

Research on the Driving Factors of Technological Innovation of Technology-based Small and Medium-sized Enterprises in the Context of Energy Conservation and Emission Reduction

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Abstract: Energy conservation and emission reduction is an important measure to implement the Scientific Outlook on Development, promote economic restructuring and change the development mode. It is an unshirkable social responsibility of technology-based small and medium-sized enterprises (SMEs) to require the joint efforts of all citizens. Based on the current situation, this paper analyzes the influencing factors of the technological innovation ability of China's energy conservation and emission reduction enterprises from both external and internal aspects, and puts forward some suggestions.

Keywords: Energy conservation and emission reduction, Technological innovation, Small and medium-sized enterprises.

1. Introduction

With the rapid development of China's economy and the continuous progress of science and technology, various constructions have made remarkable achievements in the world, and people's living standards have been steadily improved[1]. However, behind this, huge resources and environmental costs have been paid. Therefore, since the "Eleventh Five-Year Plan", the state has stepped up efforts to improve the environment, and carried out energy-saving actions in nine key energy-consuming industries, such as steel, nonferrous metals, coal, electric power, petroleum, chemical industry, building materials, textile and paper making[2]. Facing this new development opportunity, energy-saving and emission-reducing enterprises should change their traditional ideas and vigorously improve their technological innovation ability, so as to maintain their core advantages in the increasingly fierce international competition and develop for a long time[3]. Therefore, it is of great reference value to analyze the influencing factors of energy-saving and emission-reducing enterprises' technological innovation ability to improve their technological innovation ability and maintain their core advantages[4].

Energy conservation and emission reduction are the objective needs of the survival and development of small and medium-sized scientific and technological enterprises[5]. On the one hand, the low energy consumption of enterprises is a benefit in itself; On the other hand, enterprises should put in place emission reduction measures, pay attention to cleaner production, and reduce waste gas and sewage discharge from the source, which can not only avoid the "high-voltage line" that pollutes the environment, but also enjoy the preferential policies of ecological compensation[6-7].

2. Analysis on Driving Factors of Technological Innovation of Energy Saving and Emission Reduction in Small and Medium-sized Scientific and Technological Enterprises

The influencing factors of China's energy conservation and emission reduction enterprises' technological innovation capability are mainly divided into internal and external factors, as shown in Figure 1.

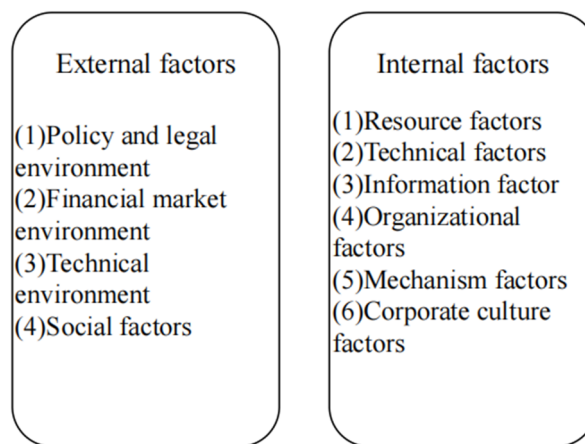


Figure 1. Analysis of influencing factors

2.1. Analysis of external influencing factors

On the one hand, the publicity of relevant policies and documents is not in place. At present, many policy documents requiring enterprises to carry out energy conservation and emission reduction have been issued, but the current developed media has not been used to make the ideas of these documents penetrate into enterprises and people. Enterprise leaders have not set up the idea of energy conservation and emission reduction. Some enterprises focus on economic interests and put environmental benefits and employee responsibilities at a secondary position. On the other hand, the publicity of various environmental protection laws and

regulations is not in place. Although China has established a relatively perfect environmental protection law and regulation system, there are few measures to popularize the law. Many managers do not know much about the provisions of relevant laws and regulations, and do many acts beyond the provisions of the law[8].

The establishment of technology-based SMEs is mostly lack of planning, showing randomness and decentralization in regional distribution. This characteristic seriously affects the production of scale effect, and then affects the economic benefits of enterprises[9].

