**Frontiers in Business, Economics and Management**
ISSN: 2766-824X | Vol. 12, No. 1, 2023

# Integration Mechanism of Intellectual Property and Scientific and Technological Innovation from A Cross-domain Perspective: International Experience and Enlightenment

**Mingkai Guo, Chao Wang, Sen Chen, Ying Hu, Wenhui Zhang**

East China Jiaotong University, Nanchang, China

**Abstract:** With the deepening of economic globalization and technological advancement, intellectual property and technological innovation have increasingly become pivotal elements driving economic growth and societal progression. A coupling relationship exists between intellectual property and technological innovation: technological advancement promotes the continuous evolution of intellectual property systems, while conversely, intellectual property stimulates technological innovation. By analyzing the intellectual property strategies characteristic of various nations, it is discerned that propelling technological innovation fundamentally depends on establishing a legal system and cultural environment conducive to incentivizing and safeguarding innovative outcomes. On the one hand, it's vital to ground strategies in the nation's realities. On the other, there's a need to incorporate the best from all sources, with an emphasis on indigenous innovation and applying these insights for national benefit, shaping an intellectual property legal framework with Chinese characteristics. Amid China's rapid development trajectory, the structure of its technological innovation chain manifests a "broad-middle and narrow-ends" configuration. The optimal remedy lies in delineating a developmental pathway for the intellectual property sector that aligns with China's unique circumstances. To elevate technological innovation, China ought to reinforce intellectual property education, establish an efficient operational model, intensify international collaboration and exchanges, ensuring the profound integration and symbiotic growth of intellectual property and technological innovation.

**Keywords:** Intellectual property; Scientific and technological innovation; International experience.

## 1. Introduction

With the deepening of globalization, intellectual property rights and scientific and technological innovation have become the core elements of national competitiveness. The relationship between the two affects not only every innovator, but also the economic prospects and development speed of a country or region. However, it is an extremely challenging task to combine intellectual property rights with innovation and technology construction in a specific national context, so as to optimize the overall innovation ecology.

Intellectual property rights, as a means of legal protection for innovation, aim to balance public and private interests and encourage more innovation activities. Scientific and technological innovation, on the other hand, is an important driving force for sustained economic growth and social well-being. In theory, the existence of the intellectual property system should provide protection and incentives for scientific and technological innovation, but in practical application, how to deal with the relationship between the two and how to learn lessons from the experience of other countries or regions is still a topic worthy of in-depth discussion.

International experience, especially the practice of some countries or regions that have made remarkable achievements in the field of intellectual property and scientific and technological innovation, provides us with valuable references. Their success is largely related to their effective integration mechanisms. Through the study of these successful experiences, we can not only deeply understand the internal relationship between intellectual property rights and scientific and technological innovation, but also provide inspiration for our own policy making and practice. However, it is not realistic to directly copy the experience of other countries, as each country or region has its own unique social, economic and cultural background. This requires a more nuanced analysis to determine which experiences are suitable for us and which need to be adjusted or avoided.In view of this, this study aims to explore the integration mechanism of IP and STI from a cross-domain perspective and provide theoretical and empirical support for relevant policy making and practice in the light of international experience.

## 2. Intellectual Property Rights and Scientific and Technological Innovation: Exploration of Basic Theories

With the deepening of economic globalization and technological development, intellectual property rights and scientific and technological innovation have gradually become key factors in promoting economic growth and social progress. This chapter will explore in depth the basic theory and internal mechanism of intellectual property rights and scientific and technological innovation.

### 2.1. Definition and Classification of Intellectual Property Rights

#### 2.1.1. Definition of Intellectual Property Rights

Intellectual property rights, French "Propriete Intellectuele", German "Geistiges Eigentum". The concept of intellectual property rights was firstly proposed by the French scholar Captseau in his work in the 17th century.

Subsequently, the Belgian jurist Picardy further elaborated and developed the concept. Since then, the doctrine of intellectual property has been widely disseminated internationally, and in 1976, with the signing of the Convention Establishing the World Intellectual Property Organization (WIPO), the concept of "intellectual property" was recognized by the majority of countries and regions in the world, as well as by many international organizations.

