

# Research on Scientific and Technical Achievements Transformation of Colleges Based on the Perspective of Interest

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**Abstract**—As the cradle land of basic research and technological innovation, colleges not only shoulder the responsibility of talent cultivation and knowledge dissemination, but also shoulder the task of scientific knowledge creation. Chinese colleges have nearly half of the total scientific and technological talents, creating a large number of scientific and technological achievements each year, but most of these achievements are laid aside. There are many factors affecting college scientific and technological achievements, and the subject interest conflict is the root cause. Starting from the perspective of interest, this paper firstly positions various subjects' interest objectives in the process of college scientific and technological achievements transformation first of all, and then analyzes systematically the interest conflict between government, colleges, enterprises and intermediary agencies in the process of college scientific and technological achievements transformation, and finally puts forward the countermeasures and suggestions for constructing cooperative interests target and promoting college scientific and technological achievements transformation.

**Keywords**—colleges; scientific and technological achievements transformation; interests

## I. INTRODUCTION

At present, China's economic development has entered into the new normal. In order to move toward the mid to high level from the mid to low level for China's economic development, the key is to transform from factor driven to innovation driven, give play to the role of engine of science and technology innovation in economic development. Colleges are the main strength in national science and technology innovation system, assuming a large number of national, local and enterprises' scientific research tasks, having abundant scientific and technological achievements of their own, becoming the important base of science and technology innovation. But the college scientific and technological transformation rate in China is only 10%, far lower than the level of 60% ~ 80% in developed countries[1] Statistics show that, at present, colleges in our country have a large number of high-quality scientific research talents, nearly 50% of the full-time R&D personnel come from colleges, who control about 10% of R&D funds. However, about 90% of the R&D funds obtained by colleges are used in theoretical research, and the technology transfer contract number always accounts for 20% of the total, and the

volume of business of college science and technology transfer contract only accounts for about 5%. On the surface, the factors such as fund shortage, unreasonable funds expenditure structure and low conversion yield have affected the transformation of scientific and technological achievements. But it can be found through further analysis that unbalanced interest is the root cause for having difficulties in transformation of scientific and technological achievements. Along with the amendment of "Promotion Law for Transformation of Scientific and Technological Achievements" in 2015, the new round of promotion mechanism reform for scientific and technological achievements transformation is opened. This paper has analyzed the interest conflict issues generated in the process of scientific and technological achievements transformation, and put forward the specific measures for straightening interest relationship and promoting the scientific and technological achievements transformation.

## II. SUBJECT INTEREST OBJECTIVE POSITIONING OF COLLEGE SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS TRANSFORMATION

College scientific and technological achievements transformation is a complicated and systematic engineering, involving government, colleges, intermediary agencies, enterprises and many other interest subjects. According to rational agent hypothesis, each benefit subject is rational in market economy activities, and the target of participating in the economic activities is to maximize their own interest.

### A. Government Interest Objective

Government is the macro-economic control system, playing a very important role in the transformation of college scientific and technological achievements. On the one hand, government will develop a series of laws, regulations, policies and plans to promote the transformation of scientific and technological achievements, such as the Promotion Law of Scientific and Technological Achievements, the Patent Law, on the other hand, it will provide guidance, coordination and management of scientific and technological achievements transformation. As the administrator of society, government's interest objective is net social benefit maximization. One goal

of the government to take a series of measures to promote the scientific and technological achievements transformation is to make technology serve economy better, as the economic development of China has entered into the new normal, requiring to change the growth mode and promote the upgrading of industrial structure through innovation ability improvement; another goal is to improve the level of talent cultivating, as the scientific and technological achievements transformation can improve teachers' understanding of industries, so that they can bring latest knowledge to students, students can also often go to the enterprise for practice to improve their practical ability, which is helpful to improve the talent cultivation quality.

### *B. College Interest Objective*

College is the supply system of scientific and technological achievements, and the most critical node in the chain of college scientific and technological achievements transformation. From the institutional level, the scientific and technological achievements supply system mainly refers to college, which is the basis and source for scientific and technological achievements to transform to practical productivity, and its effective supply determines the change direction and possibility of productivity. As a nonprofit organization, college's primary interest objective is the reputation and status of the school, and then the economic benefits; from the individual level, the scientific and technological achievements supply system mainly refers to college teachers, and they are the creator of scientific and technological achievements. Teachers' primary interest objective is the promotion of professional titles and academic position, followed by the economic income, as high professional title and academic status often bring the increase of economic income.

### *C. Enterprise Interest Objective*

Enterprise is bearing system of scientific and technological achievements, the demander of scientific and technological achievements, and the specific implementer to transform the scientific and technological achievements into practical productivity. Enterprise is a place to realize combination of science and technology and economy, and the important base for commercialization and industrialization of scientific and technological achievements. Enterprise want to introduce in new type of scientific and technological achievements from college, to drive enterprise technology innovation, develop new production area, or reduce the production cost, improve the added value of products, and improve the economic benefits. Therefore, enterprise's interest objective is internal interest maximization.

