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Research On Development Mechanism Of New Energy Vehicle Enterprises Based on Open Source Innovation Model

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Abstract: This paper analyzes the feasibility of implementing open source innovation mechanism and the path of realizing open source innovation in new energy vehicle enterprises. Based on the main features of open source innovation and characteristics of electric vehicle products, combining the product type of electric vehicle and the process of product innovation, we apply the principle of technological innovation management to design the operation mechanism and conceptual model of different authorization protocols with the elements of innovation object, operation mechanism and innovation performance.

1. Introduction

Open source innovation has gradually become an important innovation mode under the new conditions of informatization and network. However, how to apply the open source innovation model in new energy vehicle enterprises and how to improve the independent innovation ability of enterprises are still the primary goal of the automobile industry and an important proposition of academic research.

Based on the main features of open source innovation and characteristics of electric vehicle products, the feasibility of implementing open source innovation mechanism for new energy automobile enterprises and the path to realize open source are analyzed. In addition, we apply the principle of technological innovation management to design the operation mechanism and conceptual model. This study has important value for enterprises.

2. Feasibility and path of new energy automobile enterprises to realize open source innovation

2.1. Evolution of independent innovation mode of Enterprises

2.1.1. Closed innovation

In order to improve the independent innovation ability of enterprises, each enterprise has established its own technology center of R & D. They believe that innovation can only be created by enterprises themselves to create new products and services, so as to ensure that they maintain a leading position.

The enterprise develops these research results independently, designs and manufactures new products by itself, and enters the market through its own marketing channels. Obviously, this is a closed innovation mode. It can't adapt to market.



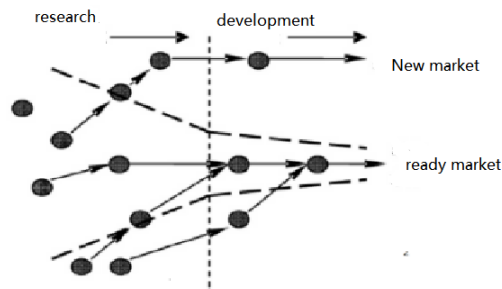


Figure 1 The model of open innovation

2.1.2. Open innovation

In 2003, The concept of "open innovation" was proposed by Henry Chesbrough, a professor at Harvard University. He gives a model of open technology innovation, as shown in Figure 1. That is to say, external creativity can enter into the enterprise through the boundary of the enterprise. Enterprises can also export their own technology to the outside of the enterprise.

2.2. The path of new energy vehicle enterprise innovation based on open source mode

With the rapid development of computer technology and the wide application of Internet, the success and popularization of open source innovation, its high-efficiency development process, high-quality innovation results and low innovation cost, make some companies gradually pay attention to this new innovation mode.

The features of electric vehicle products. Figure 2 shows the structure of an electric vehicle. The electric vehicle is divided into three subsystems: electric drive, energy and auxiliary. These subsystem components are controlled by special computers or computer chips. Using intelligent and modular design, it is obvious that this directly provides a system platform for open source. It is entirely feasible to implement the mechanism of open source innovation in enterprises.

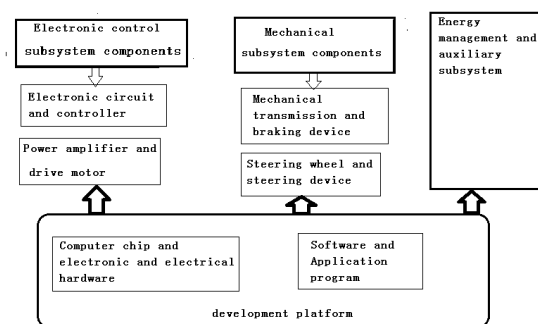


Figure 2 structure with modular structure and computer intelligent control

Product innovation process and path of implementing open source. According to the theory of technological innovation, the technological innovation of an enterprise consists of five links: project demonstration, scheme design, product design, test and process design, production and sales as shown in Figure 3. Referring to the theory of open innovation, we can get the following enterprise open source innovation model, as shown in Figure 4. In the figure, the triangle represents an external open source project.

