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Analysis of the Role and Challenges of Scientific and Technological Journals in the Transformation of Scientific and Technological Achievements

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Abstract: Scientific journals, as a significant medium for the transformation of scientific and technological achievements, have received widespread attention in recent years. They are not only platforms for the dissemination of scientific information but also crucial venues for researchers to exchange ideas and showcase their research results. However, during the process of translating scientific achievements, scientific journals also face numerous challenges. The increasing frequency of international research collaboration under globalization has made the international influence of journals and issues surrounding open access significant factors affecting the internationalization of scientific achievements; academic misconduct and the loopholes in the peer review system also threaten the credibility of journals. This study utilizes a combination of literature review, case analysis, and expert interviews to discuss the current state of domestic and international scientific journals, with a focus on analyzing the supportive role of scientific journals in scientific and technological innovation activities and the challenges they face in promoting the transformation of scientific achievements. Through quantitative analysis of publication volume, citation frequency, and reader survey data from 200 national scientific journals, this research delves into the impact and dissemination effectiveness of scientific journals and conducts an optimization study on the key aspects of the journal publishing process. The results show that in the process of popularizing and commercializing research findings, scientific journals must strengthen the cultivation of professional ethics for authors and peer reviewers and establish a rigorous academic evaluation system. At the same time, open access policies of journals should be more flexible to meet the needs of different reader demographics. The research provides feasible suggestions for how scientific journals can more effectively serve scientific and technological innovation under the new landscape and has both immediate and long-term significance for enhancing the status and role of scientific journals within the national innovation system.

1. Introduction

Scientific and technological journals serve as an indispensable carrier for the transformation of scientific and technological achievements, playing an irreplaceable role in accelerating this

process(Figure 1). In recent years, China has attached great importance to the transformation of scientific and technological achievements, issuing a series of policies and measures to vigorously promote this endeavor. In 2015, the Law on Promoting the Transformation of Scientific and Technological Achievements was officially implemented, providing a legal guarantee for the transformation of scientific and technological achievements in China. In 2016, the Ministry of Science and Technology and four other departments jointly issued the Action Plan for Promoting the Transfer and Transformation of Scientific and Technological Achievements, proposing the establishment of a service system for the transfer and transformation of scientific and technological achievements to accelerate this process. Against this backdrop, it is worthwhile to delve into how scientific and technological journals can leverage their advantages to facilitate the transformation of scientific and technological achievements[1-3].

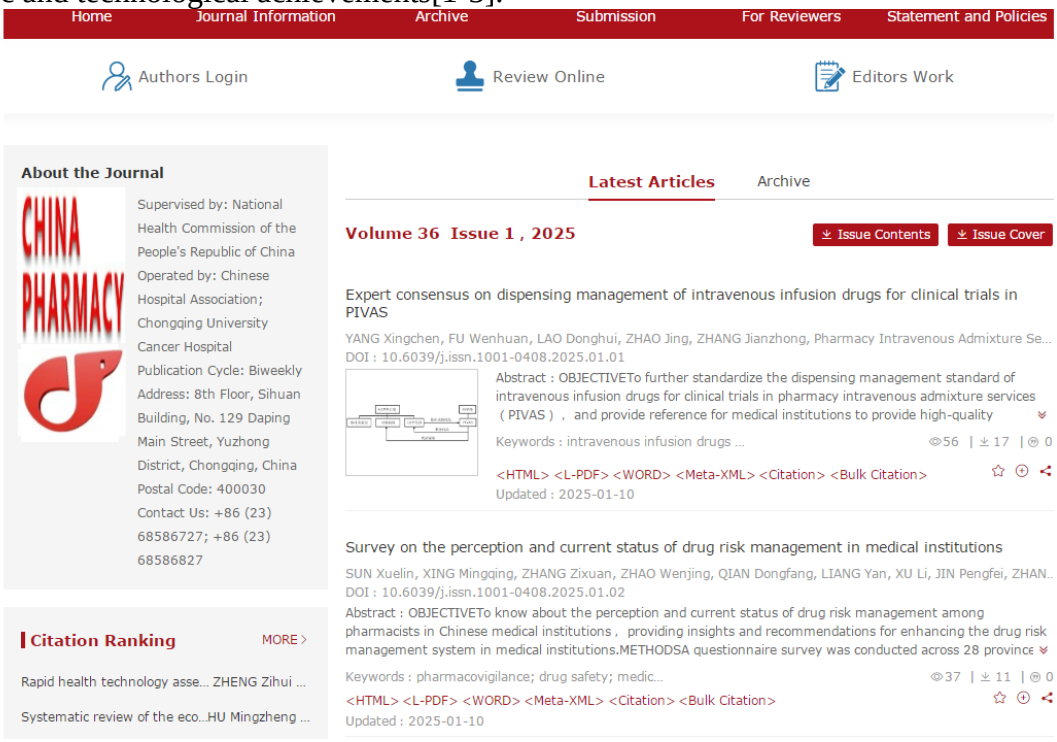

Figure 1 The official website of the scientific journal "China Pharmacy"