### *D. Science and Technology Intermediary Agent*

Science and technology intermediary agency is the service system of scientific and technological achievements transformation, and the bridge connecting college and enterprise. As the intermediate link of scientific and technological achievements transformation, science and technology intermediary agency provides market information for the scientific research institutions while they are

researching on the one hand, in order to make the scientific and technological achievements developed adapt to the market; on the other hand, it need to provide enterprises with information about scientific and technological achievements, to evaluate value of scientific and technological achievements, for example, build the technology promotion center, college technology transfer organization, university science and technology park, business incubator, etc., to provide a platform for the communication, exchange, transfer, diffusion and appreciation of scientific and technological achievements. If it is a folk intermediary agency, its goal is to pursue accounting profit maximization; and if it is a cause-oriented intermediary agency, it pursues the public interest.

## III. ANALYSIS OF INTEREST CONFLICT AMONG VARIOUS SUBJECTS OF COLLEGE SCIENTIFIC AND TECHNOLOGICAL TRANSFORMATION

### *A. Interest Conflict between College and Government*

In the system engineering of scientific and technological achievements transformation, college scientific research personnel assume the heavy burden of scientific and technological creation. College is mainly responsible for the management of scientific and technological achievements as well as the guidance and consultation in subsequent transformation process. Reasonable distribution of college research personnel's interests plays an important role in promoting transformation of scientific and technological achievements. The concrete implementation program of Law of People's Republic of China on Promoting Scientific and Technological Achievements Transformation in 2016 stipulates that, the revenue obtained by college scientific and technological transformation shall be owned by the unit, while the completers of scientific and technological achievements and other personnel that have made important contribution for achievement transformation shall be rewarded with no less than 50% of the net income. The implementation of these two measures has broken the long-standing economic interest conflict exists between college and government. But as a nonprofit organization, college's largest interest demand is not economic interests, but reputation and status. When the social institutions conduct university ranking, they often regard "number of papers", "project quantity", "monograph quantity" and "highly cited papers" as indicators to measure college scientific research capacity, and college often take the above indicators as standards for measuring teachers' teaching effects, thus to regard them as the basis for title evaluation and scientific research reward.[2] School and college scientific research personnel will necessarily invest their main energy into theoretical research of topics and the paper writing to improve school's reputation and status as well as to promote the research personnel's professional title and academic status, having greatly reduced the time of researching and developing the scientific and technological achievements, which is not conducive to the transformation of scientific and technological achievements, and it is in conflict with government's interest objective of promoting industrial structure upgrading and improving the talent cultivation quality.

### *B. Interest Conflict between Enterprise and College*

College is the supplier of scientific and technological achievements, and the enterprise as the demander of scientific and technological achievements. The interest conflict is inevitable as both of them have different motivations and risks. One is the interest conflict at the stage of projecting selection of scientific and technological achievements. Affecting by college scientific evaluation mechanism, scientific research personnel often start from the research field of their own subject in term of project selection, pursuing theoretical innovation and publishing the high level academic papers, yet they are short of the attention to market demand, and ignore the marketing feasibility of their research achievements; however, enterprise pursues the internal revenue maximization, as a result, the scientific and technological achievements needed by enterprise shall be the achievements with high marketization degree, but not the outcome at the preliminary test period in the laboratory, and shall be in line with the market demand. [3] The other is the interest conflict at the trading phase of scientific and technological achievements. Conflicts are often generated between college and enterprise in terms of interest distribution upon conclusion of trading intention. As the developer, college thinks that they shall obtain high interest return as they hold enterprise's core technology; while the enterprise holds the opinion that a scientific research and technological achievement shall undergo the long cycle of development, experiment, production, sales, and recognition by the market. The problem of any link of the cycle is likely to cause the failure of enterprise investment. Enterprises need to bear great risk, so they should receive most of the interests. Therefore, the transaction often fails at the trading period because of interest conflict.