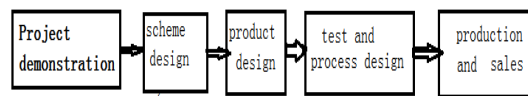


Figure 3 process links of product innovation

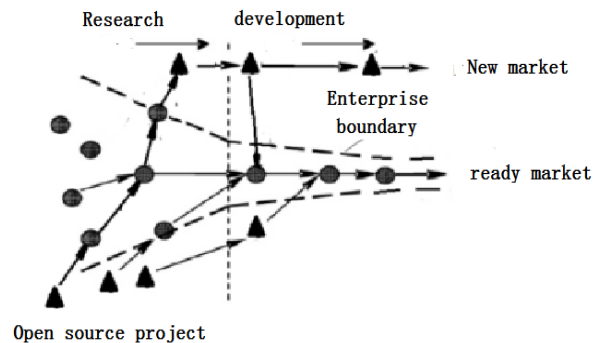


Figure 4 open source innovation model

There are two ways for enterprises to realize the open source mechanism: one is external open source projects, which enter the process node of enterprise product innovation according to different knowledge and achievement forms. Another way is to put open-source projects of enterprises on the outside.

Open source projects enter the specific process node of the enterprise, which is related to the content and practical level of the project. First of all, after the innovation project is formally approved by the enterprise demonstration, it enters the node of scheme design process. At this time, external open-source projects may be knowledge or patents of invention. After entering the enterprise, they will be digested and absorbed to enter the node of scheme design process. Utility model patents and knowledge can also be digested and absorbed to enter the node of product design process or the node of industrial design trial production process according to different contents, and finally enter the production and sales link and go to the market.

In a path of external open source, when the project enters the scheme design process node, the project will open source outside the enterprise, attract external individuals or organizations to participate in the development, and its results will be returned to the enterprise for the new product design process; of course, they may also integrate the results into external projects as special users to enter the new market. Obviously, open source innovation is a special open innovation mode.

3. Concept model and operation mechanism of enterprise open source innovation

There are important differences between open source innovation and open innovation: first, open source publishes all technical details and instructions, users can learn and improve; second, open source not only opens the right to use, but also the right to improve, disseminate, modify and redistribute. It can also be said that open source is more open and thorough.

The operation mechanism of enterprise open source innovation can be studied from three aspects: innovation object, operation mechanism and innovation performance (see Figure 5).

3.1. Innovation object

There are three different dimensions to describe innovation objects. The main body of innovation can be simply divided into individuals and organizations (including universities, research institutions, users, suppliers, etc.). Compared with other innovation models, the main body of open-source innovation is more diversified.

User type: the type of open source users, which can be divided into: open source leaders and open source users (including individuals and enterprises), users can also be divided into ordinary and integrated users.

Organizational form: using the loose "soft" way of Internet virtual community or virtual enterprise, or through the "hard" relationship of close cooperation with enterprises through strategic alliance, cooperative development and other forms.

3.2. Operation mechanism

The author believes that the electric vehicle enterprises that implement the open source mechanism play two roles. The enterprise is the special users of the open source, and external technologies and processes need to be applied in the enterprise.

Second, as an open-source enterprise, the project is open to the outside world in an open-source way. Different from the software project open source, what is introduced is not only knowledge and software, but also technology and process. What is open is not only software platform (program, code), but also hardware platform (including structure and performance parameters).

Therefore, in the process of operation, enterprises need to choose the type of open source products and design different licensing protocols according to the nodes of innovation process.

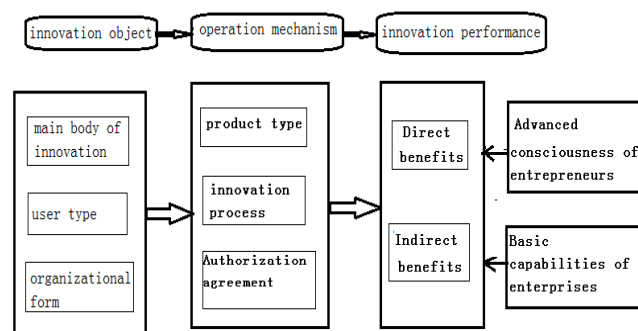


Figure 5 operation mechanism model of open source innovation

Compared with the previous open-source innovation, an important difference lies in the introduction of licensing agreement, that is, drawing on the ideas and framework of copyright law, the dissemination and diffusion of innovation results must conform to the provisions of licensing agreement. The open source licensing agreement allows developers to have important control rights at the same time of sharing innovative achievements. These rights can be used according to the provisions of the licensing agreement to ensure that the openness of innovative achievements is not damaged.