Scientific and technological journals are crucial platforms for researchers to publish their research results and exchange academic ideas. Statistics show that there are over 5,000 scientific and technological journals in China, forming a comprehensive and reasonably distributed journal system across various disciplines. The research papers published in scientific and technological journals represent the latest research progress and academic frontiers in various fields, containing a wealth of scientific and technological achievements. These achievements are displayed and disseminated through scientific and technological journals, providing a solid foundation for the transformation of scientific and technological achievements[4].

Furthermore, scientific and technological journals play a vital role in promoting industry-academia-research cooperation and driving the industrialization of scientific and technological achievements[5]. Many high-level scientific and technological journals have dedicated industrialization columns, releasing technical demand information to enterprises and building bridges for industry-academia-research cooperation. Some scientific and technological journals also regularly hold summits, project matchmaking events, and other activities, inviting enterprises, universities, and research institutes to engage in face-to-face exchanges, thereby promoting technology transfer and achievement transformation. For instance, the Chinese Journal

of Lasers holds the annual "Summit Forum on Laser Processing and Equipment Industrialization," establishing a cooperation platform for industry, academia, research, and application to promote the industrial development of laser processing technology, achieving good social and economic benefits.

While scientific and technological journals have significant potential in the transformation of scientific and technological achievements, they also face several challenges. Firstly, the awareness of transformation needs to be strengthened. Some scientific and technological journals place too much emphasis on academia, neglecting technological application and industrialization, leading to difficulties in bringing many scientific and technological achievements out of the "ivory tower." Secondly, the transformation mechanism needs to be improved. Scientific and technological journals lack sufficient consideration for achievement transformation in the manuscript solicitation and review processes, as well as dedicated evaluation standards and incentive mechanisms for achievement transformation. Thirdly, service capabilities need to be enhanced. Scientific and technological journals lack professionalism and completeness in technical consultation, roadshow promotion, intellectual property protection, and other services, making it difficult to meet the actual needs of the transformation of scientific and technological achievements.

2. Overview of the Transformation of Scientific and Technological Achievements

The transformation of scientific and technological achievements refers to the process of transferring scientifically and technologically developed achievements with practical value through technology markets, capital markets, and other channels into productive forces, forming new production capabilities[6]. The transformation of scientific and technological achievements is the ultimate goal and outcome of scientific and technological innovation, representing a crucial link in the close integration of science and technology and the realization of innovation-driven development. The transformation of scientific and technological achievements can not only accelerate scientific and technological progress but also generate substantial economic and social benefits, driving high-quality economic development. The Action Plan for Promoting the Transfer and Transformation of Scientific and Technological Achievements jointly issued by the Ministry of Science and Technology, the Ministry of Education, and 11 other departments points out that by 2020, the nationwide technology contract transaction volume exceeded RMB 2 trillion, with an expectation to surpass RMB 4 trillion by 2025.

Currently, the main issues in the transformation of scientific and technological achievements in China include: firstly, there is a significant gap between the supply of scientific and technological achievements and market demand, with the relevance and practicality of scientific and technological achievements being insufficient; secondly, the channels for the transformation of scientific and technological achievements are not smooth, lacking effective platforms for the transformation of scientific and technological achievements; thirdly, the main bodies involved in the transformation of scientific and technological achievements are unclear, with innovation entities such as scientific research institutions, universities, and enterprises not fully playing their roles in this process; fourthly, the policy environment for the transformation of scientific and technological achievements needs to be optimized, as existing science, technology, taxation, finance, and other policies have yet to form a concerted effort, providing inadequate support for the transformation of scientific and technological achievements; fifthly, the talent base for the transformation of scientific and technological achievements is weak, lacking a professional talent pool for this endeavor.