### *C. Interest Conflict between Government and Science and Technology Intermediary Agent*

As the intermediate link of scientific and technological achievements transformation, science and technology intermediary agent is the medium for the communication between college and enterprise. The agent shall provide service for the suppliers and buyers based on the principle of justice and equity, so as to better promote the transformation of scientific and technological achievements. At present, most of the science and technology intermediary agents in China are cause-based units. The identity of cause-based unit makes these agencies lack of the motivation of economic interests. In practical work, a lot of intermediary agents perform the supervision function, rather than the service function, revealing severe function deficiencies; in addition, part of these cause-based science and technology intermediary agencies are established or restructured colleges, while they providing intermediary services, they consider more of the public interests for setting up colleges. However, interest conflict exists between college and government, as a result, it is difficult to coordinate the interest objectives of science and technology intermediary agencies and that of government.[4]

## IV. RESEARCH ON PROMOTION STRATEGY OF COLLEGE SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS TRANSFORMATION BASED ON COOPERATIVE INTEREST OBJECTIVE

### *A. Reform College Scientific Research Evaluation Indicator System*

College scientific research evaluation system reform is primary approach for coordinating the interests of government and colleges. Colleges and college scientific research personnel pursue the quantity and quality of subjects, papers and monographs, which is caused by the long-term unreasonable evaluation system of scientific research in our country. In the present college scientific research, "a ruler" is adopted to measure most of the scientific research achievements. The evaluation standard of almost all the science and engineering discipline for papers, especially the SCI papers, is very high. But in the field of engineering, which is more of application, it is difficult to publish a large number of such papers. If require them by force, it will distract the scientific research effort, and college scientific research will become the achievement-oriented research, but not the research for transforming science and technology into productivity, which runs in the opposite direction of the government's interest objective. To break through the bondage of old scientific research system, the college scientific research evaluation system shall be conducted from the following two aspects. First of all, transform from evaluation dominated by government to the evaluation dominated by the market. The government shall give the dominant right of evaluation to the market, with the evaluation standard to be formulated by the college and experts within this industry, and the evaluation focus shall transform from quantity of research achievements to the research quality, original value and actual contribution, as well as organize third-party evaluation on the evaluation results regularly; second, avoid "one size fits all", construct the classification evaluation system and classify the college teachers as per different posts such as teaching-oriented, research-oriented, and teaching research-oriented. Different evaluation standards shall be applied to different posts. Teaching-oriented teachers can concentrate on improving teaching quality, and don't have to publish waste papers in order to meet the scientific appraisal; research-oriented teachers can concentrate on to be engaged in the technical studies and transformation, which is also a greater contribution to the progress of science and technology.

### *B. Strengthen Enterprise's Dominant Position*

In the chain of current college scientific and technological achievements transformation in China, enterprise is at the downstream of colleges. Colleges conduct scientific research and development according to the proposed research topic, and promote the research achievements to enterprises through science and technology intermediary agencies. Because interest conflict exist in the project selection of college and enterprise, it is possible that the scientific and technological achievements researched by colleges are not the ones really needed by enterprises, resulting in the scientific and technological achievements cannot be transformed. In the new round of scientific and technological innovation reform,

enterprise's dominant position shall be strengthened, moving the enterprises from downstream to upstream of chain. Enterprise should formulate its own technical requirements according to market development situation, and then delegate these requirements to college research institutions to research and develop. In the process of research, enterprise should timely feedback market information to college, and help to deal with the difficulties encountered in the process of scientific research. The project selection based on market guiding is more conducive to the transformation of scientific and technological achievements.

#### *C. Transform the Property of Science and Technology Intermediary Agent*

College science and technology intermediary agency shall transform from government-oriented to market-oriented. As a third party, science and technology intermediary agency cannot completely belong to the government, otherwise it will produce "bureaucracy" and interest conflicts, yet it also can't fully operated by the market, as science and technology intermediary agency undertakes certain policy functions. The Chinese science and technology intermediary agencies can be operated by the public and supported by the government. As a civil subject, on the one hand, the fairness of it in the chain of scientific and technological achievements the transformation can be guaranteed, to value the scientific and technological achievements on an objective basis, without harming the interest of any party; on the other hand, civil subject has the characteristics of profit pursuing. In the process of scientific and technological achievements transformation, it can consider to reasonably distribute the interest among college, enterprise and intermediary agency in the form of share holding, to reduce economic interest conflict among various parties.

#### *D. Give Play to Government's Macro Control Function*

Government should speed up the functional transformation, strengthen its role of supervision and service in the transformation of scientific and technological achievements, give full play to its macro control functions, and create a good environment which conducive to scientific and technological achievements transformation. In terms of colleges, government shall grant their rights and benefits, to make colleges have more autonomous right and profit motivation; in the aspect of enterprises, the government can improve the enthusiasm of enterprise innovation through increasing value-added tax and enterprise income tax and other tax preferences; in terms of science and technology intermediary agencies, the government can support their development by providing free land, subsidized loans and other forms. In the whole process of transformation of college scientific and technological achievements, government no longer plays the role of "parent", but a qualified policymaker, supervisor of scientific and technological achievements transformation and the provider of public service, rendering a coordinated development of the interest objective of college, enterprise and intermediary agency through system reform and policy guidance, and consistent with the government's ultimate goal, to ensure smooth promotion of college scientific and technological achievements transformation.

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