In practical application, there are three types of open source project users, one is individual developer, who only uses the hardware and software provided by the open source leader for platform development, and the development results directly return to the open source enterprise to serve the open source. The second is common users, that is, the development results become new products, but the development results and knowledge are open source and open. The third is to integrate users, that is, to use the knowledge, technology, achievements and platform provided by open source for their own special products. But the results are privatized, closed and not open-source. Obviously, different authorization protocols must be designed for different users.

According to the types and practicability of open source projects, there are also differences in licensing protocols. In China, patents are divided into three categories: invention, utility model and design. Invention category mainly involves product innovation and method, utility model category, micro innovation of product shape and structure, and design involves product shape packaging. American patents are divided into invention, design and plant patents. The content and time limit of

protection are also different. According to the different process links (or requirements) of open source users' references, there are obvious differences in licensing protocols.

To sum up, product type selection, process nodes of enterprise innovation and design of authorization protocol are the factors that affect the operation of enterprise open source mechanism.

3.3. Factors controlling the performance of open source innovation mechanism

3.3.1. Direct economic benefits

As users, enterprises introduce technologies and processes of open-source projects, improve R & D capabilities or reduce development costs. As the leader of open-source projects, using the development achievements of participants, they directly reduce costs. The application of users' new products increases the additional functions of enterprises' products. They can obtain benefits by providing complementary value-added products and services. Special integrated users can obtain economic benefits through different authorization protocols. Especially in electric vehicle enterprises, by learning and applying the achievements of advanced enterprises, the development cycle is greatly shortened and the product technology level of enterprises is improved.

3.3.2. Indirect social benefits

Open source of electric vehicle enterprises can let more people participate in the research and development of electric vehicle technology, and further promote the development of electric vehicles. Open source for the society, provide technology platform, serve other enterprises and users, and expand the popularity and influence of enterprises. The common development of shared platform and participants is just an important feature of open source mechanism.

3.4. factors controlling the performance of open source innovation mechanism

The entrepreneur's strategic consciousness and long-term strategic vision are the decisive factors that affect the development of the enterprise. With the rapid development of computer technology and the wide spread of Internet in the world, the open-source innovation model represented by open-source software has achieved great success. The performance of the innovation model has greatly subverted the original innovation ideas. Because of the free and open nature of open source innovation.

For the open source model seriously affects the profits of enterprises. Moreover, the main success area of open source innovation is software. In the field of new energy vehicles involving multi technology, whether they dare to open source or not depends on their strategic awareness and courage, and is also a new topic and challenge.

The basic innovation ability of enterprises is an important factor for the success of open source. In the open source innovation mode, the collaboration of internal and external innovation elements must be supported by internal capabilities, which are all based on internal capabilities. The mastery of technology, absorption and utilization of the knowledge and achievements provided by open source projects reflect the ability of enterprises to innovate.

How to coordinate the relationship between individual and collective objects, how to absorb and utilize the imported open-source technology, and how to open up to the outside world test the comprehensive innovation production capacity and innovation management capacity of enterprises. Including innovation spirit and strategic management ability, the team of scientific and technological personnel with strong research and development ability, R & D infrastructure and management level are all important factors that affect the performance of enterprises.

4. Conclusion

With the rapid development of computer technology and the wide spread of Internet in the world, open source, as a new innovation mode, will gradually evolve into an important innovation mode under the background of information age.

Therefore, based on the principle of technology innovation management, this paper initially designs a conceptual model with innovation object, operation mechanism and innovation performance as the elements, and expounds the operation mechanism of different authorization agreements designed by enterprises according to the combination of product type and product innovation process.

This study provides new ideas and reference for new energy vehicle enterprises and other enterprises to introduce open source technology and implement open source innovation.

Acknowledgement

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