development (Cooperation) Contract," the actual content revealed that Nanchang Demando Company had already filed a patent application for a fully automatic tissue pathology specimen processing system and was seeking cooperation with Kunshan Yitian Company to commercialize this technical solution. Thus, the true purpose of the contract was not the joint development of new technology but rather the further refinement and commercialization of existing technology.

The Supreme Court, in adjudicating this case, reiterated that the name of the contract should not be the sole or decisive factor in determining the nature of the contract. The court stated that the nature of the contract should be determined based on the rights and obligations stipulated in the contract terms. In this case, the court ultimately determined that the contract was a technical development commission contract, with Kunshan Yitian Company as the commissioning party responsible for designing, assembling, and debugging mechanical components according to the technical requirements of Nanchang Demando Company, and delivering the research and development results on schedule. Nanchang Demando Company, as the commissioning party, provided necessary medical technical support and paid the corresponding research and development remuneration.

The judgment in this case is of significant importance for understanding and applying the principles of risk allocation in contract law. It emphasizes the necessity for contract parties in rapidly developing technological fields to clearly define their respective rights and obligations to ensure that risks in the technological development process are allocated reasonably. Moreover, this case provides guiding precedents for future similar disputes over technical development contracts, helping to reduce contract disputes and promote the healthy development of technological innovation.

### 5.2. Jurisprudential Interpretation

From a jurisprudential perspective, the case of the technical development commission contract dispute between Kunshan Yitian Intelligent Technology Co., Ltd. and Nanchang Demando Technology Co., Ltd. focuses on several core elements: the determination of the nature of the contract, the allocation of rights and obligations, and the interpretation of contract terms. The main issue faced by the Supreme Court was the inconsistency between the name of the contract

and its substantive content. The court's judgment emphasized the importance of the substantive content of the contract, even though it was named "Technical Development (Cooperation) Contract." Since the contract terms clearly defined the rights and obligations of both parties, the nature of the contract should be determined based on its substantive content. The court further analyzed the background of the contract, noting that Nanchang Demando Company had submitted a patent application for the fully automatic tissue pathology specimen processing system before the contract was signed, indicating that the technical solution was essentially formed, and the purpose of the contract was to commercialize this technical solution, rather than to jointly develop new technology from scratch. This was corroborated by the contract terms where Nanchang Demando Company provided medical technical support, and Kunshan Yitian Company was responsible for the design, assembly, and debugging of the relevant mechanical components. Therefore, the court determined that the contract was a technical development commission contract.

The court's judgment reflected the application of the principle of allocation of rights and obligations in contract law. As the commissioning party, Kunshan Yitian Company undertook the research and development work and was required to deliver the research and development results on schedule, while Nanchang Demando Company, as the commissioning party, was responsible for providing technical support and paying the research and development remuneration. This clear allocation of rights and obligations helps both parties to understand their respective responsibilities and expectations, thereby reducing the risks associated with technological uncertainty[10].

## 6. Conclusion

The legal environment in the field of technological innovation is complex and ever-changing, with contract law demonstrating notable adaptability and flexibility within this context. Secondly, technological uncertainty poses significant risks to innovators, and contract law provides effective legal protection for innovators during the technological development phase through legal mechanisms such as clear contract definitions, principles of interpretation, and performance standards. Furthermore, in the context of business model innovation, contract law harmonizes the relationship between innovators and their partners by coordinating contract design principles and contractual agreements on the sharing of commercial benefits, safeguarding the rights and interests of all parties. Lastly, when confronted with issues at the intersection of ethics and legal boundaries, contract law offers innovators clear legal guidance through jurisprudential reflection and analysis of legal boundary issues.

## References

- [1] Khan A, Jiliani M A H S. Expanding The Boundaries Of Jurisprudence In The Era Of Technological Advancements[J]. IIUMLJ, 2023, 31: 393.
- [2] Casarosa F. Technology-Neutral Legislation: Are Judges Able to Keep Pace with Technological Innovation?[J]. Available at SSRN 4391702, 2022.
- [3] Sund P. The Rationality Gap between Cyber Security and Rule of Law in Extra-Territorial Processing of Classified Information on Cloud Environments[J]. 2020.
- [4] Sidorenko E L, von Arx P. Transformation of law in the context of digitalization: Defining the correct priorities[J]. Digital LJ, 2020, 1: 24.
- [5] Wan V, Jiming Y. Torts and intellectual property in Industry 4.0: a comparative study of Chinese and American jurisprudence[J]. Peking University Law Journal, 2021, 9(1): 111-142.
- [6] Dong Y, Wang C. Copyright protection on NFT digital works in the Metaverse[J]. Security and Safety, 2023, 2: 2023013.

- [7] Ohya T. Image of jurisprudence reconstructed to enhance innovation: Liability allocation for improved predictability[J]. *Innovation Beyond Technology: Science for Society and Interdisciplinary Approaches*, 2019: 285-299.
- [8] Brownsword R. Regulatory fitness: Fintech, funny money, and smart contracts[J]. *European Business Organization Law Review*, 2019, 20: 5-27.
- [9] Sidorenko E L, von Arx P. Transformation of law in the context of digitalization: Defining the correct priorities[J]. *Digital LJ*, 2020, 1: 24.
- [10] Wang J, Lei C. Will innovative technology result in innovative legal frameworks?—smart contracts in China[J]. *European Review of Private Law*, 2018, 26(6).