In China, "intellectual property" has long been called "intellectual achievement right", and Taiwan is called "intellectual property right". 1986, China's General Principles of Civil Law officially In 1986, China's General Principles of Civil Law formally adopted the term "intellectual property rights", while Taiwan still uses the term "intellectual property rights".

It is now generally recognized that intellectual property rights are the rights that people enjoy in accordance with the law over their specific intellectual achievements, goodwill and other specific related objects. For intellectual property rights, the following three points should be noted: firstly, compared with the right of property, the object of intellectual property rights is intangible objects such as intellectual achievements and goodwill, while the object of the right of property is tangible objects; secondly, not any intellectual achievements and goodwill can be the object of intellectual property rights, only the specific knowledge form stipulated in the law belongs to the scope of the object of intellectual property rights; lastly, not only original knowledge is the object of intellectual property rights, some non-creative knowledge also belongs to the scope of the object of intellectual property rights. Finally, not only original knowledge is the object of intellectual property, some non-creative knowledge also belongs to the scope of intellectual property object. Therefore, intellectual property should be understood in a broad sense.

#### 2.1.2. Classification of intellectual property rights

Theoretically, intellectual property rights include the following three aspects:

The first is literary property rights, including copyright and neighboring rights. Their main role is to bring beauty to people rather than to create industrial economic benefits.

Secondly, there are industrial property rights, which mainly include patent rights, trademark rights, trade name rights, geographical indications rights and anti-unfair competition rights, whose main functions are to improve production efficiency, maintain business reputation and create economic value. It is worth noting that the "industry" mentioned here should be understood in a broad sense, which not only refers to the processing and manufacturing industry, which is traditionally regarded as the secondary industry, but also includes the primary industry, agriculture, and the tertiary industry, such as the service industry.

Finally, there is the exclusive right of intellectual property. Along with the progress of the times, the development of science and technology, there are constantly new non-material objects are regarded as objects of intellectual property rights, which are neither industrial property rights nor industrial property rights, and they are categorized as new independent intellectual property rights, i.e., intellectual property exclusive rights. There are mainly the following three kinds of intellectual property rights: the right to new plant varieties; the right to layout designs of integrated circuits; and the right to trade secrets.

## 2.2. Definition and importance of scientific and technological innovation

#### 2.2.1. Definition of scientific and technological innovation

Scientific and technological innovation refers to the use of industrial enterprises for scientific and technological innovation and technology development specific activities of industrial enterprises in terms of scientific and technological innovation and technological development. This includes activities used for the enterprise's research and development topics activities, as well as direct expenditures on research and development activities all expenditures. Scientific and technological innovation can be categorized into three types: knowledge innovation, technological innovation and management innovation led by modern technology.

Knowledge innovation Technological innovation and management innovation are mutually reinforcing. Knowledge innovation is the cultural foundation of technological innovation and management innovation, without new theories and doctrines, there can be no technological innovation and system innovation; technological innovation in turn lays the necessary material foundation for knowledge innovation and management innovation; management innovation provides the necessary micro and macro environment for knowledge innovation and technological innovation. Macro environment Technological innovation is Technological innovation is social development hardware", while knowledge innovation and management innovation are the "software" of social progress, which play a key role in the development of the country and the progress of society, and are the power source of social development. They play a key role in national development and social progress, and are the driving force of social development.

#### 2.2.2. Importance of scientific and technological innovation

Scientific and technological innovation is an important driving force for social progress and economic development, and the in-depth promotion of scientific and technological innovation plays an important role in promoting economic growth, social well-being, and the core competitiveness of enterprises.

From a micro point of view, science and technology innovation helps enterprises to occupy the market and realize the market value, so as to enhance the core competitiveness of enterprises and even the regional competitiveness; from a macro point of view, science and technology innovation can promote the improvement of social productivity, meanwhile reduce environmental pollution, meet the needs of the society, and solve social problems.

It is because of the important role of scientific and technological innovation, the construction of the intellectual property system should be based on the current needs of scientific and technological innovation in society, in order to maximize the intellectual property system for scientific and technological innovation to play a key role in escorting.

