Research on the Transformation of Energy Saving and Emission Reduction Scientific and Technological Achievements in Universities Based on Network Analysis

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Abstract. In view of the low conversion rate of energy conservation and emissions reduction achievements, from the two perspective of papers and patent analysis and evaluation, revealing the deep reason of low conversion efficiency; In multi-agent collaboration as the breakthrough point, to build linkage mechanism of the government, enterprises, colleges and universities, realize multi-agent collaborative mode of transformation of scientific and technological achievements of ecological environment and puts forward some practical and feasible specific policy recommendations.

Introduction

Universities as a priority that country implement the independent innovation and scientific research, have a huge own innovative resources and advanced software and hardware research equipment, in the part of improving scientific research system, promoting technological innovation, improving the scientific and technological achievements transformation mechanisms has made great contributions. Meanwhile, in the process of energy saving scientific and technological achievements, the College reflects the increasingly important role. However, compared with the scientific research strength of major colleges and universities and technological achievements obtained, university scientific achievement transformation efficiency makes us worry.

Situation Analysis of Scientific and Technological Achievements Transformation in Universities Energy Saving

Analysis of Universities Energy Saving Academic Achievements

All along, the domestic and foreign universities have a high degree of concern to study energy conservation, and published a large number of papers result, which research covering many areas; at different times, there has been different increment and decrement trend in this area, but few people study for the conversion of these results[1].

After the actual investigation, the authors found various national databases indexed papers on energy saving quite a bit, but the transformation of energy saving in papers less frequently mentioned. Research of universities about energy conservation on the more limited basis application and technical guidance, substantially no in-depth study and analysis about improving the relevant policies and attitudes of scientific and technological achievements conversion rate, so these studies in practical applications and not really play its effectiveness, it is very unfortunate.

Compared to domestic, the time of foreign starting to study energy saving scientific and technological achievements is earlier, the author made substantially analysis from papers published annual of foreign universities papers conversions, as shown in FIG. 1. Form FIG1, it is easy to see the study of foreign energy conservation in addition to 2012, has been relatively stable, and growing trend, which reflects the attention of foreign universities scientific and technological achievements. Essentially, this conversion rate is still not very high, about 25%, indicating that every year there are
about three-quarters of research resources are wasted, but only such a gap, it has been enough to arouse our attention, that needs our governments, big companies and universities to seriously reflect on reasons for such emergencies.

Figure 1. The situation of Foreign Universities Papers in different years.

The Patent Transformation Analysis of Universities Energy Saving

WIPO said that, in 2014, the number of the major countries using the PCT system to declare patents is 215000, the top three are the United States, Japan and China. The number of patent applications increased by 18.7%, however, compared with the previous two countries, we also have significant gaps, and the patent-pending unit slightly concentrated. In recent years, the number of China’s major colleges and universities patent applications increasing, which explains the importance for the energy conservation and the initiative for energy emission reduction efficiency research is improving. Although the number of declared patents is increasing, but the conversion efficiency is still low, real achievements conversion efficiency is only about 20%, and ultimately the formation of industrial scale even less, only about 5%, while the conversion ratio of about 80% of U.S. Patent. Thus, the gap between China and the United States is still large. Cause low conversion rate of patents are: lack of university patent conversion mechanism, patent applications touch with the market and the lack of capital investment, which is why we urgently need to address the problem.

The Outstanding Issues of Energy-saving Technology Achievements Conversion

Universities energy saving low conversion efficiency, this result for many reasons, divided into about four aspects:

Governments factors. Although in recent years our government has taken a number of initiatives to support and promote scientific and technological achievements into practical university, but the effect is not obvious. First, there is a disconnect between the science and technology innovation chain management of science and technology, resulting in a chain of college enterprise disjointed. Second, the state funds to support research projects is still insufficient, the state key laboratory construction funds has not been in place, more than 40 national key laboratories established by the State still has not given timely financial support. Finally, the implementation of the government is not in place, lacking of incentives.

