Obstacles to the Transformation of Scientific and Technological Achievements and Countermeasures Based on Computer Technology

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Abstract. As the environment and situation changes in the transformation of scientific and technological achievements, the decisive role of the market in the transformation of scientific and technological achievements has become increasingly critical. The insufficiency of some existing technologies in China has become the institutional obstacles to promoting the transformation of scientific and technological achievements. In this paper, the domestic transformation technologies of scientific and technological achievements are consolidated. The institutional factors that constrain the transformation of scientific and technological achievements in China under the new situation are analyzed. The countermeasures and suggestions for building the transformation system of scientific and technological achievements in China are proposed from the perspectives of playing the role of the market, improving the transformation and disposal right for scientific and technological achievements, changing the scientific and technological evaluation system, valuing the overall technological coordination, reforming the evaluation mechanism, etc.

Keywords: Transformation of Scientific and Technological Achievements, Constraining Factors, Technological Analysis, Countermeasure Study

1. Introduction
Currently, scientific and technological innovation has become a strategic choice for a new round of economic and social development in China. To enhance the core competitiveness of science and technology [1], China has also introduced a large number of laws, regulations and technologies since the 1980s to facilitate the transformation of scientific and technological achievements, but the implementation effect is not satisfactory. The transformation rate of scientific and technological achievements of universities and research institutions in China has been at a low level for a long time [2-3]. The innovation dilemma of a low transformation rate of scientific and technological achievements has not been completely reversed, and the phenomenon of “creation without application” is still severe. However there are many scientific and technological achievements in universities, scientific research institutes and other units that cannot be effectively transferred to the industry [4-5]. On the other hand, the industry is facing the problem of a lack of core technology. Hence, it is hard for creators of scientific and technological achievements to realize the effective transformation from achievements to
applications. Therefore, it is urgent to systemize the existing technology of scientific and technological achievements transformation in China, further improve the technology system of scientific and technological achievements transformation in China, and explore the system and mechanism that constrain the implementation effect of current technology, which has become an indispensable part of revising the system of scientific and technological achievements transformation and promoting scientific and technological transformation.

2. Status Quo of computer technology application in promoting the transformation of scientific and technological achievements in China

Small and medium-sized sci-tech enterprises can choose two transformation ways in the transformation of scientific and technological achievements based on different transformation subjects: self-transformation and cooperative transformation. Based on the source of achievements, self-transformation can be further divided into independent research and development for scientific and technological achievements transformation and introduction of technology for subsequent development for scientific and technological achievements transformation. Cooperative transformation can be further divided into technological cooperation technology alliance, production university research, cooperation incubator for comprehensive services and cooperation investment for scientific and technological achievements transformation mainly reflected in the capital. In Figure 1, \( \bar{y} \) represents the average income of small and medium-sized enterprises (SMEs), and \( \delta \) represents any positive deviation of average income. The random income of small and medium-sized enterprises can be expressed by half of two incomes \( \left( \bar{y} + \delta, \bar{y} - \delta \right) \). The expected utility of random income of SMEs can be expressed as half of the two income utility levels as follows:

\[
E(u) = \frac{1}{2}u(\bar{y} + \delta) + \frac{1}{2}u(\bar{y} - \delta)
\]  

(1)

The utility function is a concave function (it can also be a convex function or a direct function). Hence, the following can be obtained:

!![Diagram](image)

**Figure 1.** Income and utility of scientific and technological achievements transformation of SMEs.

\[
E(u) < E(\bar{y})
\]

(2)

Where \( rc = E(\bar{y}) - E(y) \), \( rc \) represents a measure of the transformation cost of the expected utility of scientific and technological achievements. In terms of funding, creators were asked how much revenue they would like to give up achieving the same cost-effectiveness of technology.
transformation. Hypothetical income utility level $\hat{y}$ and $y$ same, i.e., $u(\hat{y}) = Eu(y)$, $\Delta y = y - \hat{y}$ represents the premium for the transformation of scientific and technological achievements.

The credit selection conditions for SMEs are as follows:

$$E(y) = \theta Q^b + (1 - \theta) Q^{\theta} > Q^b + rB + rc$$  \hspace{1cm} (3)

Where $E(y)$ represents the expected income and credit of SMEs.

3. Analysis of institutional factors constraining the transformation of scientific and technological achievements in China under the new situation

The current series of technological documents on driving the transformation of scientific and technological achievements in China have played an essential role in guiding and standardizing the transformation activities of scientific and technological achievements and mobilizing the enthusiasm of all parties to promote the transformation of scientific and technological achievements. However, with the significant changes in the current environment and situation of the transformation of scientific and technological achievements, many technologies have not met the urgent needs of promoting the transformation of scientific and technological achievements. Some problems have become institutional barriers to the transformation of scientific and technological achievements. Many technologies have yet to achieve their legislative expectations and institutional effectiveness in promoting the transformation of scientific and technological achievements, which should be redesigned accordingly.