# 3. The Basic Coupling Mechanism Between Intellectual Property and Scientific and Technological Innovation

With the deepening of economic globalization and technological development, intellectual property rights and technological innovation play an increasingly important role

in promoting economic growth and social progress. Intellectual property rights and scientific and technological innovation are the two pillars of modern economic development, and they have gradually become the key factors to promote economic growth and social progress. The link between intellectual property and technological innovation is very close. As a system for protecting inventions and encouraging scientific and technological innovation, intellectual property plays an important role in promoting scientific and technological innovation. The development of scientific and technological innovation has also put forward new tests to the intellectual property system, and promoted the intellectual property system to constantly adapt to the current situation of scientific and technological innovation and development.

On the one hand, scientific and technological innovation promotes the continuous progress of the intellectual property system. In recent years, the development of emerging technologies such as big data, artificial intelligence, digital technology and the meta-universe has put new demands on the existing intellectual property legal system. The intellectual property system can play an effective role only when it interacts with the economic and social environment. The economic base determines the superstructure, so the intellectual property system will be improved along with the innovation and development of science and technology, and coordinate with economic development. At the same time, the development of scientific and technological innovation also promotes the continuous improvement of intellectual property management. For example, since reform and opening up, China has continuously improved its level of scientific and technological innovation, gradually established a relatively complete intellectual property system, and made notable progress in intellectual property management.

On the other hand, intellectual property motivates scientific and technological innovation. First, the intellectual property system can provide financial rewards to innovators, thus encouraging more people to participate in innovative activities. The new institutional theory points out that scientific and technological innovation needs to be supported by a complete institutional system, and the intellectual property system can not only ensure that the rights and interests of knowledge creators are not infringed, but also effectively reduce the information asymmetry of innovation activities, so as to fully release the higher benefits brought by innovation factors such as research and development capital and human capital. Secondly, intellectual property rights can also protect the environment for scientific and technological innovation. The intellectual property system can prevent others from using or copying innovative results without authorization, and is conducive to forming a social atmosphere that respects intellectual property rights and scientific and technological innovation. Finally, the application of intellectual property rights can promote the transformation and implementation of scientific and technological achievements. Intellectual property is the basic mechanism to encourage scientific and technological innovation and ensure the timely transformation of scientific and technological achievements.

The intellectual property system can promote the flow and application of technology, thus accelerating the popularization and application of scientific and technological innovation achievements. As a kind of market mechanism, intellectual property is actually connected with "innovation" at one end and "market" at the other end. It has become an important link for the transformation of scientific and technological achievements into real productive forces, and an intermediate link for realizing scientific and technological strength to industrial strength and economic strength.

However, the relationship between intellectual property rights and scientificand technological innovation is not always harmonious. The intellectual property system should not only encourage the generation of innovation, but also promote the application of innovation and pay attention to the improvement of the overall welfare of society. While strengthening intellectual property protection, we should also make good use of the legal system to curb the abuse of intellectual property rights. In applying intellectual property rights to promote scientific and technological innovation, we should also pay attention to moderation. This is because insufficient protection of intellectual property rights will not provide sufficient incentives for innovation, resulting in insufficient impetus for scientific and technological innovation. Excessive protection of intellectual property rights, which goes beyond the scope of rights that rights holders should obtain, will weaken market competition and spread application. 6Sometimes, too strict IP protection may hinder the flow and application of technology. Therefore, how to deal with the relationship between intellectual property rights and scientific and technological innovation, and how to obtain the maximum social and economic benefits from it, is a problem that needs in-depth study.

# 4. International Experience: Extraterritorial Cases of Integration of IP and STI

Globally, the integration of intellectual property and science, technology and innovation has become a key element of economic growth. Different countries or regions have developed their own strategies and policies to promote the integration of the two, taking into account their specific economic, cultural and social contexts. This section explores the experiences of some typical countries with a view to providing useful insights.

