Research on transmission model for technology rewards to enhance enterprises innovation ability: Based on the case of power enterprises.

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Abstract. This study refines the formation of key indicators of science and technology reward evaluation, determines the key evaluation indicators affecting the development of electric power science and technology innovation and the key contents of electric power science and technology development according to the characteristics and features of the electric power industry and the energy Internet enterprises; taking the key indicators as a breakthrough, this study constructs the role transfer model between the influence of the evaluation indicators of scientific and technological rewards on the development of science and technology innovation in the electric power industry and carries out empirical analyses to verify and optimize the influence transfer model.

1 Introduction

Scientific and technological awards have an important incentive effect on individual scientific and technological workers, awarding organizations and the scientific community as a whole. A scientific research project winning a scientific and technological award will promote the enhancement of the enterprise's innovation capacity in several aspects: technology innovation, economy, policy innovation and team cooperation; the enhancement of the enterprise's innovation capacity will further increase the innovation motivation of scientific researchers, increase the innovation resources, and promote a new round of innovation activities. Even if scientific research projects fail to win scientific and technological awards, they can slowly improve the innovation capacity of enterprises in the process of transforming the results; however, the promotion effect is weak because of fewer rewards and the impact of the incentive function[5].

2 Incentive function model of scientific and technological rewards

From a psychological perspective, Scientific and technological rewards can be viewed as psychological incentives that give researchers a sense of satisfaction and contentment[1]. Motivation theory holds that motivation is "a psychological process that constantly stimulates the engine", and that "The higher the level of motivation, the greater the effort and satisfaction in achieving the goal, the higher the work efficiency, including Maslow's Hierarchy of Needs Theory, Alder's ERG Theory, Herzberg's Two-Factor Theory, Fromm's Expectation[1] Theory of Work Motivation, and Adams's Equity Theory, among others. The theory of incentives holds that, since human needs are diverse, If we can take appropriate incentives to satisfy human needs and targets, human needs can turn into good work performance. Thus, exploring the incentive mechanism of scientific and technological awards for scientific and technological innovation will help to rationalize the operation of scientific and technological awards and further mobilize the enthusiasm of scientific research workers. With reference to the "Diamond Model", this paper focuses on four factors influencing technology innovation: technology prowess, financial support, policies, and group work[2].

2.1 Diamond Model for Technology Rewards

The national science and technology awards will motivate the award-winning enterprises to strengthen the motivation of technology innovation and stimulate the technology innovation intention [4]. Besides, from the perspective of innovation motivation, the element parts needed for enterprise innovation conclude technology, talents, data and capital, shown as Fig. 1.
First, science awards are the society's priority for scientific discovery and recognition of scientific research labour achievements, the national technological awards refer to high-end scientific research results in China. Therefore, after obtaining the recognition of the national technological award, the enterprise will make a leading part in the transformation and development of the industry, bring disruptive innovation to the entire industry, and then stimulate the wave of scientific and technological innovation. Taking power enterprises for instance, technological achievements of winning the National Science and Technology Prize will realise a technological breakthrough or a series of technological breakthroughs, which usually leads to the energy transformation and decarbonization\(^7\). The realisation of a particular core technology identified by the national technological prize can have a revolutionary impact on an industry or technological field, change the original development model, bring non-gradual leapfrog development, and finally achieve scientific and technological progress.

Secondly, scientific and technological awards can further help enterprises to support the scientific research work of their research teams, while at the same time recognising the scientific contribution of existing projects. Enterprise science and technology personnel to obtain scientific and technological awards, on the one hand, can increase the value of self-realisation, to obtain legitimate wealth, so as to continue to shine in the field of scientific research, to expand the influence of the original scientific research, to win more scientific research funds, to help individuals to promote a higher level, and then to achieve some individual development chances. Besides, it can enhance the visibility and academic authority of researchers, thus obtaining more academic resources to help them incubate more innovative talents and provide sufficient reserves for scientific and technological innovation. In addition, for scientific and technological staff who have not received scientific and technological awards in the same enterprise, scientific and technological awards are one of the incentive factors and goals with good attractiveness, which can stimulate their enthusiasm for work to a certain extent and promote the overall improvement of scientific and technological strength\(^6\). On the whole, from the perspective of enterprises, the issuance of science and technology awards will enable the unit to invest more financial help and personnel support to the award-winning projects to help incubate more outputs; On the other hand, it will help the unit to improve its visibility in the country and recruit more high-quality research teams, thereby improving the construction of scientific research teams.