To further promote the efficient transformation of scientific and technological achievements, the Action Plan proposes eight key initiatives, including strengthening the position of enterprises as the main body for the transformation of scientific and technological achievements, improving the

system for the transfer and transformation of scientific and technological achievements, and promoting the construction of talent teams for the transfer and transformation of scientific and technological achievements. In addition, the Action Plan emphasizes leveraging the supporting roles of science and technology projects, base platforms, science and technology finance, military-civilian integration, and other aspects to create a favorable policy environment for the transformation of scientific and technological achievements[7-8]. It is foreseeable that with the implementation of a series of policies and measures, the transformation of scientific and technological achievements in China will further accelerate, providing stronger support for the implementation of the innovation-driven development strategy.

3. Functional Analysis of Scientific and Technological Journals

Scientific and technological journals play a pivotal role in the transformation of scientific and technological achievements due to their unique academic and social roles. In the manuscript review process, journals ensure the standardization and academic value of published papers through rigorous peer review mechanisms, enhancing the overall paper quality. Additionally, journals provide a platform for the exchange of scientific and technological information, enabling researchers to stay informed about new developments and trends in their fields. The functions of scientific and technological journals have further expanded, not only promoting academic exchanges but also providing important references for recording the latest scientific research achievements and guiding future research directions.

However, scientific and technological journals also face challenges in promoting the transformation of scientific and technological achievements, such as accurately analyzing market demand and objectively evaluating scientific and technological achievements[9-10]. Crucially, they must determine whether the achievements meet the transformation criteria. If successful, this process will guide researchers to write transformation reports, apply for patents, and ultimately realize commercial production and the promotion and application of achievements. Conversely, if they do not meet the criteria, the achievements may return to the research stage. To address this process, scientific and technological journals can provide strong support for the market docking and transformation of scientific and technological achievements through special reports, expert commentaries, and other forms.

When discussing the effectiveness of the transformation of scientific and technological achievements, assessing the transformation effectiveness of various provinces by region is a commonly used research approach. For this purpose, the necessary data usually involves specific indicators of the transformation effectiveness of scientific and technological achievements in various provinces and is presented in the analysis(Figure 2). This step requires scientific and technological journals to integrate information from multiple aspects for in-depth analysis and discussion.

Policy analysis is also indispensable. The research should incorporate discussions on the implementation status and factor analysis of policies for the transformation of scientific and technological achievements, covering the issuing units of policies, fields covered, target enterprise sizes, transformation indicators(Table 1), and other content. The specific tabular analysis method helps clarify the influencing factors and implementation effects of different policies, thereby providing decision support for subsequent policy adjustments.

In summary, the role of scientific and technological journals in promoting the transformation of scientific and technological achievements cannot be underestimated. Journals need to continuously optimize their manuscript review and publication processes, deepen their understanding of market demand and the evaluation mechanism for scientific and technological achievements, and guide

research directions and promote achievement transformation through regional and policy analyses. This requires journal editors and operating teams to have in-depth knowledge of the scientific frontier, accurate grasp of transformation policies, and a high sense of responsibility and mission(Figure 3).

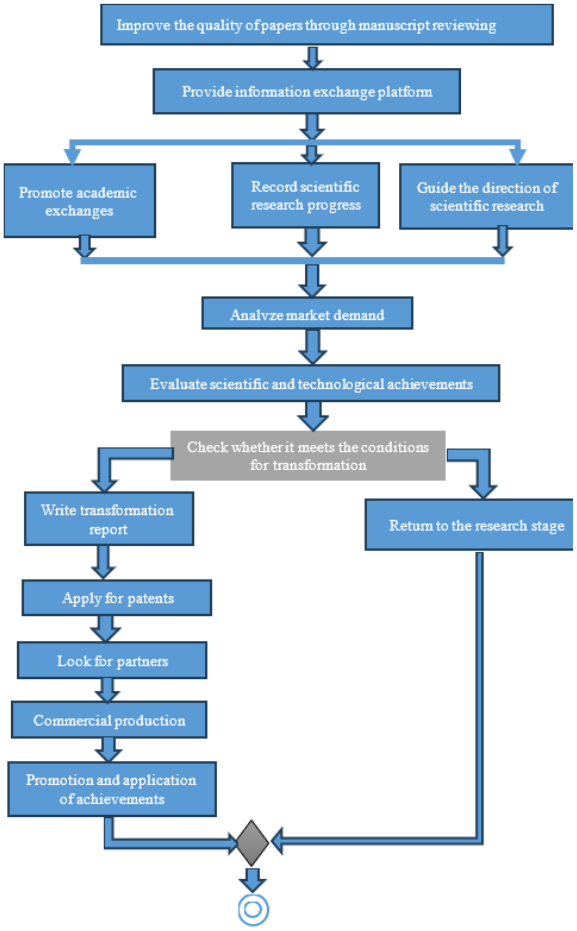

Figure 2 The process of transforming scientific and technological achievements into practical applications