## 4.1. The United States: Innovation-Driven Intellectual Property Strategies

The United States, as a global leader in science and technology innovation, has a long history of legal protection of intellectual property and has always focused on implementing an innovation-driven intellectual property strategy.

At the beginning of the founding of the United States, the Constitution of the United States of America in 1787, Chapter I, Article VIII, Section 8, clearly stipulates that Congress has the right to "guarantee to authors and inventors the exclusive right to their respective writings and inventions for a limited period, in order to promote the progress of science and useful arts." In the late nineteenth century, along with the emergence of the second industrial revolution, the global centre of scientific and technological innovation has gradually shifted from the United Kingdom to the United States. In order to protect a large number of scientific and technological achievements that emerged during that period, and further promote scientific and technological innovation, the United States has established a set of relatively complete legal system for the protection of intellectual property rights. These mainly

include the Patent Law, the Anti-Unfair Competition Law and the Trademark Law. Subsequently, the U.S. has built a relevant system on the basis of the legal system of intellectual property and implemented a series of supporting policies. All these constitute the innovation-driven intellectual property strategy characteristic of the United States. This major strategy has played an important role in promoting scientific and technological innovation and economic development in American society.

The U.S. innovation-driven intellectual property strategy consists of the following key elements:First, in terms of legal protection and incentives for innovation. The United States continuously improves the legal system of intellectual property rights, and fully implements the requirements of the law through optimal administration and strict judicial trial, so as to provide effective protection for scientific and technological innovators. For example, it has set up special institutions to deal with disputes related to new technologies and products. At the same time, property rights incentives are provided for in the law to mobilise scientific and technological innovation and creativity in society as a whole. These laws ensure that innovators are able to enjoy the intellectual property rights they have created and receive financial rewards in the form of patents, trademarks and copyrights.

Second, in terms of financial support and results. The United States Government and the private sector have continued to provide a large amount of financial resources to support basic research, key common and frontier common technology research in important industries, and military scientific and technological research projects. It has also taken tax breaks and other measures to encourage enterprises to increase their investment in research and development so as to promote their independent participation in scientific and technological innovation. At the same time, the government strongly supports industry-university-research co-operation and military-civilian scientific and technological research co-operation, and supports the development of small and medium-sized enterprises and venture capital through tax incentives and other measures; in terms of demand cultivation, it supports innovative products through military ordering and government procurement. It has also established technology transfer agencies and science and technology incubators to promote the commercialisation of scientific research results and to transform scientific and technological innovations into actual commercial products and services, thereby promoting the transformation of scientific and technological achievements.

Finally, in terms of talent training and the cultivation of a culture of innovation, the United States has long implemented a policy of high-quality national education and broad acceptance of talents. The United States has long implemented high-quality national education and a policy of recruiting a wide range of talents, focusing on cultivating and attracting scientific and technological innovation talents, while at the same time paying attention to the cultivation of a spirit of risk-taking and a culture of innovation in society as a whole. As a result, the United States has nurtured a large number of scientists, researchers and entrepreneurs through its high-quality education system, scientific research institutions and innovation centres, providing talent support for science, technology and innovation.

In summary, the United States innovation-driven intellectual property strategy emphasises legal protection and incentives, financial support and transformation of results, talent cultivation and the fostering of an innovation culture and intellectual property protection. These strategies work in tandem with each other to provide protection, incentives and resource support for innovators, and promote scientific and technological innovation and economic development in the United States.

## 4.2. Europe: Integrated Intellectual Property Protection Fuelling STI Development

Europe is the birthplace of intellectual property protection in the world. In the 15th century A.D., with the development of the commodity economy along the Mediterranean coast, commercial competition intensified, stimulating the vitality of social innovation and creation, promoting the birth of new technologies and products, but also making people aware of the importance of the protection of innovative achievements. In order to further clarify the ownership of these intangible properties and protect the interests of the creators, Venice enacted the world's first law closest to the modern patent system - the Venice Patent Law, followed by the United Kingdom in 1642, the Monopoly Act, the enactment of the Queen Anne's Decree in 1709, and in 1857 France promulgated and implemented the Law on the Manufacture of Marks and Trademarks with the Principle of Use without Censorship. These are the earliest patent, copyright and trademark laws in the world, marking the significance of intangible wealth such as patented inventions, writings and trademarks as legal property, from which intellectual property rights arose.