Most of China's private technology-based SMEs need funds to operate from two aspects: first, the profits generated by production and operation; The second is lending. The lending object is either a commercial bank, or private funds, or government support funds. However, in the actual operation process of enterprises, due to small scale, backward technology and other reasons, it directly led to low profits and less own funds, which hindered endogenous financing.

At present, although there are various relevant environmental protection laws and regulations in China, such as the Natural Resources Law, the Environmental Protection Law, the Water Pollution Prevention Law and the Energy Conservation Law, the effect is greatly reduced in the actual implementation process. On the one hand, local enthusiasm for GDP growth is likely to lead relevant departments to prefer the former between economic growth and environmental protection, giving enterprises an opportunity to take advantage of it. On the other hand, the current widespread rent-seeking behavior is also very easy to induce enterprises to use some illegal means to obtain loose regulations on environmental protection.

The technology environment is a technology market established for orderly and efficient trading of various scientific research achievements under the condition of establishing a scientific research system. A sound, mature and stable scientific research and technology R&D system can continuously provide technological achievements to enterprises to continuously support their technological innovation activities, thus promoting social and economic development. Further extension on this basis, if a developed technology trading market system can be established, it will greatly shorten the time for enterprises to turn innovative technologies into products, and then the cost of enterprises for technology development and research will be reduced, which will improve the utilization of resources.

Enterprises exist in the industry, so the industrial structure will have a great impact on the technological innovation of enterprises. With the rapid economic growth and the change of energy structure in China, people's living environment and working conditions have changed greatly. Under such changes, people put forward new requirements for enterprises, which also promoted the process of technological innovation, and technological innovation has brought new impacts to people's lives. Therefore, technological innovation activities and changes in the energy structure simultaneously and mutually affect each other. The industrial structure is also constantly adjusting and evolving. In turn, the industrial structure affects the technological innovation of energy conservation and emission reduction enterprises, forming a virtuous circle between the two.

2.2. Analysis of internal influencing factors

(1) Resource factors

It is the basis for capital enterprises to carry out technological innovation activities normally. Without the support of capital, all innovation activities of enterprises will become empty talk. Especially in the current economic and social environment, energy saving and emission reduction enterprises need to invest a lot of money to develop new energy saving and environmental protection technologies. Every link in the process of technological innovation needs financial support. It is the main body engaged in technological innovation activities in talented enterprises, and it is one of the key factors that affect the technological innovation capability of energy-saving and emission-reduction enterprises. The technological innovation process is the process of productizing the knowledge accumulated by human beings in the process of understanding and transforming nature. Therefore, in the technological innovation activities of enterprises, not only solid and complete technical knowledge, but also keen observation ability and judgment ability of the market are needed, and these abilities can only be realized by talents. Technology is the material basis for enterprises to carry out technological innovation activities, and it is the direct carrier and executor of technological innovation achievements. These are just what small and medium-sized scientific and technological enterprises lack.

(2) Technical factors

Technical factors can be divided into two aspects: one is the technical level of the enterprise, and the other is the overall technical level of the industry in which the enterprise is located. The technical level of an enterprise is mainly related to its R&D capability. If an enterprise's R&D capability is stronger, its independent innovation capability will be stronger, and its ability to absorb and transform the introduced new technologies will be stronger.

(3) Information factors

Whether an enterprise can know and obtain information timely and accurately is the key to improve R&D efficiency. A strong information system is an important factor for the success of technological innovation activities of energy-saving and emission-reduction enterprises. It can greatly enhance the ability of enterprises to collect, process and transform technical information, greatly improve the efficiency of information capture, filtering, analysis and final decision-making, and help reduce the uncertainty and risk of technological innovation activities of enterprises.

(4) Organizational factors

Organizational factors are mainly reflected in organizational form and organizational management. A reasonable and efficient innovation organization will have a set of scientific enterprise organization system, which can correctly and clearly determine the responsibilities and authorities of each member of the organization in the technological innovation activities, and help the communication and information sharing of technical personnel within the enterprise to truly make the best of their talents.

