Optimal Choice of Innovation Mode in Combine with Enterprise Technological Capability – Independent, Imitation or Cooperative

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Abstract This essay researched on characteristics of three kind modes of technological innovation by comparatively study. Analysis point out that different technological innovation mode adapt to different enterprise’s technological capability status. The technological innovation mode should be selected based on analysis on the characteristics of enterprise’s technological capability factors.

Keywords enterprise’s technological capability, technological innovation mode, knowledge management

1 Introduction

At present, the choice theory of technological innovation mode bring forward by scholars, generally based on the comprehensive evaluation of enterprise technical capabilities, the selection of technology innovation mode in accordance with enterprise technical capability comprehensive evaluation level. However, it is not enough when select technological innovation mode only based on the comprehensive evaluation of enterprise’s technical capability. It is clearly wrong that evaluate the state of enterprise technological capabilities or choice technological development strategy and technological innovation mode, only briefly based on the level of a comprehensive evaluation of technological capability, for those who have the different technological capability factors enterprise. Different enterprises in different aspects of technological capability with its own different characteristics, and to choose their own enterprises in technological innovation mode should also be based on these different characteristics are different. There is a need to choice technological innovation mode based on enterprise’s own the characteristics of technological capability factors.

Based on the Comparative Study of three kind of technological innovation modes, and through the study indicated that with different characteristics of the technological capability of enterprises should choose different types of technological innovation mode.

2 Comparative analysis of technological innovation mode

2.1 Technological innovation mode

The mode of Technological innovation will be divided into three types:

Independent innovation is an innovative activities that the enterprise through its own efforts to overcome technical difficulties and achieve valuable research and development results, and on this basis, relying on its own ability to promote innovation and the follow-up session, to complete the commercialization of technological achievements, access to the innovative activities of commercial profits.

Imitation innovation is an innovative activities that the enterprise through referring to the first innovator’s innovative ideas and innovation action, absorbing the first innovator’s successful experiences and the lessons of failure, through buying or deciphering the first innovator’s core technology innovation and technology secrets, and on this basis, improve and perfect and further development, and main input power in the process design, quality control, cost control, production management, marketing and other Follow-up stages, to produce the ability, quality, price competitive products, and with other enterprises, including the leader of innovative enterprises to compete in order to establish its competitive position in the market.

Cooperative innovation is a cooperative Innovation actions that enterprise between enterprises, or
2.2 Comparative analysis of technological innovation mode

Different mode of technological innovation has their own advantages and disadvantages suits to different the enterprises of different technological capabilities conditions. Enterprises should choose the appropriate method to carry out technological innovation activities in accordance with its own characteristics and the business environment. Using these modes also need to have different conditions and requirements. (see table 1)

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<th>Independent innovation</th>
<th>Imitation innovation</th>
<th>Cooperative innovation</th>
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<tbody>
<tr>
<td>Advantages</td>
<td>Made breakthroughs in core technologies, can create technical barriers; the first to open up markets, monopoly profits; priority accumulation of technology and management experience.</td>
<td>Low investment costs, development risks small, well-targeted products, high technological starting point, cost-effective.</td>
<td>Research and development risks and costs shared by the partners, shorten the time for innovation.</td>
</tr>
<tr>
<td>disadvantages</td>
<td>High input, high risks.</td>
<td>Technology development in a passive position, technical barriers to be more restricted.</td>
<td>Conditioning and coordination of higher costs</td>
</tr>
<tr>
<td>suitable enterprises</td>
<td>With sufficient capital and high-quality researchers, technological innovation capability strong.</td>
<td>Capital and technology is relatively weak, but with rapid reaction capacity and a certain technological learning, improve capacity.</td>
<td>Cooperators have certain advantages and advantages is complementary.</td>
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</table>

Independent innovation requires innovator has a strong economic strength, strong research and development, and accumulated a lot of results in a leading-edge technology, the starting point and demand is the highest; independent innovation mode is used by a few developed countries and by large multinational companies. Nevertheless, the starting point of Imitation innovation and Cooperative innovation required much lower. Therefore, Imitation innovation is an effective means of developing country to achieve rapid innovation, and narrow the gap with the developed countries, it is more realistic option to developing countries.

3 Research on the component factors of enterprise’s technological capability based on knowledge management

Technological capability is the aggregation of the knowledge and skills in enterprise’s technological resources and activities. The essence of technological capability is knowledge, or a kind of manifestation of organization knowledge. When technological capability factors are being analyzed, it should be redivided from the point of view of knowledge management and the division of factors should give attention to the static and dynamic description of technological capability. Based on the existing definition and factor analysis for technological capability research, the component factors of technological capability can be split into four kinds.