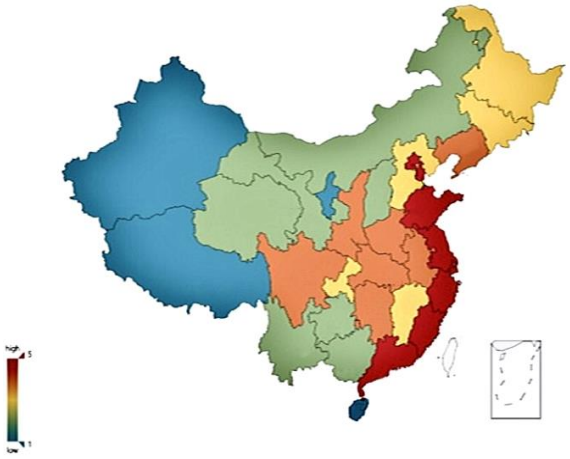

Figure 3 Distribution Map of the Effectiveness of Scientific and Technological Achievement Transformation in Various Provinces of China from 2010 to 2019

4. Major Challenges Faced

Identifying and addressing multidimensional challenges is crucial for enhancing innovation capabilities, improving research quality, and advancing the transformation of scientific and technological achievements in the process of promoting the transformation of scientific and technological achievements through scientific and technological journals[11]. To reveal the complexity of this aspect in detail, we adopt a systematic approach for analysis and construct an analytical diagram of the scientific and technological achievement transformation system to intuitively showcase the various links and interactions within it.

In the analysis of technical difficulties, we utilize a methodology combining qualitative and quantitative approaches to explore the key technical factors affecting achievement transformation and bottlenecks in the innovation chain. Through expert consultations and market trend analyses, combined with historical data and case studies, we classify the maturity levels of technologies and analyze the key parameters influencing their application. Market risk assessment involves demand analysis and forecasting for potential application fields, estimating market acceptance and its impact on the transformation of scientific and technological achievements using demand analysis models and risk assessment algorithms.

Additionally, financial support serves as a significant driving force for the transformation of scientific and technological achievements. Through regression analysis and a summary of historical data, we explore how funds of different types and sources impact the research and development, as well as the transformation, of scientific and technological achievements. Meanwhile, the analysis of policy and regulatory constraints focuses on how the current policy environment influences the development of scientific and technological achievements. This analysis combines policy text analysis and empirical analysis, aiming to provide references for the improvement of relevant science and technology policies.

After organizing the above analysis, we propose solutions to address these challenges, with the goal of enabling scientific journals to more effectively serve the transformation of scientific and technological achievements. These suggestions are based on the roles that scientific journals can play, the need for reforms in traditional publishing models, the optimization of editorial and peer review systems, and strategies for enhancing journal influence. This also requires scientific journals to deepen cooperation with research institutions, universities, enterprises, and capital markets to build a more open and efficient support system for the transformation of scientific and technological achievements(Figure 4).

The entire process of analysis and proposal development adheres to academic rigor and is based on a deep understanding of the current status of the issue of scientific and technological achievement transformation. This part of the study provides new analytical perspectives and specific practical countermeasures, demonstrating a certain degree of originality and practicality, and is presented within an appropriate theoretical framework. The writing and structure of the article follow academic norms, clearly expressing the research ideas and methods. Through sufficient citations of related research, the article demonstrates the author's profound understanding of the field and provides data support and reasonable suggestions for the specific issues and challenges in the process of scientific and technological achievement transformation in the region(Figure 5).