### 2.2 Evidence from power enterprises

For the power industry, on the one hand, the national science and technology awards have a chain effect, and winning an award enhances the recognition and influence of the project, which is conducive to continuing to receive awards at other levels; The award highlights the positive side of the allocation of innovative resources, promotes the emergence of relevant knowledge achievements, and guides the public to pay more attention to the protection of intellectual property rights, and further develops orderly market competition; the award-winning project directly influences the development and continuity of the organisation, and expands its influence; it indirectly promotes the extension of relevant disciplines to universities and research institutes\(^8\). On the other hand, at the team level, the national science and technology award "planted plane trees and attracted golden phoehnixes", relying on science and technology awards to cultivate a group of national leading talents; Guide all sectors of society to actively build a group of innovative teams, and cultivate more high-quality technical and skilled personnel, skilled craftsmen, and craftsmen from major countries; It is also an effective guide to gather global brains; Meanwhile, It also has a positive impact on the increased stability of the project team and the level of scientific and technical output of the team.

Finally, the most direct rewarding dividend that science and technology awards bring to enterprises is more funding, which can lead to more economic benefits through the transformation of results, as science and technology awards increase the visibility of the project and the likelihood of obtaining more project opportunities and co-operation opportunities. As far as
Taking power industry for instance, National Technological Award is positive to promote the innovation and promotion of scientific research achievements, which has a very good impact on the industrial development of the power industry, as well as achieving independent innovation, independent production and batch production, promoting the whole power industry innovation level, help the electric power industry and related industrial structure adjustment and upgrading, promote the better development of the electric power equipment manufacturing industry, drive the electric power industry upstream and downstream related industries to develop together. It has injected a stronger impetus to the rapid development of the economy and society, showing extremely strong economic benefits[9].

On the other hand, from the perspective of motivation to innovate, a firm's motivation to innovate consists of three main assumptions:"maximum profit", "customer creation" and "social responsibility". Taking the power industry for example, the program honoured with awards are more in line with the strategic needs of the country, such projects are generally centred on the relationship between the people's livelihood and national security of the major technical issues for scientific research, scientific research results speak directly to the security of the major technical issues for scientific researchers to carry out innovative activities according to the development plans of the State, industries and scientific researchers will carry out corresponding innovation activities in accordance with the development plans of the State, industries and innovation subjects, and in the light of their own actual conditions, including the declaration of new scientific research projects, and the reasonable selection of scientific research projects for the transformation of achievements[14]. After the end of the current planning period, the state, industry and innovation main body will formulate the development plan for the next planning period according to the current development situation at home and abroad, taking into account the fulfillment of the development goals.

The guiding role of science and technology awards is essentially a regulating role. After the introduction of the national development plan, the reward orientation and selection criteria of science and technology awards should be consistent with the key areas and main objectives of the national development plan. In the process of innovation subjects formulating their own development plans according to the national development plan and industry development plan, and in the process of scientific researchers carrying out innovative activities according to the development plans of the country, industry and innovation subjects, science and technology awards play a positive regulating role.