3.1 Capability of technology identification

Capability of technology identification means the capability to identify the development trend and direction of technology in the future, and impact of technology on social economy and livelihood. Capability of technology identification is the foundation for other technological capability factors. The key to enterprise’s capability of technology identification lies in the following two aspects:

1) Judging the development direction of the key technology of an industry based on the correct understanding for the technical infrastructure, policy, and scientific and technological conditions of the state. On the one hand, research or investment is made in accordance with a misidentification for the
evolution direction of technology in the future may leads the enterprise to waste substantial manpower, materials and fund on a technology which is becoming old-fashioned or an interim technology; On the other hand, the enterprise may miss significant development opportunity or make wrong decision which may threaten the survival of the enterprise because of misidentification for impact of technology on social economy or livelihood.

(2) Choosing the technology which can couple with the existing technology of the enterprise taking account of enterprise long-term development strategy in the future. This requires the enterprise to match long-term technology with short-term technology in the course of identifying technology. On the one hand, the chosen technology should be favorable for the realization of enterprise development strategy in the future; on the other hand, the chosen technology should be able to be introduced, digested, absorbed or further innovated by the existing technological capability of the enterprise.

3.2 Capability of technology acquisition

Capability of technology acquisition means the capability of acquiring (seeking, collecting, importing and purchasing etc.) the available technological resources (data, equipment and information etc.), and the most distinct presentation of enterprise capability of technology acquisition is enterprise’s internal technological knowledge inventory and the capability of accumulation. The key of enterprise’s capability of technology acquisition lies in the following two respects:

(1) Capability to find technological sources. When the enterprise has correctly recognized the technological development trend and chosen the technological development direction of it in the future, it should know the technological source which can provide relevant technology via technology search, and finally choose the object of technology acquisition after comparing all the technological sources.

(2) Capability of technology acquisition. It means the capability that the enterprise acquires technology through collection, exchange, purchase and cooperation after the object of technology acquisition is chosen.

Not only the technological imitation but also technological innovation of an enterprise has to be based on the existing technology. If the enterprise’s acquisition capability of technology is deficient, the inventory and accumulation of the enterprise technology will certainly restrain the exerting of the enterprise’s technological creative ability. Simultaneously, the enterprise has to invest a number of resources to develop the existing matured technology. This not only restrains the enterprise’s capability of technological innovation but also wastes a lot of manpower, materials and fund of the enterprise.

3.3 Capability of technology learning

Capability of technology learning means the capability to improve the level of enterprise’s technology knowledge through digesting and absorbing the technology resources acquired. The key of enterprise’s capability of technology learning lies in the following two respects:

(1) Capability of sharing technology knowledge. The new knowledge acquired through technology acquisition by the enterprise must be shared in order to transfer and transmit among all the departments or individuals in the enterprise. Knowledge sharing is the most fundamental activity as well as the most complicated one in knowledge management. In enterprise’s technological capability, the purpose of knowledge sharing is absorbing new knowledge and effectively utilizing new knowledge. Via knowledge sharing, the application of the knowledge which can benefit the organization will be accelerated enabling the organization to obtain competitive advantages.

(2) Capability of technology knowledge application. Application of knowledge is gaining products and services combining the knowledge in all directions. The enterprise can practically and effectively promote converting the technology inventory of the enterprise into the upgrade of its technological capabilities. Finally these will improve products and services of the enterprise.

Even the enterprise has correctly identified the developing tendency of technology, successively acquired pertinent technological resources, and possessed some inventory and accumulation of technology knowledge, the upgrading of technological capability of the enterprise can not be guaranteed, these technological resources shall be reasonably distributed, shared and applied in the enterprise, can the resources be converted into the technology knowledge and capability of the enterprise.
3.4 Capability of technological creation

Capability of technology creation is the capability of making significant innovation and breakthrough in technology through research of institutionalization. The key of enterprise’s capability of technological creation lies in:

(1) Capability of integrating technology knowledge. The original knowledge which supports innovative achievements can not be automatically produced by the collection and accumulation of flowing knowledge in the enterprise. The yield of innovative knowledge depends on the effective integration of the knowledge in the course of technological innovation by the enterprise. No other than effective activity of knowledge integration, can the knowledge acquired in the process of innovation become the peculiar knowledge of the enterprise to form the core capability of the enterprise. The knowledge integration to an enterprise or an individual is absolutely not the simple addition of the present knowledge, but a new process of innovation.

