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The Impact of Intellectual Property Protection on Technological Innovation

- A Literature Review Incorporating New Quality Productive Forces in the Chinese Economy

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Abstract: This article explores the impact of intellectual property (IP) protection on technological innovation, particularly concerning China's recent emphasis on high-quality productivity. The paper reviews existing literature, discussing the differences in the effects of IP protection between developed and developing countries. This literature review shows that strengthened IP protection has a positive impact on technological innovation in China, but with a nonlinear relationship. The concept of new quality productive forces focuses on achieving high levels of quality and promoting disruptive technology innovation. Combining this concept, this article analyzes the influence of IP protection on its development and provides specific policy recommendations. Future studies should focus on empirical analysis to assess the actual effectiveness of IP protection within the existing policy framework. Appropriate evaluation systems are suggested to establish, and IP laws should be gradually improved so as to effectively facilitate China's technological innovation and industrial advancement.

Keywords: Intellectual property, technological innovation, new quality productive forces, China economy.

1. Introduction

The relationship between IP protection and innovation capacity has garnered significant academic interest in recent decades. While most studies focus on developed countries, it is generally observed that enhancements to IP protection have positively influenced their innovation capacity [1-2]. Represent scholars like Helpman, and Glass and Saggi based on the North-South framework of innovation in the North and imitation in the South in the model of technological progress, suggest that strengthened IP protection can inhibit imitation, deteriorate the terms of trade of the South, and not only impede technological progress in the South but also slow the pace of global innovation [3-4]. However, there are also scholars arguing that developing countries can benefit from the technology diffusion effects of developed countries. This diffusion could incentivize TNCs to enter developing countries and benefit from progressively stronger IP protection, while at the same time

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enabling domestic firms to benefit more from technological spillovers, thus facilitating domestic technological innovation in the future [5].

China, as one of the leading developing countries in the world, has sped up its technological innovation in recent years. According to the World Intellectual Property Organization's (WIPO) Global Innovation Index (GII) 2023 report [6], China ranks 12th globally with a score of 55.3, as shown in Table 1 Global Innovation Index (GII) ranking [6] row 12 below. Combined with the long-discussed topic, which model best illustrates the effect of such protection on China's domestic technological innovation? With the recent introduction of the concept of new quality productive forces, this paper aims to explore the role of intellectual property protection in fostering new quality productive forces, based on the current research status and a comprehensive literature review.

Table 1: Global Innovation Index (GII) ranking [6]

GII rank	Economy	Score	Income group rank	Region rank
1	Switzerland	67.6	1	1
2	Sweden	64.2	2	2
3	United States	63.5	3	1
4	United Kingdom	62.4	4	3
5	Singapore	61.5	5	1
6	Finland	61.2	6	4
7	Netherlands	60.4	7	5
8	Germany	58.8	8	6
9	Denmark	58.7	9	7
10	Republic of Korea	58.6	10	2
11	France	56.0	11	8
12	China	55.3	1	3
13	Japan	54.6	12	4
14	Israel	54.3	13	1
15	Canada	53.8	14	2

2. Literature Review

2.1. Existing research on intellectual property

Existing literature on intellectual property protection can be divided into several categories. The first is the study on the legislative level of intellectual property rights and its incentives and disincentives for different subjects in a closed and static environment.[7] Often, the monopoly profits provided by stronger IPR protection incentivize innovators to pursue further innovation, but this monopolistic system can also be detrimental to consumers in the short term, exemplifying the "double-edged sword" effect of IPR protection [8]. If innovation is a knowledge-production process, the existence of imitation behavior leads to the inability of innovators to obtain all possible rewards, and the lack of a constraining environment for imitation will dissipate the confidence of innovators to carry out innovative activities again. Therefore, whether from the theoretical level or the practical level, intellectual property protection is necessary for technological innovation to eliminate the existence of imitation behavior and further motivate innovators to carry out innovative activities.

In addition to the discussion on the existence of two sides of IP protection, there are empirical studies by previous researchers showing the non-linear impact of IP protection on technological innovation in developing countries. Yu Changlin and Wang Ruifang[9], based on actual data from 60 developing countries, showed that there is a significant inverted U-shaped relationship between IP

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protection and innovation capacity. Similarly, Wang Hua, in a study of 57 developing countries, found that the improvement of the intellectual property system is conducive to technological innovation in developing countries[10]. However, this incentive effect exhibits obvious nonlinear threshold characteristics, decreasing with the improvement of initial intellectual property.