Colleges factor. First, the university energy-saving emission reduction research evaluation mechanism is imperfect, the teachers see is the number of individual research projects completed, and so the number of published papers, ignoring the Institutions of Higher Learning socio-economic development should play a role. Secondly, the university research funds may not be implemented; university energy saving scientific achievement transformation can be divided into research, test,
production, in which a serious shortage of funds needed for the test link, and long life cycle, high risks. Third, they tend to focus on the art front and innovative, while ignoring the needs of the market project, which eventually led research and actual production is completely out of touch\textsuperscript{[4]}. 

Business factors. The most fundamental is that the measure of their own costs and benefits, if the benefits that brought about by using the outcome of the energy saving is less than the cost of the outcome, then the business will be difficult to accept, companies often seek immediate benefits for those who do not want to advance strong investment, long cycle, the obvious economic benefits of the project investment, which greatly reduces the business results of energy saving and emission reduction colleges acceptable range\textsuperscript{[5,6]}. Due to the current risk of existing research system is not perfect, the major business concerns high-risk, high investment in research.

Technical factors. First, China's technology market of energy saving scientific and technological achievements lacks effective science and technology agency, university and business information exchange is not smooth. On the other hands, Our technology market for energy saving and technological achievements valuation has not yet formed a practical way, lacking of an objective evaluation of the technical, economic, market and other aspects. Meanwhile, the science and technology intermediaries in social with the technology intermediaries in major colleges and universities lacks of communication, thus preventing information exchange and communication between each other.

Countermeasures and Suggestions

The author based on the actual situation of Chinese universities and technological achievements, proposed security system and policy recommendations about energy conservation and technological achievements of University based on Ecological Perspective, transformed to form a "government-led, colleges and universities as the main market for assistance, enterprise as the carrier", the all-round ecological conversion mode multi-level scientific and technological achievements. Its architecture shows in Figure 2.

![Figure 2. Energy saving and technological achievements Eco transformation mode framework.](image-url)

The Government should strengthen the guidance consciousness, improve the efforts that scientific and technological achievements conservation. The Government should improve relevant laws and regulations systems, develop clear and mandatory standards for the development of new
technologies, to create a good environment as the support. On the other hand, increasing financial investment, setting relevant tax incentives, but also should optimize the supervision, management and service functions of government, manage and supervise the whole process, all aspects from the development to application about scientific and technological achievements.

Universities promote awareness should be strengthened to promote the advantages of energy saving scientific and technological achievements. First of all colleges and universities raise awareness, and actively adapt to the new situation. Recognizing that it is an important guarantee rapid economic development; Universities need to combine the results of energy saving and technological achievements with the market, enhance the usefulness and applicability of energy saving scientific research; Universities should establish the professional research management team, meanwhile, actively cooperate with business and government, promote production and commercialization of scientific and technological achievements of colleges and universities energy saving.

Enterprises should take the initiative to implement and promote the conversion process. Chinese enterprises due to China’s market has been influenced by the environment, most companies lags behind ideas, innovation, lack of awareness of independent development, environmental protection and so on, so companies have to change the existing situation. Enhanced corporate social responsibility and sense of innovation, establish long-term cooperation programs with universities, learn the advanced experience and practices with regard to research and technological achievements of energy conservation and transformation, and actively introduce or develop advanced energy saving technology, undertake to social responsibility of protecting the environment, to promote rapid and healthy development.

Play the role of market regulation, improve the transformation technology system, speed up energy saving scientific and technological achievements conversion rate. Under the current conditions of the economy, improve the market operation mechanism, strengthen the guidance and supervision, give full play to the market in allocating resources, and to build a new technology system, introduce foreign advanced technology, improve energy saving scientific and technological achievements maximize the benefits of the security system, providing strong technical support for the transformation of energy saving scientific and technological achievements, to accelerate the transformation process.

**Conclusion**

Author understands in detail the basic situation of universities energy saving scientific and technological achievements and its influencing factors, found in university research into energy conservation is not timely, the conversion rate is too low and so serious. Therefore, proposing to study abroad energy saving measures taken by the scientific and technological achievements, combined with China's current situation, take different measures, and give specific policy recommendations from government, universities, business, technology and markets in four areas, which has an important reference to achieve a win-win economic and social benefits of energy saving.

**References**