In the 1970s, along with the acceleration of the process of economic and trade integration in Europe, there was also a trend of integration of intellectual property protection in European countries. The integrated intellectual property protection in Europe has played an important role in fuelling the development of science and technology innovation, which is mainly manifested in the following aspects:

Firstly, it is reflected in a unified and high-level legal protection system for intellectual property rights. As a pioneer in intellectual property protection, Europe was the first to realise the important role of intellectual property in promoting scientific and technological innovation. Due to the early start, the intellectual property protection system of European countries is more perfect. At the same time, the European integration process has also created its unified intellectual property protection system, such as the European Patent Law, the European Trademark Law and the European Copyright Law. This unified legal system has simplified the procedures of intellectual property protection, improved the efficiency of enterprises and individuals in applying for and defending intellectual property rights within Europe, facilitated innovators to safeguard their legitimate rights and interests in a timely manner, and further promoted scientific and technological innovation.

Secondly, it is reflected in transnational co-operation in the protection of intellectual property rights. European integration has led to a more harmonised and coordinated administration of intellectual property protection across Europe. Innovators can apply for intellectual property rights such as patents, trademarks and copyrights within Europe, and a single application can be valid in several European countries, reducing the burden of repeated applications and management. At the same time, European countries actively participate in international standard-setting and law

enforcement co-operation in intellectual property protection, and strengthen co-operation with other countries and regions in intellectual property protection, so as to provide safeguards for cross-border co-operation in scientific and technological innovation.

Finally, this is reflected in the nurturing of innovation ecosystems and entrepreneurial environments. Europe focused on supporting the development of innovation ecosystems and entrepreneurial environments. Through the establishment of institutions such as innovation centres, science and technology parks and incubators, Europe provides venues and resource support for innovation and entrepreneurship, and encourages innovators to transform intellectual property rights into innovative products and services. At the same time, Europe puts the cultivation of talents in a prominent position. Firstly, it adopts a variety of ways to cultivate talents for enterprises; secondly, it implements the share and option incentive system to attract high-tech talents; and thirdly, it subsidises enterprises to attract high-tech talents. The cultivation of innovative environment and the training of innovative talents have injected new vigour into European science and technology innovation.

All in all, Europe has optimised the environment for independent innovation across Europe through a unified legal system for IP protection, cross-border cooperation in IP protection and the cultivation of innovation ecosystems, which has helped the development of science, technology and innovation in Europe.

### 4.3. Japan: Intellectual Property Innovation Strategy

At the beginning of the new century, the world entered the era of the knowledge economy. Against this backdrop, Japan launched the "Intellectual Property National Strategy" to ensure its competitive advantage. The strategy involves the creation, protection, application and cultivation of intellectual property.The core of the strategy is to cultivate national innovation ability and promote intellectual property innovation. This will be discussed below.

First, an innovation-oriented intellectual property policy has been implemented. Japan has established a set of intellectual property incentive mechanisms to encourage researchers to participate in scientific and technological innovation through material incentives and financial support.

At the same time, it has improved its social recognition system, regularly honouring researchers who have excelled in science, technology and innovation cooperation activities, setting up models of excellence and innovation, and creating a favourable atmosphere for innovation in society as a whole.

Secondly, a complete intellectual property protection mechanism has been established. In terms of legislation, Japan has enacted relevant laws and regulations and established a fast and efficient intellectual property rights examination and approval system to ensure that innovators can obtain legal protection in a timely manner. In particular, in the field of technology, the Japanese Patent Office has implemented an accelerated examination mechanism, which has greatly shortened the patent examination and approval cycle and improved the innovation efficiency of innovators. In terms of enforcement, Japan has strengthened criminal penalties for intellectual property rights. It has also strengthened its IPR enforcement agencies by increasing the number of examiners at the Patent Office, encouraging the establishment of private search organisations, and setting up the Intellectual Property High Court. These measures have improved the efficiency of handling intellectual property disputes and increased the protection of intellectual property rights.