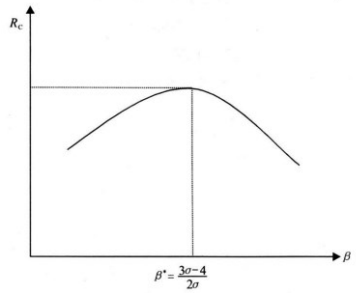

Figure 1: The relationship between intellectual property and technological innovation [9]

Referring to Figure 1, β^* is the level of IP protection,σ is the exogenous given amount of the difference in the levels of the two products. When $\sigma>1$, it indicates a substitution relationship between the two products, while $\sigma\rightarrow2$ suggests a full substitution relationship between the two products. If a country's level of IP protection exceeds a certain critical value, i.e. $\beta > \beta^* < \frac{3\sigma-4}{2\sigma}$, increasing the level of IP protection in the country will reduce the level of technological innovation in the country; conversely, if the country's IP protection level is below this critical value, increasing IP protection will enhance technological innovation. [9]

Besides the legislative and theoretical dimensions, some studies focus on the specific enforcement process and actual results of IP protection. Shi Yupeng and Gu Quanlin previously pointed out that China's inadequate protection of intellectual property rights leads to a lack of incentives for enterprises to conduct independent research and development [11]. Wu Chaopeng and Tang Gelin showed that strengthened enforcement of intellectual property rights protection can incentivize enterprises to increase the intensity of R&D investment and enhance patent output, mainly by reducing spillover losses and alleviating external financing constraints through the two paths of enhancing enterprise technological innovation [12]. From a practical perspective, there is still room for improvement in the protection of intellectual property rights in China. Enhancements are needed not only in theory and legislation but also in the actual enforcement process, which should be analyzed on a case-by-case basis, and the operability and reasonableness of the actual law enforcement should be carefully examined.

Other studies focus on the field of international trade, signing trade agreements that include IP protection clauses helps to increase bilateral trade liquidity. This effect is observed in both IP protection-intensive and non-intensive industries, though agreements with IP protection provisions have a more significant impact on net international trade growth [13-14]. Intellectual property is highly relevant in international trade, and many studies have focused on the effects of entering into bilateral trade agreements with IPR protection provisions, or on measuring IP protection levels with trade-related explanatory variables, which is also an important topic in the study of IPs.

2.2. Existing Research on New Quality Productivity

Zhou Wen and Xu Lingyun suggested that to understand the new quality productive forces, we need to grasp the two aspects of "new" and "quality". The so-called "new" refers to the fact that the concept of new quality productive forces is different from traditional productivity in the general sense. It is the productivity that leads to the realization of key and disruptive technological breakthroughs,

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embracing new technologies, new economies, and new business forms. The "quality" emphasizes that by adhering to the essence of innovation-led development, breakthroughs in key and disruptive technologies will provide a stronger innovation-driving force for productivity development [15].

In general, new quality productive forces is the advanced productivity of the new era brought about by the subversive breakthroughs in science and technology, the innovative allocation of production factors, and the upgrading of industries. With scientific and technological innovation as the essence and high-quality development as the goal, new quality productive forces integrate new technologies and new factors such as artificial intelligence and big data, embarking on a new growth path with lower inputs of factors for production, high efficiency of allocation, low cost of resources and environment, and good economic and social benefits [16].

Chen Qiangyuan, Lin Sitong, and Zhang Qing noted that, in the practice of innovation-driven development strategy, China positions enterprises as the main drivers of technological innovation. China puts enterprises in the position of the main force of technological innovation, the central government promotes the enhancement of enterprises' technological innovation capacity by a package of technological innovation incentives centered on tax incentives and financial subsidies. In the past [17], the concept of "strong quantity, weak quality" needs to be changed, and "strong quality" is now the key value of technological innovation.

2.3. Literature Summary and Purpose of Review

This paper reviews existing research on technological innovation in the context of IP protection, categorizing studies into three main areas: theoretical legislation, enforcement outcomes, and combined studies on related fields like international trade. Key issues discussed include the dual nature of IP protection, non-linearity, and its varying effects on technological innovation in developed countries. Meanwhile, current research on new quality productive forces has focused on theoretical foundations and modeling to guide practical recommendations, but few studies combine these 2 research topics. The paper innovates by exploring the impact of IP protection on new quality productive forces, rather than just policy factor, and aims to offer targeted legal and technical support to help enterprises accelerate productivity breakthroughs.

