

A Study on Innovation Capability

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Abstract

As a whole, the enterprise's track of technical capability in the developing countries has three technology platforms. They were arranged step by step as technology import & imitation capability, assimilation capability and independent innovation capability. They also can be called as copy capability platform, creational imitation capability platform and independent innovation platform. Every platform's advance all needs huge supply from enterprise's technical innovation capability. Technical innovation capability composed of several technical innovation factors has its own integer function. Its advance cannot be deviated from technical innovation factors' improvements. It's absolutely not one part's or one factor's advance but all factors' improvement not only in quantity but also in quality. On the basis of comparison between the imitation innovation and independent innovation, this paper analyses different factor's change traits in the process of innovation capability's evolution. After that, this paper makes an empirical study.

Keywords: Imitation innovation, Independent innovation, Baosteel

1. Introduction

Since 1980s, Western scholars initially had studied the studying process with the focus on how to enlarge and deepen their capability through creating knowledge. Equally, many Asian scholars also made many researches on the mechanism about how to improve technical capability of the enterprises in the developing countries. And they had found an admitted pattern of "import---assimilate---innovation". This pattern indicates in nature the basic progress of technical capability improvement of the enterprises in the developing countries.

According to the origin of technology source, the innovation mode can be divided into three types: imitation innovation, cooperative innovation and independent innovation. However, with the external environment's change and technical development and innovation, sometimes one enterprise did not depend on one pattern of technical innovations. Through recalling some correlative researches, it was found by us that there were few researches on the capability evolution from one innovation mode to another and on the factors of innovation capability. This paper aims to analyze and compare the implementation points of all factors in imitation innovation and independent innovation mode. And then, with the case study of Baosteel Group, this paper discusses the conversion process of innovation factors in the capability evolution.

2. The comparison between imitation capability and independent capability

The above-mentioned three innovation modes can be classified into two major kinds: 1) the independent innovation is a technical innovation pattern which obtains knowledge from interior enterprise. In other words, the enterprise obtains the technical knowledge and technical abilities in the R&D process by itself. 2) the imitation innovation and cooperative innovation are the other technical innovation patterns which obtains knowledge from external world.

Through analysis from the angle of innovation process, the innovation capability can be decomposed into five aspects: decision-making capability, R&D capability, productive capability, marketing capability and organization capability. There are many differences between imitation innovation and independent innovation.

From the table above, it can be known that the imitation innovation mode emphasizes on progress design, quality control, cost control, huge product, marketing and so on. In a word, it focuses on the money and technology at the end of innovation chain. In this mode, the enterprise establishes its competitive status and gains benefits by producing goods with more competitiveness on function, quality, or price than other enterprises.

In the same market, generally speaking, independent innovation has no meaning if its goods don't lead the market. Independent innovation enterprise should aim to pursue leading status in technology. But technical leading needs market development leading. Only through changing commodities, can the technical development achievements bring huge benefits to the enterprise. As a result, the independent innovation enterprises shall aim to the market leading. They shall prevent their market from being rapped and their technical achievements from being burgled. So in the independent mode, the enterprises should put enough technology and money in every step of innovation chain.

They should shape their own core capabilities and keep their leading status. Or else, it's easy to be defeated by competitors.

Table 1. Comparison between imitation innovation capability and independent innovation capability

MODE \ FACTOR	Imitation innovation	Independent innovation
Decision-making capability	Swift response, Discernment to valuable technology and information	Establishing appraisal and selection mechanism Arranging expert date for consultation Forming a technical innovation committee
R&D capability	Studying and assimilation capability, rehabilitation capability, especially rehabilitating production function	“Production, studying and researching” Strong technical development capability Strong capability to afford risk Huge fund Patent to protect core technology
Production capability	Cut down the cost Enlarge the market	Training, Accumulating production and management experience
Marketing capability	Establishing marketing network	Finding potential market Opening up new market and making advertisement Technical standardization Finding better places
Organization capability	Consider more imitation innovation Cultivating its own independent innovation capability	Conforming to all innovation factors Coordination at all levels Inspiring all innovation bodies

3. Technical innovation capability's evolution

As a whole, the enterprise's track of technical capability in the developing countries has three technology platforms. They were arranged step by step as technical import & imitation capability, assimilation capability and independent innovation capability (Figure 1). They also can be called as copy capability platform, creational imitation capability platform and independent innovation platform. Each platform has its own focuses on technical capability. Every platform's advance needs huge supply from enterprise's technical innovation capability.