(2) Capability of technological knowledge reorganization. Knowledge reorganization is based on knowledge application, which is an internal sublimation course. Specifically, it involves the differentiation, selection and maintenance of knowledge. When knowledge is reorganized by differentiation, selection and maintenance, the new and the old knowledge cross and merge into each other, and ultimately the resources are activated as practical competitive advantages to meet the requirements of the change of conditions.

The capability of technology creation of an enterprise is based on the accumulation and continuous reorganization, the relationship between knowledge accumulation and technological creation is of mutual promotion. The enterprise can only maintain continuous competitive advantages against the competitors by making technological innovation and breakthrough which is further conformed to technological evolution trend, adapted to social economy and request of livelihood development through self-research in technology.

4 Choice of Technological Innovation Mode Based on Enterprise’s Technological Capability

Table 2 Choice of Innovation Mode Based on Enterprise’s Technological Capability Factor Relation Degree

<table>
<thead>
<tr>
<th>Index Enterprise</th>
<th>Factors of enterprise’s technological capability</th>
<th>Suitable innovation mode</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>technology identification</td>
<td>technology acquisition</td>
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<tr>
<td>A</td>
<td>strong</td>
<td>ordinary</td>
</tr>
<tr>
<td>B</td>
<td>ordinary</td>
<td>strong</td>
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<tr>
<td>C</td>
<td>ordinary</td>
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Different mode of innovation have different characteristics and advantages suited to the enterprises under different circumstances. This is due to different innovation mode request that enterprise has different constituent factors of technological capability. Therefore, it is important issues ,that how to choose the mode of technological innovation ,in different technological capability characteristics of own and competitors, it will not only determine the effectiveness of technological innovation, but also deciding the future development.

According to strength rating of the enterprise’s technological capability factors, enterprises with different technological capability factors, which should be choose different technology innovation mode.(see Table2).

4.1 Independent innovation mode based on the evaluation of technological capability factor

In the table 2, enterprise A is the leading enterprises in industry or has significant advantage in technological capability compare with it’s major competitors, Especially in the technological creation
capability, far stronger than its competitors.

At this time, enterprises should choose independent innovation mode, which can give full play its own technological creation capability to create the dominant position. In the process of independent innovation, through its own efforts to overcome technical difficulties and achieve valuable research and development results, and on this basis, relying on its own ability to promote innovation and the follow-up session, to complete the commercialization of technological achievements, access to commercial profits. Enterprises which choose mode of independent innovation can be the leading developer in key technologies and the first to open up markets, and access to high profits.

4.2 Cooperative innovation mode based on the evaluation of technological capability factor

In the table 2, enterprise B is weak inferior status in technological capability compared to its competitor enterprise A, but the enterprise B has a stronger technology acquisition capability and technological creation capability compare with its competitor enterprise A.

At this time, enterprises should choose cooperative innovation, by using its dominant position of technology acquisition capability and technological creation capability. In the cooperative innovation process, enterprise could united innovate through with other companies or research institutions, university, based on cooperation and the sharing resources that the two sides complement each other, in the technological innovation entire process or some aspect of common investment, joint participation and share the results of risks. Enterprises B ,which choose cooperative innovation mode, could share the benefits of innovative resources complementary , shorten the time of technological innovation, lower transaction costs and technical cooperation costs, share research and development costs, risk, rapid access to new technology or the market.

4.3 Imitation innovation mode based on the evaluation of technological capability factor

In the table 2, enterprise C compared with industry leader enterprise A, has a larger gap on technology identification capability and technology creation capability, except technology acquisition and study capability.

At this time, enterprise should choose imitation innovation mode, to give full play its own advantage on technology acquisition capability and technology study capability. In the imitation innovation process, the enterprise could rapidly enhance their technological level, through referring to the first innovator’s innovative ideas and innovation action, absorbing the first innovator’s successful experiences and the lessons of failure, through buying or deciphering the first innovator’s core technology innovation and technology secrets. The main benefits of choosing imitation innovation mode are small risks and easy to achieve, low cost and high starting point of research.

5. Conclusions

In the course of enterprise technological innovation, Firstly, enterprises should make a comprehensive evaluation of the technological capability. Secondly, enterprises can identify their own technological capability advantages, compare enterprise’s technological capability with major competitors, looking for the technological capability relative advantages and disadvantages compare to competitors. Thirdly, select enterprise technological innovation mode, Enterprise should choose the right innovation mode according to their technical capacity of the advantages and disadvantages. Finally in the process of technological innovation, enterprise should constantly improve the management of technological innovation by technical knowledge in the enterprise transfer, sharing, to provide a good platform for technological innovation.

Reference