Finally, the application and commercialisation of intellectual property rights are promoted. Japan actively promotes technology transfer and commercialisation of innovations. Regional intellectual property strategy headquarters have been set up in each region, and experts have been hired to provide information counselling and free training to small and medium-sized enterprises (SMEs) and venture companies. It has also set up an exchange platform between enterprises and universities to promote the transformation of scientific and technological achievements and the application of intellectual property rights. In addition, the Japanese Government encourages cooperation between innovators and industry to promote the marketing of scientific and technological achievements.

Through the implementation of innovation-oriented intellectual property policies and the establishment of supporting intellectual property protection mechanisms, Japan has actively promoted the application and commercialisation of intellectual property rights, stimulated the country's innovative and creative vitality and cultivated its competitive advantages in the knowledge-based economy, thereby promoting economic development and prosperity.

## 5. Strategies and Suggestions: Integrating Intellectual Property with Technological Innovation

The integration of intellectual property and technological innovation serves not only as the cornerstone of modern economic growth but also underpins the enduring competitive prowess of nations and enterprises. As China stands at a pivotal juncture in its economic restructuring, the shift towards high-quality growth necessitates transcending a mere extensive model of growth reliant on traditional inputs. Instead, the emphasis must be placed on innovative elements, recognizing intellectual property protection as a pivotal institutional construct to spur technological innovation. The Global Innovation Index Report of 2022 highlighted that among 141 economies, China ranks 11th in terms of its intellectual property protection index. In juxtaposition with advanced economies such as the US, EU, and Japan, there remains room for enhancement.

In light of these observations, crafting strategies for the seamless amalgamation of intellectual property with technological innovation, ensuring their synergistic contribution to economic growth and societal advancement, is paramount. The subsequent sections delineate recommendations in this context.

### 5.1. Strengthen Intellectual Property Education and Training; Encourage Interdisciplinary Collaboration and Cross-Innovation

To actualize the genuine merger of intellectual property and technological innovation, it's imperative to imbue the relevant stakeholders with a robust awareness of intellectual property protection. There's a pressing need to intensify intellectual property education across academic institutions, research bodies, and corporate entities. This entails the establishment

of multi-disciplinary and cross-industry research platforms, accentuating the creation of elite interdisciplinary research teams, fostering exchanges between scholars, legal practitioners, and other specialists, and stimulating interdisciplinary amalgamation within higher education institutions. This approach necessitates the nurturing of intersections among intellectual property, technological innovation, and market strategies, collaboratively navigating the latest trajectories and challenges posed by intellectual property and technological innovation. Such curricula should be institutionalized, aligned with the rapid technological advancements of contemporary society. Concurrently, there's a mandate to bolster foundational research in technological innovation and its pragmatic applications.

### 5.2. Constructing an Efficient Intellectual Property Operational Drive Model

Intellectual property is not only essential for protection but, more crucially, for its rational utilization, unveiling its latent potential. This is because the operation of intellectual property translates technological innovations into industrial and commercial entities, metamorphosing them into wealth and productivity, fostering subsequent technological innovations and gauging the efficacy of technological outputs.

To erect an efficient intellectual property operational drive model, it is imperative to develop a functional IP operational platform. Depending on the modalities of patent licensing and technological transfers through patent authorizations, one should stimulate the industrial and commercial applications of technological accomplishments, such as in financial innovation, civil-military integration, and international operations. It is also vital to establish industries with localized characteristics, create IP operation centers, and amass IP resources in a given region while influencing adjacent provinces and cities. Support should be given to IP operation entities with an emphasis on the marketization of technological innovation outcomes, streamlining IP licensing and transaction processes. Moreover, active integration of IP with financial elements like financing, insurance, securities, and guarantees is crucial, providing firms with financial support and risk assurance. This consolidates the role of IP technological outcome assessment, information consultation, and similar services, ensuring robust backing for the transformation of technological results. Enterprises should be encouraged to adopt innovative IP management and operational patterns, such as IP pools, patent transactions, and technology transfers.