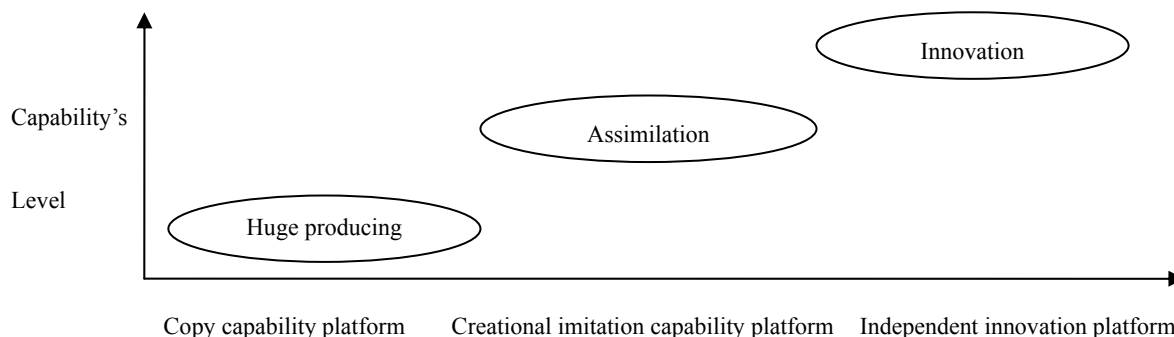


Figure 1. Enterprise's technical capability growth track

The technical innovation capability composed of several technical innovation factors has its own integer function. Its advance cannot be deviated from technical innovation factors' improvements. It's absolutely not one part's or one factor's advance but all factors' improvement not only in quantity but also in quality. Providing innovation factors essentially mean to provide enough capability factors in all steps of innovation process. The capability factors

include manpower factor, fund factor, equipment factor and information factor.

In quantity, the most important factor of manpower factor is the R&D personnel who are usually trained by the university and college or supplied by enterprise, professional industry or foreign countries. The supply of funds mainly depends on the creative funds of the enterprise and companies with the government's special preferential policy, the creative risk fund and mechanism to increase the reservation of the funds. The supply of equipment can adopt the means of import. And based on import, the technical innovation may come into being. The supply of the information depends on the establishment of modern communication system, communication network and the science and technology information system of enterprise who can quickly follow, analyze and process the information.

While strengthening the supply of factors, it also needs to improve factors' quality. In order to improve the quality of manpower, it is important to improve the whole research and innovation capability of R&D personnel by improving the age structure or technique structure of R&D personnel and carrying on the follow-up education for R&D personnel. It is also a good way to attracting scholars from universities or academes to take part in R&D activities to cultivate R&D personnel. To improve the quality of the funds mainly means to distribute capital reasonably in all steps of innovation activities. By effectively arranged, the fund is of great availability in the innovation activities.

The formation and elevation of technical innovation capability is a continuously iterative process. The creative capability of technology can be upgraded based on enhancement. After the creative capability of technology being promoted to a higher level, the new circumstance and the new market competition put forward new request on the quality and the quantity and allocation of technical innovation capability. So it is necessary to cultivate and upgrade the creative capability of technology again. Hence the evolution of the technical innovation capability was formed.

4. A Case Study of Baosteel Group

As a leader in iron and steel industry, Baosteel Group developed from a new company to a large iron and steel group in the world. Now it has developed into the sixth largest iron and steel enterprise in the world. Since Baosteel Group has been put into production, its development has been always depending on its technical innovation's drive. It all can be seen from three blast furnaces of Baosteel Group. The first blast furnace was made in Japan. With reference to other's design, the second one was made in China. But the third one was designed and made all by ourselves. That's to say, the third blast furnace was an independent innovation result.

The development of Baosteel Group can be divided into three steps. The first step dated back to 1978, called "Baosteel Group project". At that time, the metallurgy technology at home had large gap with the one abroad. Blast furnace's design and construction were done by others else. In the first step, the main purpose of Baosteel Group was to form the assimilation capability through establishing its own R&D department and attracting technical personnel after importing new technology. The first step project was finished in Sept., 1985.

Early in 1983, the second step of Baosteel Group was arranged. The second step had more homegrown technology than the first one. In this step, Baosteel Group took more attention to forming its independent innovation capability especially in its major products. The government made some new decisions about "developing important technical equipment". In order to enlarge its independent innovation capability; the government established the related offices to deal with the related matters. Though cooperating with universities and academes, Baosteel Group realized its own research capability. Taking hi-tech series X as an example, Baosteel Group cooperated with some universities. It developed its independent research capability in continuous learning. Compared to the first step, there was 88 percent smelting equipment made by itself in the second step. The second step of Baosteel Group was finished in June 1991.

With the development of information technology, computer becomes an important tool in modern enterprise management. Baosteel Group planed to install computer information management system and imported two big equipment UNISYS2200/600 and four medium equipments U6000/65. In 1995, Baosteel Group basically installed computer management system. And in 1998, it imported ATM technology and equipment, then researched an information management system for production, supply and sale. With the development, Baosteel Group also took his employees' train as his significant work. Baosteel Group took its training center as its employee training base. It formed its new education system through improvement of the old education mode. It also completed its own incentive mechanism. With this system, it cultivated its employees at three levels: management, specialization and operation. In the third step, Baosteel Group's smelting technology was almost entirely made at home and 85 percent of its steel rolling technology was also made by him.

Emphasis on technical innovation made a big leap. In 2003, Baosteel Group had applied for 166 patents and 117 authorizations. Up to today now, Baosteel Group has accumulated more than thousand patents and more than 721 authorizations.

5. Conclusions

It can be known from this paper that with the help of technical innovation capability's development, Baosteel Group has developed into a large group from a small company. It can be seen from its capability's evolution that innovation capability's development cannot depart from the improvement of all innovation factors in quantity and quality..

In the second development and the process of nationalization, the enterprise shall form its own independent innovation capability especially in its core products. Then, it shall enlarge the scope of innovation to process, equipment and installation. And it also cannot depart from improvement of organization management capability, complementation of innovative study system, alliance with universities and academes, establishment of effective study mechanism. Only having a good command of the independent core technology, can the enterprise form the capability of sustained development and core competitiveness. Through analyzing Bao Gang's success, we hope it can give some reference to some developing enterprises.

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