Scientific and technological awards should be closely integrated with national development plans. Commodity prices are determined by the supply and demand of commodities, when supply exceeds demand, the demand for commodities is large and the supply is insufficient, the price of commodities will rise; when there is an oversupply of commodities, the demand for commodities is small and the supply is too much, the price of commodities will fall. The supply and demand of commodities is determined by the stage of socio-economic development, and the demand for commodities is different at different stages of socio-economic development, which leads to fluctuations in commodity prices. Similarly, at different stages of socio-economic development, there are differences in the level of demand for and supply of different industries and technologies, and industries and technological fields with high demand but insufficient supply will become key areas[10]. By analysing the current level of national economic and scientific and technological development, the national development plan specifies the key industries and technological fields for the coming period, leading the direction of national economic development and technology innovation. In terms of scientific and technological awards, the Regulations on National Science and Technology Awards clearly stipulate that the positioning of awards and selection criteria for scientific and technological awards should be closely integrated with the major strategic needs of the country and the medium- and long-term scientific and technological development plan, so as to guide the gathering of innovative resources and innovative talents in key areas and to promote the rapid development plans according to their own development conditions, and specify the development goals and key tasks of their own industries and units in the current planning period; scientific researchers will carry out corresponding innovation activities in accordance with the development plans of the State, industries and innovation subjects, and in the light of their own actual conditions, including the declaration of new scientific research projects, and the reasonable selection of scientific research projects for the transformation of achievements[14]. After the end of the current planning period, the state, industry and innovation main body will formulate the development plan for the next planning period according to the current development situation at home and abroad, taking into account the fulfillment of the development goals.

The orienting role of technological awards is to guide scientific researchers to carry out innovative activities oriented to national needs and to solve hot, difficult and key problems related to economic construction, social development and national security. The state formulates development plans (such as the Outline of the Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the National Medium- and Long-Term Scientific and Technological Development Plan (2021-2035)), which specify the key development areas, main objectives and deployment of major projects during the current planning period; on this basis, the main bodies of innovation in various industries and sectors formulate development plans in accordance with their own development status[12]. On this basis, innovation subjects in various industries and sectors will formulate...
development of China's economy and society. For example, new awards can be set up to increase the number of awards in key industries and key technology fields, highlighting the outstanding contribution of scientific and technological innovation achievements to socio-economic development, and so on, so as to guide the advantageous scientific and technological resources to gather in key scientific and technological fields and strategic emerging industries. For non-key industries and backward technology fields, the negative effects can be suppressed by reducing the number of awards, so as to realize a good interaction between S&T innovation and social and economic development. Therefore, the positioning of S&T awards is in line with the national development plan.

Scientific and technological awards can promote the development plans of innovative subjects and the innovative activities of researchers. Reputation theory holds that organizations have the need to pursue a good reputation, strive for social recognition, obtain resources, opportunities and support, and then accomplish value creation. Maslow’s Hierarchy of Needs Theory holds that human needs are divided into five types from low to high like a ladder, i.e. physiological needs, safety needs, social needs, respect needs and self-actualization needs. Only after satisfying the low-level needs can we pursue the high-level needs. Therefore, as high-level talents, researchers will have a strong need to pursue self-actualization on the basis of satisfying physiological needs, safety needs, social needs and respect needs. As science and technology awards are in line with the national development plans and industry development plans, science and technology awards are an institutional arrangement for recognizing the innovative achievements of scientific researchers, which can satisfy both the pursuit of organizational reputation by innovation subjects and the need for self-realization by scientific researchers. Therefore, whether it is the implementation of national and industrial development planning or the pursuit of organizational reputation, the innovation subject should actively formulate development planning, clarify the strategic objectives and work deployment in the coming period, so that its national and industrial development objectives are consistent with the positioning of scientific and technological rewards; whether it is to strive for scientific research funding, improve scientific research, or declare scientific and technological rewards, and pursue the realization of value, the scientific researchers should actively adjust the innovation direction, in the key areas determined by the national development plan, in accordance with the industry development plan and the scientific and technological innovation tasks determined by the development plan of the main body of innovation, actively declare scientific research projects, rationally select the results of the transformation projects, and strive to achieve significant social and economic benefits, and to meet the selection criteria for scientific and technological awards.

4 Conclusions

In summary, the reward positioning of science and technology awards is consistent with the national development plan, and scientific and technological innovation activities in key areas are more in line with the needs of social and economic development at this stage, and it is easier to achieve significant economic or social benefits, and meet the selection criteria of science and technology awards. Therefore, the guiding role of science and technology rewards is reflected in the fact that it can promote the formulation of the development plan of innovation subjects, promote the adjustment of the innovation direction of scientific researchers, and thus promote the gathering of superior scientific and technological resources and scientific and technological talents in key technical fields and industrial directions.

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References