### 5.3. Enhancing International Collaboration and Exchange on Intellectual Property and Technology

In the era of globalization, the confluence of intellectual property and technological innovation represents not just a challenge for individual nations but also a global opportunity. Actively participating in international IP organization activities and sharing experiences and resources with other countries is paramount. The role of industry associations as a link in international IP and technological exchanges cannot be understated. Collating and organizing patent products and related information across various sectors to create a comprehensive patent information database is essential. Strengthening international communication on IP laws and policies, addressing domestic legal shortcomings, and aligning domestic IP and technology-related policies with international standards are all vital steps. Furthermore, coordinating foreign affairs related to IP and technological innovation, establishing patent early warning systems, investigating and updating foreign infringement cases, and offering guidance and financial support to domestic technological innovation entities are essential actions. Building bilateral or multilateral cooperation mechanisms with major IP-holding nations and regions can also facilitate technological exchanges and transfers.

## 6. Strategies and Suggestions: Integrating Intellectual Property with Technological Innovation

The integration of intellectual property and technological innovation serves not only as the cornerstone of modern economic growth but also underpins the enduring competitive prowess of nations and enterprises. As China stands at a pivotal juncture in its economic restructuring, the shift towards high-quality growth necessitates transcending a mere extensive model of growth reliant on traditional inputs. Instead, the emphasis must be placed on innovative elements, recognizing intellectual property protection as a pivotal institutional construct to spur technological innovation. The Global Innovation Index Report of 2022 highlighted that among 141 economies, China ranks 11th in terms of its intellectual property protection index. In juxtaposition with advanced economies such as the US, EU, and Japan,there remains room for enhancement.

In light of these observations,crafting strategies for the seamless amalgamation of intellectual property with technological innovation, ensuring their synergistic contribution to economic growth and societal advancement,is paramount.The subsequent sections delineate recommendations in this context.

### 6.1. Strengthen Intellectual Property Education and Training;Encourage Interdisciplinary Collaboration and Cross-Innovation

To actualize the genuine merger of intellectual property and technological innovation, it's imperative to imbue the relevant stakeholders with a robust awareness of intellectual property protection. There's a pressing need to intensify intellectual property education across academic institutions, research bodies, and corporate entities. This entails the establishment of multi-disciplinary and cross-industry research platforms, accentuating the creation of elite interdisciplinary research teams, fostering exchanges between scholars, legal practitioners, and other specialists, and stimulating interdisciplinary amalgamation within higher education institutions. This approach necessitates the nurturing of intersections among intellectual property, technological innovation, and market strategies, collaboratively navigating the latest trajectories and challenges posed by intellectual property and technological innovation. Such curricula should be institutionalized, aligned with the rapid technological advancements of contemporary society. Concurrently, there's a mandate to bolster foundational research in technological innovation and its pragmatic applications.

### 6.2. Constructing an Efficient Intellectual Property Operational Drive Model

Intellectual property is not only essential for protection but, more crucially,for its rational utilization, unveiling its latent potential. This is because the operation of intellectual property translates technological innovations into industrial and commercial entities, metamorphosing them into wealth and productivity, fostering subsequent technological innovations and gauging the efficacy of technological outputs.

To erect an efficient intellectual property operational drive model, it is imperative to develop a functional IP operational platform. Depending on the modalities of patent licensing and technological transfers through patent authorizations, one should stimulate the industrial and commercial applications of technological accomplishments, such as in financial innovation, civil-military integration, and international operations. It is also vital to establish industries with localized characteristics, create IP operation centers, and amass IP resources in a given region while influencing adjacent provinces and cities. Support should be given to IP operation entities with an emphasis on the marketization of technological innovation outcomes, streamlining IP licensing and transaction processes. Moreover, active integration of IP with financial elements like financing, insurance, securities, and guarantees is crucial, providing firms with financial support and risk assurance. This consolidates the role of IP technological outcome assessment,information consultation, and similar services, ensuring robust backing for the transformation of technological results. Enterprises should be encouraged to adopt innovative IP management and operational patterns, such as IP pools, patent transactions, and technology transfers.