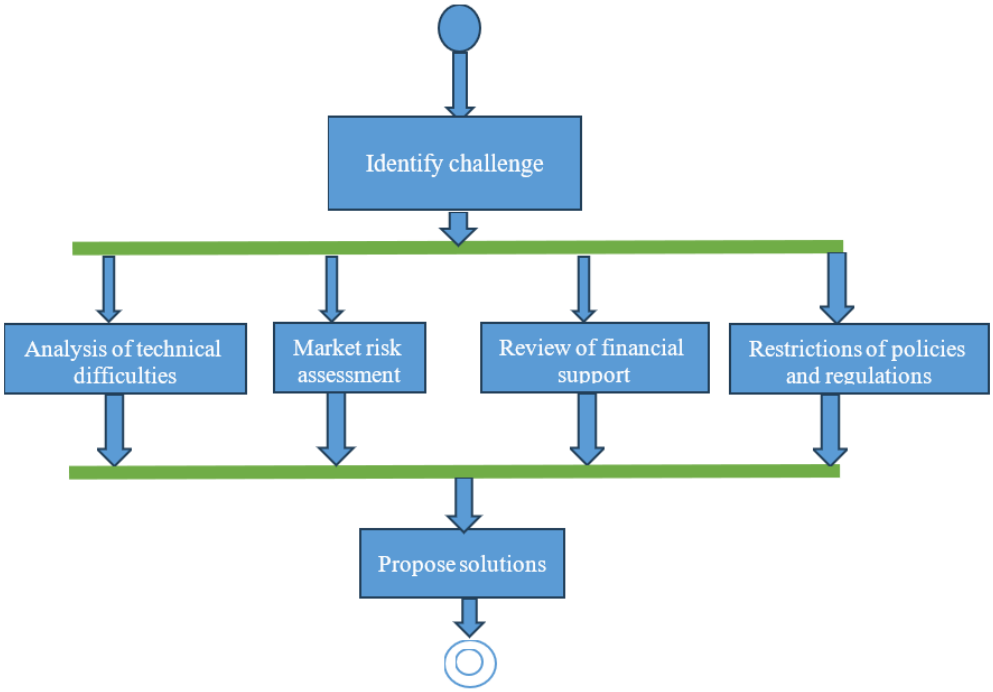

Figure 4 Analysis Diagram of the Scientific and Technological Achievement Transformation System

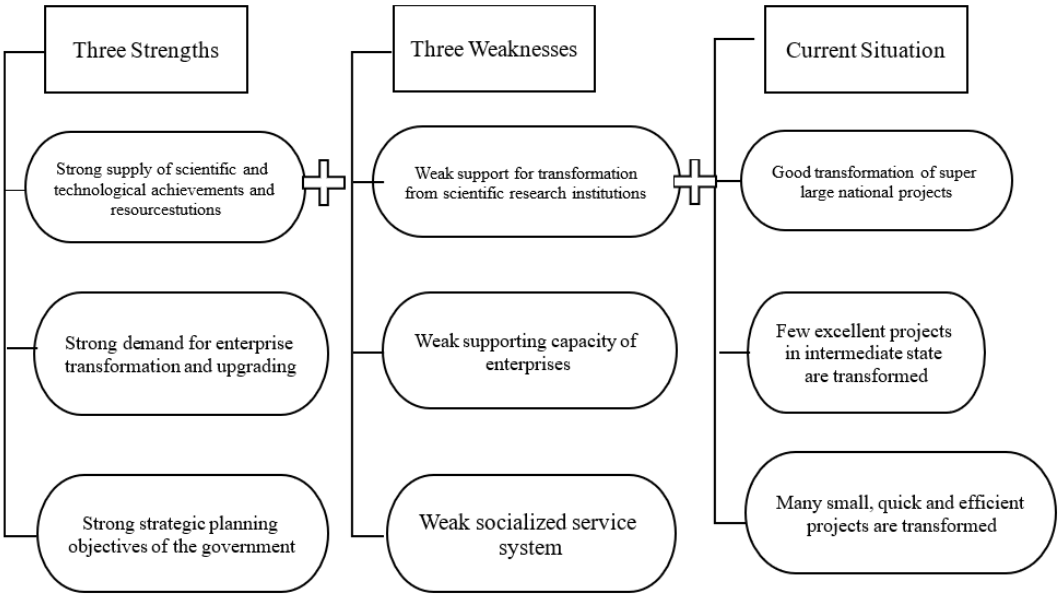

Figure 5 Current Status of Issues in the Transformation of Scientific and Technological Achievements

5. Conclusion

Through this study's analysis of the role and challenges of scientific journals in the transformation of scientific and technological achievements, the following conclusions can be drawn:

Scientific journals are one of the important carriers and channels for the transformation of

scientific and technological achievements. By publishing high-quality research papers and showcasing the latest scientific research results, scientific journals provide a platform for the dissemination and application of scientific and technological achievements. Excellent scientific papers can not only promote disciplinary development but also provide theoretical guidance and practical references for technological innovation and industrial upgrading. At the same time, scientific journals also play important roles in evaluating scientific research results and selecting talents, which to some extent influence the allocation of scientific and technological resources and the formulation of science and technology policies.