To promote the transformation of scientific and technological achievements, the national science and technology, education, intellectual property, finance, assets and other competent departments took the lead in issuing a series of technological documents. However, there is still a lack of coordination between the technological development departments at present, with even a situation of mutual conflict and constraints. Due to the lack of coordination and communication among different departments in the process of technological system formulation, the implementation effect of technology is greatly reduced. For example, as per Several Opinions on Further Strengthening the Protection of Legitimate Rights and Interests of Service Inventors and Promoting the Application and Implementation of Intellectual Property Rights, where the service inventors fail to use and implement the intellectual property rights within two years after obtaining the intellectual property rights without justifiable reasons, the service inventors can apply and enforce the intellectual property rights by themselves after consultation with the units. However, according to the current regulations on the management of state-owned assets, all technology transfer belongs to the disposal of state-owned assets, which must be examined and approved, and shall not be transferred without authorization. What's more, to promote the transformation of scientific and technological achievements, some places have introduced many technological measures. However, these technologies are usually only local laws and regulations or government documents in terms of effectiveness. Hence, it is highly doubtful whether they can be effectively implemented in the universities directly under the Ministry of Education or the scientific research institutions of the Chinese Academy of Sciences (CAS). Some colleges and universities are limited by the regulations of the Ministry of education and other competent departments, so many local preferential technologies are difficult to be effectively implemented, nor dare to perform according to the local regulations. The equity incentive for achievement transformation can be confirmed by equity, etc. However, the state and the Ministry of Education stipulate that the transformation of scientific and technological achievements in Colleges and universities must be subject to the approval system according to the management of state-owned assets. These favorable technologies are challenging to implement for the local colleges and universities directly under the Ministry of Education and the scientific research institutions directly under the central government.

Universities, scientific research institutions and other research institutions often pay attention to the background of famous overseas universities when they introduce talents, mainly taking high-level papers as the leading indexes of evaluation. Upon the assessment, evaluation, and professional title
promotion, all units imperceptibly focus on vertical projects, awards, essays and other key indexes as the guidance; in the aspect of peer recognition, it also focuses on evaluation indexes such as vertical projects, papers, awards, etc., and even attending academic conferences in the industry are based on papers. Engineering and technological developers are also at a disadvantage in personal development. In some countries, when crucial talent plans, innovation teams, major project applications, and honorary titles are won, the primary evaluation indexes are vertical projects, papers, awards, etc. the current evaluation system is not conducive to the growth and long-term development of engineering and technological personnel. Currently, there is a common phenomenon that young teachers are not active in the transformation of scientific and technological achievements. Because the current environment of science and technology evaluation has not really formed an atmosphere oriented by innovation quality, a lot of scientific research personnel pursue the growth of quantity too much to assess and evaluate professional titles; many patent applications and awards are also mainly used to complete the requirements of scientific research project acceptance, to evaluate and evaluate professional titles. Most of the patents and many scientific and technological achievements may only stay in the stage of test and verification, and the technology maturity is not enough. The transformation of scientific and technological achievements in the subsequent implementation is still very high, and there is a gap with the industrialization application stage. Hence, it is difficult to implement an effective transformation of scientific and technological achievements.

4. Technical suggestions for promoting the transformation of scientific and technological achievements under the new situation
To verify the rationality of the calculation strategy for the transformation of scientific and technological achievements, we conduct numerical experiments. Meanwhile, it is also used to illustrate that this method can effectively help time-series big data analysis to make an entrepreneurial choice. Rural college students who return to their hometown to start a business apply the type II scientific and technological achievement transformation belief calculation rule to calculate the reputation value of an entrepreneurial provider, Figure 2 shows the cumulative reputation evaluation results of the existing 50 interactions of the start-up provider and the corresponding update values of each interaction:

![Figure 2. Evaluation results from the transformation of scientific and technological achievements](image)

In recent years, the state is also vigorously promoting the revision of laws and regulations related to the transformation of scientific and technological achievements. Some scholars are also studying how to revise scientific and technological achievements properly in China. To promote the transformation of scientific and technological achievements in China, we should value the role of market subjects, especially the role of service agencies in the transformation of scientific and technological
achievements. The experience of foreign countries shows that it is difficult for researchers to participate directly in all aspects of achievements transformation. Therefore, colleges and universities in the United States, Japan, Germany and other developed countries or scientific research institutions have organizations specialized in the transformation of achievements in science and technology. Hence, we should not emphasize the stimulation of technicians in the existing technologies but how to cultivate them. It is necessary to cultivate the market subjects specialized in the transformation of scientific and technological achievements and establish and improve the transformation mechanism of scientific and technological achievements in colleges and Universities Guided by market demand. At the same time, as the transformation of scientific and technological achievements is a systematic project involving many aspects and fields, involving many departments such as the government, enterprises, scientific research institutes, universities and intermediary agencies, it is necessary to strengthen the coordination and connection between various departments of the government and form a technological joint force that is the key point of the construction of the technological system for the transformation of scientific and technological achievements.

5. Conclusion
In the development of technologies for promoting the transformation of scientific and technological achievements, on the one hand, we should consider the coordination among the administrative departments of science and technology, assets, finance, intellectual property rights, etc. Local government should be granted more authority for technology formulation and supported in issuing technological documents with local methodological effects based on the actual local situation. In addition, the unification of transformation technology for scientific and technological achievements with finance, taxation, and other laws, regulations and administrative rules should be considered to enhance the application scope and implementation effect of technology. To this end, China should make coordinated provisions on relevant matters in the revision of “Law for promotion of scientific and technological achievements”. It should be clearly stipulated that the technical regulations and normative documents issued by local governments to promote the transformation of scientific and technological achievements are directly applicable to the affiliated universities and scientific research institutions. Only in this way can local laws, regulations and technologies developed for the “Law for promotion of scientific and technological achievements” be implemented to drive the transformation of achievements in the research institution system of affiliated universities and the CAS with massive patents effectively.

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