### 6.3. Enhancing International Collaboration and Exchange on Intellectual Property and Technology

In the era of globalization, the confluence of intellectual property and technological innovation represents not just a challenge for individual nations but also a global opportunity. Actively participating in international IP organization activities and sharing experiences and resources with other countries is paramount. The role of industry associations as a link in international IP and technological exchanges cannot be understated. Collating and organizing patent products and related information across various sectors to create a comprehensive patent information database is essential. Strengthening international communication on IP laws and policies, addressing domestic legal shortcomings, and aligning domestic IP and technology-related policies with international standards are all vital steps. Furthermore, coordinating foreign affairs related to IP and technological innovation, establishing patent early warning systems, investigating and updating foreign infringement cases, and offering guidance and financial support to domestic technological innovation entities are essential actions. Building bilateral or multilateral cooperation mechanisms with major IP-holding nations and regions can also facilitate technological exchanges and transfers.

## 7. Conclusion

In the coupling process of intellectual property rights and scientific and technological innovation, China has not only achieved a series of practical results, but also accumulated valuable experience. By reflecting on this process, we can more clearly see the direction of progress and challenges, and provide useful inspiration for future work.

## Acknowledgment

Research Project: Research on the policy system and operation mechanism of intellectual property supporting the construction of sci-tech strong province(20213BAA10W18).

## References

[1] Wang Qian. Intellectual property law tutorial seventh edition [M]. Beijing:Renmin University of China Press, 2021:3-4.

[2] Liang, Qiande. Basic Statistics [M]. Beijing:Higher Education Press, 2011:50-51.

[3] Cheng Huifang, Liu Zhuoran, Hong Chenxiang. Investment in scientific and technological innovation, protection of intellectual property rights and high-quality economic development [J]. Zhejiang Social Science, 2023 (09):22-30.

[4] Qi Jiangang, Zhang Xiaoxuan. On the new development pattern and the new development ideas of intellectual property rights [J]. Social Science of Chinese Universities, 2022 (03):109-123.

[5] Shen Changyu. Intellectual property rights are an important factor supporting the new normal of economic development [J]. Globalization, 2015 (03):111-113.

[6] Liu Ying. Historical investigation and enlightenment of the intellectual property system in Japan [J]. Foreign Social Science Frontier, 2020 (11):28-35.

[7] Zhu Yurong. Japan's Intellectual Property Strategy and its Implications for China [J]. Heilongjiang Foreign Economic and Trade,2009,No.176(02):66-67.

[8] Jiang Xiaoyan. Japan's Intellectual Property Innovation Strategy [J]. China Economic and Trade Journal, 2007, No.549 (02):38-40.

[9] Wu Handong. Discussion on the construction of intellectual property system of the rule of law and the concept of development[J]. Intellectual Property,2019(6):25-26.

[10] Chen Jiaju,Zhang Hanyang. Development of Intellectual Property Rights with Chinese Characteristics and Self-Reliance and Self-Strengthening of Science and Technology[J]. Science and Law (in English),2023(03):10-19.

[11] Li Keqiang: effectively strengthen basic research and continue to promote applied innovation[EB/OL]. (2020-12-08) [2023-03-28]. http://www.scio.gov.cn/tt/34849/Document/1694116/1694116.htm.

[12] CPC Chinese Academy of Sciences Party Group. Protecting intellectual property is protecting innovation[J]. Seeking truth,2021(3):28-31.

[13] Wu Handong. A Test of China's Independent Intellectual Property System[J]. Intellectual Property,2023(1):1-3.

[14] CHENG Huifang, LIU Zhuoran, HONG Chenxiang. Technological Innovation Investment, Intellectual Property Protection and High-Quality Economic Development [J]. Zhejiang Social Sciences, 2023(09):22-30+157.

[15] HU Jianjian. Construction and Practice of Intellectual Property Operation System [J]. Property Rights Guide, 2023(07):31-35.

[16] ZHANG Jianxin. Issues and Suggestions on Intellectual Property Protection in International Trade [J]. Legal Review, 2023(22):160-162.