(5) Mechanism factors

It mainly includes incentive mechanism, information exchange mechanism and prevention mechanism, as shown in Figure 2. A sound, perfect and effective incentive mechanism system can ensure the enthusiasm of employees for continuous technological innovation, which has a strong role in promoting the efficiency and success rate of technological innovation activities of the entire enterprise.

Energy saving and emission reduction enterprises should establish a scientific and reasonable risk prevention mechanism to minimize the risk of technological innovation.

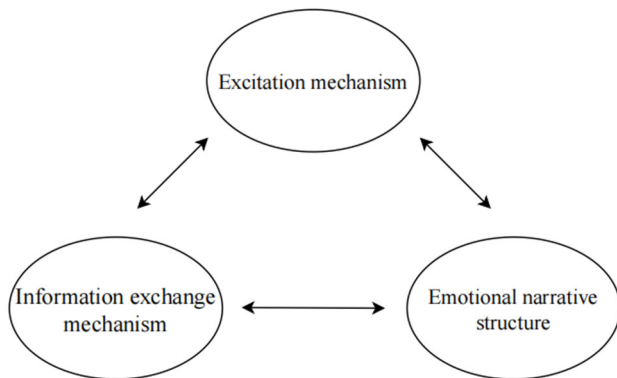


Figure 2. Technological innovation driving mechanism factors of technology-based SMEs

(6) Corporate culture factors

Enterprise culture is the cultural concept and historical tradition formed in the long-term business activities of an enterprise. The enterprise has a common value criterion and moral code, is a unique personality of an enterprise, and is the spiritual pillar for the survival and development of an enterprise. To a certain extent, it affects the values and behavior of enterprise employees.

3. Countermeasures for Energy Conservation and Emission Reduction Efficiency of Innovation Driven Small and Medium-sized Technology-based Enterprises

In the innovation system of energy conservation and emission reduction for technology-based SMEs, scientific and technological innovation is the core, followed by innovation at the basic level such as system management. The two coordinate to promote innovation driven strategy.

3.1. Give full play to the government's role in the innovation of energy saving and emission reduction of small and medium-sized scientific and technological enterprises.

Foreign experience shows that enterprises are the source of innovation, followed by government. However, due to the limited innovation ability of small and medium-sized scientific and technological enterprises, and the great risks and positive externalities of energy-saving and emission-reduction innovation activities, enterprises often do not have enough power and ability to participate in energy-saving and emission-reduction innovation. This requires the government to provide strong support in policy, capital and technology[10]. The government should formulate tax policies and financial subsidy policies that are conducive to small and medium-sized scientific and technological enterprises' innovation in energy conservation and emission reduction, so as to make up for the losses caused by innovation risks and positive externalities; Establish a stable and sustained funding guarantee mechanism and incentive mechanism for enterprise innovation, and increase the

investment in energy-saving and emission-reduction technology innovation, so as to drive enterprises and social funds to invest in energy-saving and emission-reduction innovation activities.

3.2. Energy saving and emission reduction system and management innovation countermeasures of small and medium-sized scientific and technological enterprises

Due to the externalities of energy conservation and emission reduction, the government should further play a leading role in energy conservation and emission reduction in the future. In particular, we should strengthen the supervision and inspection of energy conservation and emission reduction of small and medium-sized technology-based enterprises, and establish a statistical monitoring and information disclosure system; Implement energy conservation and emission reduction target management and certification management system for small and medium-sized technology-based enterprises, and give policy support to enterprises that have completed the target or passed the certification.

4. Conclusions

In recent years, the country has paid more and more attention to the energy conservation and environmental protection industry, and its policy support for energy conservation and emission reduction of enterprises has been increasing year by year. Energy conservation and emission reduction technology achievements have also been constantly introduced and developed. While giving play to the role of government leadership and enterprises as the main body, the advanced experience of Europe, America and other countries has been used for reference to strengthen the role of industry organizations in the management of energy conservation and emission reduction of small and medium-sized technology-based enterprises. Cooperate with the government to implement market access, sign self-discipline agreements on energy conservation and emission reduction, carry out certification and labeling activities on energy conservation and emission reduction, and provide consultation and training on energy conservation and emission reduction.

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