However, scientific journals also face many challenges in promoting the transformation of scientific and technological achievements. Firstly, there is still a certain gap between the overall level of China's scientific journals and that of developed countries, with a relatively small number of high-level scientific journals and room for further improvement in discourse power in international academic exchanges. Secondly, many scientific journals suffer from homogenization issues, lacking distinct publishing concepts and development orientations, making it difficult to attract high-quality manuscripts. In addition, there are some unreasonable aspects in the evaluation system of scientific journals, with excessive emphasis on quantitative indicators such as SCI inclusion and impact factors, which to some extent has led to the breeding of academic misconduct.

To better leverage the role of scientific journals in the transformation of scientific and technological achievements, it is urgent to take the following measures: firstly, strengthen the content construction of scientific journals, improve paper quality, and create a group of high-level scientific journals with significant influence both domestically and internationally; secondly, innovate the publishing model, explore a publishing concept that combines industry, academia, research, and application, and enhance the application orientation of journals; thirdly, improve the evaluation system of scientific journals, establish diversified evaluation indicators, and guide journals towards a path of connotative development; and fourthly, strengthen academic integrity construction and create a clean and upright academic ecological environment.

In summary, as a bridge connecting scientific research and application, scientific journals shoulder an important mission in promoting the transformation of scientific and technological achievements. Only by continuously enhancing the strength of journals and improving their service capabilities can scientific journals better serve as a bridge and make greater contributions to accelerating the transformation of scientific and technological achievements into real productive forces.

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Table 1 Implementation Status and Factor Analysis of Policies for the Transformation of Scientific and Technological Achievements

Policy Name	Issuing Unit	Document Count	Field Coverage	Target Enterprise Scale	Achievement Transformation Indicator	Relevant Legal Basis	Expected Effect	Implementation Difficulty	Policy Implementation Degree	Influencing Factors
Innovation Scientific and Technological Achievement Transformation Incentive Policy	Ministry of Science and Technology	45	Biotechnology	Large and Medium-sized Enterprises	High Market Demand	Science and Technology Progress Law	40% Increase	Medium	80%	Capital Investment
High-tech Achievement Transformation Support Policy	National Development and Reform Commission	30	High-tech Industries	Small and Medium-sized Enterprises	Increased Competitiveness	Law on Promotion of the Transformation of Scientific and Technological Achievements	60% Growth	High	75%	Talent Shortage
Support Policy for Technology-based Startups	Ministry of Science and Technology	25	Information Technology	Startups	Economic Benefit Growth	Law on the Promotion of Small and Medium-sized Enterprises	50% Increase	Low	85%	Tax Incentives
Technology Innovation Guidance Fund Investment Policy	Ministry of Finance	38	Energy and Environmental Protection	Medium and Large Enterprises	Improvement in Technology Maturity	Fiscal Law	30% Growth	Medium to High	70%	Government Support
Formulation of Scientific and Technological Achievement Transformation Regulations	Legislative Body	18	Multiple Fields	Not Limited	Promotion of Technological Progress	Legislation Law	20% Increase	High	65%	Legislative Procedures
Promotion Policy for Technology Transfer in Scientific Research Institutions	Ministry of Education	33	Education and Scientific Research	Scientific Research Institutes	Improvement in Research Environment	Higher Education Law	25% Growth	Medium	78%	Social Recognition
Inter-departmental Cooperation Policy for Scientific and Technological Achievement Transformation	Ministry of Science and Technology, Ministry of Commerce	22	Chemical and Pharmaceutical Industries	Large Enterprises	High Economic Benefits	Anti-Monopoly Law	35% Increase	Medium to High	60%	Industry Barriers
Demonstration Policy for Local Characteristic Scientific and Technological Achievement Transformation	Local Governments	50	Local Characteristics	Small and Medium-sized Enterprises	Significant Social Contribution	Local Legislation	45% Growth	Low	82%	Regional Culture
Intellectual Property Protection and Incentive Policy for Scientific Research Achievements	National Intellectual Property Administration	40	Manufacturing	All Industries	More Patents Obtained	Patent Law	30% Increase	Medium	77%	Intellectual Property Protection
International Cooperation Policy for Scientific and Technological Achievement Transformation	Ministry of Foreign Affairs	28	Renewable Energy	Multinational Corporations	Improvement in Technological Advancement	Law of the People's Republic of China on Foreign Trade	55% Growth	High	68%	International Situation