3. Prospect for Future Research and Recommend Actions

3.1. Future research

Future research on intellectual property protection in relation to technological innovation and new quality productive forces should focus more on actual effectiveness rather than solely analyzing theoretical aspects. Existing literature on the impact of intellectual property protection on technological innovation primarily relies on domestic policy and empirical analysis from previous years. Most studies conclude that intellectual property rights significantly and positively promote technological innovation. [11,18].

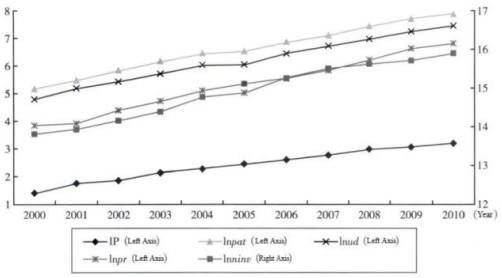

Figure 2: Intellectual Property Protection and China's Industrial Innovation Capacity [18]

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However, these studies are time-sensitive. Nowadays, national policies and intellectual property rights are developing rapidly, and the actual effects may have been different from the previous research theories. Therefore, future research may need to be more forward-looking and cutting-edge, integrating current theories with contemporary developments. It is also important to consolidate theoretical knowledge with empirical data and results.

Meanwhile, there may be limited empirical literature on the impact of IPR on new quality productive forces, but recent studies in related fields have tentatively shown that the two are also positively correlated. For example, Fang Jiewei and Shi Bingzhan pointed out that improved IP protection effectively promotes the deep participation of developing countries in the division of labor in the global value chain and facilitates their shift to more technology- and IP-intensive industries, aiding in industrial transformation and upgrading [19]. This aligns with the goals of new quality productive forces, which emphasize industrial upgrading and innovation breakthroughs. Additionally, existing studies have demonstrated that China's intellectual property protection is generally positively correlated with its industrial innovation capacity [18]. In a word, the basic direction and approximate results can be summarized and analyzed through the existing literature, and further empirical analysis and accurately set econometric models are needed in the future to verify the actual impact.

3.2. Recommendations

This paper would like to give several relevant policy recommendations based on existing literature and relevant national policies.

First, combined with the relevant recommendations of Chen Qiangyuan, Lin Sitong, and Zhang Qing, the development of new quality productive forces and the enhancement of technological innovation of enterprises still need to profoundly implement the "quality-centered" innovation, and comprehensively implement it into the formulation and improvement of technological innovation incentives and intellectual property rights protection related laws [17]. At present, domestic policy targets at improving existing policies, but intellectual property protection-related laws should also be progressively refined and enforced. Strengthened law enforcement and policy guidance are complementary with each other to create a favorable innovation environment and jointly promote incentives for high-quality technological innovation of enterprises.

Second, a set of official scientific and open and transparent evaluation and assessment systems for technological innovation should be established. Existing research on technological innovation assessment indexes is diverse, and no official unified standard. Developing a standardized evaluation system would support the long-term growth of technological innovation, as it can more accurately reflect the actual effectiveness of enterprises' technological innovation. This, in turn, would allow for the provision of technical support and incentives based on evaluation results, ultimately encouraging more SMEs to invest in technological innovation over time.

Finally, the proposed evaluation system should be accompanied by more favorable policies, technical support, and guidance on intellectual property protection for SMEs. SMEs may lack technical support and knowledge of intellectual property, making them hesitant to pursue high-quality technological innovation or enter IP-intensive industries. For these enterprises, the government should provide preferential treatment and support, which should be implemented through the evaluation system proposed in the second recommendation.

4. Conclusions

Based on previous literature, it can be concluded that IP protection has significant effects on innovation. For most developing countries, stricter IP protection may pose a non-linear and U-shaped relationship with innovation. In developed countries, most research and empirical tests have shown

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that stricter IP protection exerts positive effects on innovation. For developing countries like China, stricter IP protection has the similar motivational effect on innovation as seen in developed countries. This aligns with the implementation of China's new quality productive forces policy, which necessitates further empirical analysis.

It can be presumed that with the further strengthening of intellectual property protection, the domestic innovation environment will become better and the concept of high-quality technological innovation and development will be carried out in depth under the guidance of national policies.

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