

Research on the Path of Technological Innovation of Small and Medium-sized Technological Enterprises

Yang Juchao

Tianjin Agricultural University, Tianjin, 300384, China

Keywords: Technology-based; Small and Medium-sized Enterprises; Technological Innovation

Abstract: The technological innovation of small and medium-sized technological enterprises has been paid more and more attention by the theoretical and practical circles. On the whole, the weak ability of technological innovation seriously restricts the development of small and medium-sized technological enterprises, which needs to be solved by various measures. In short, the growth of an enterprise means that it has the capacity to continuously tap unutilized resources and continuously realize potential value. It is an expectation of the future development of the enterprise made by the existing development situation and other internal and external objective factors. Understanding the technological innovation capabilities of SMEs and their influencing factors is a prerequisite for achieving this goal. Only by continuously carrying out the basic core innovation work of technological innovation and maintaining its vigorous innovation activities can it be invincible in the fierce competition in the domestic and foreign markets, and can effectively promote the economic growth of a country and a region.

1. Introduction

Scientific and technological innovation is the source of social sustainable development and an important way to improve international competitiveness. With the development of economy, small and medium-sized technology-based enterprises play an increasingly important role in the development of national economy, and have become an important force to promote industrial upgrading and replacement and to form new industries [1]. Technological innovation of enterprises is a complex multi-level system, which is influenced by multiple dynamic factors from enterprises and external society. It should cover all links involved in enterprise value innovation and the whole industrial value chain of enterprises [2]. The core of the theory of enterprise growth can be simply stated as follows: the enterprise is a collection of various resources built in a management framework, and the growth of the enterprise mainly depends on the more effective use of existing resources. Improve the ability of independent innovation and build an innovative country. This is the core of the national development strategy and the key to improving the overall national strength [3]. SMEs are the new force for technological innovation in China, and therefore the basic force for building an innovative country [4]. The implementation of the “going out” strategy of the state will greatly encourage a group of small and medium-sized enterprises to accelerate their entry into the international market, participate in international economic and technological cooperation and competition on a wider scale, in a broader field and at a higher level, and promote reform and Development [5].

Implementing innovation-driven development strategy clearly points out that scientific and technological innovation is the strategic support for improving social productivity and comprehensive national strength, and must be placed at the core of the overall national development [6]. In the economically developed coastal areas and intelligence-intensive areas, most science and technology enterprises are involved in emerging industries, especially in new technology-intensive industries, new materials, new energy and other fields, which will undoubtedly lead to the adjustment and optimization of industrial structure [7]. Only when the enterprise maintains a certain degree of overall expansion in all aspects of future production capacity, asset size, market share and profit retention, can it be considered as growth, although this expansion sometimes shows a progressive state of logic. At the same time, technological innovation is also the motive force for

the survival and development of small and medium-sized technological enterprises [8]. Strengthening the technological innovation ability of small and medium-sized technological enterprises and effectively realizing the transformation of economic development mode by relying on scientific and technological progress are important ways to promote the construction of an innovative country in the long run [9]. The overall improvement of the overall operating efficiency and profit of the enterprise has driven the enterprise to take innovation as the core value strategy, and the entrepreneurial spirit has guided the enterprise to pursue a larger market and value space, forming an inexhaustible source of innovation power and driving the technological innovation of the enterprise. Research on the technological innovation path of SMEs [10].

2. Materials and Methods

2.1. Technological SMEs and technological innovation

As the main body of financial demand, technological SMEs need to go through different stages of development. According to the theory of enterprise life cycle, they are generally divided into four stages: seed stage, entrepreneurship stage, growth stage and maturity stage. We will encourage scientific and technological financial institutions to innovate financial services products, innovate financial investment instruments, meet the financial needs of small and medium-sized enterprises, encourage private capital to invest in small and medium-sized financial investment institutions, and provide venture capital to small and medium-sized enterprises in various forms. At the same time, we should also consider the overall environmental factors of the country, because the industrial development situation affects the level of technological innovation and the future development prospects of enterprises, while the small and medium-sized enterprises themselves have inadequate congenital conditions, which make them more affected by the environment. Innovation is a gradual innovation based on the accumulation of existing knowledge. Every incremental innovation does not necessarily lead to a major breakthrough in technology, but the accumulation of innovation will eventually lead to huge technological changes. The technology innovation model is an important means for SMEs to optimize resource allocation and improve innovation effectiveness and efficiency.

2.2. The characteristics and functions of technological innovation of small and medium-sized technological enterprises

The development strategy of an enterprise is a series of important decisions about its medium and long-term development goals and how to achieve them. The driving factors of technological innovation have evolved from single factor to multiple factors, focusing on the driving relationship of independent factors to technological innovation. Scientific and technological small and medium-sized enterprises cooperate with scientific research institutions and institutions of higher learning to speed up the industrialization of scientific and technological achievements through the close integration of industry, education and research. They can also cooperate horizontally and jointly invest in the establishment of research and development centers with similar products and scales to share risks. "Science and technology innovation, people-oriented" Talent is the key to complete technological innovation, so the talent base is another major aspect that affects the technological innovation capability of SMEs. Encourage enterprises to declare funds for national and local scientific research and industrialization projects, encourage enterprises to build enterprise engineering centers, technology centers and key enterprises of enterprises, and at the same time explore new types of project research and development systems that involve government funding, social funds and venture capital participation.

Enterprise's technological innovation capability is a kind of ability to provide new products, processes or services for enterprises through the integration of existing stock resources and under the guidance of a new idea or method. At the same time, it can ultimately bring business profits to enterprises. After entering the growth stage, small and medium-sized technology-based enterprises have completed the initial accumulation, and their products have certain market competitiveness.

Construct a cluster brand support system, develop small and medium-sized enterprises to foster incubation carriers, strengthen resource optimization cooperation among carriers, form a point-to-point linkage, and point-to-point linkage, build an industrial cluster of small and medium-sized enterprises, realize the development of small and medium-sized enterprises, package products, and build cluster brands effect. Accelerate the research and formulation of the management regulations for venture capital institutions, and actively explore the use of financial and credit guarantees to support the development of small and medium-sized enterprises. The level of technological innovation support system is shown in Figure 1.

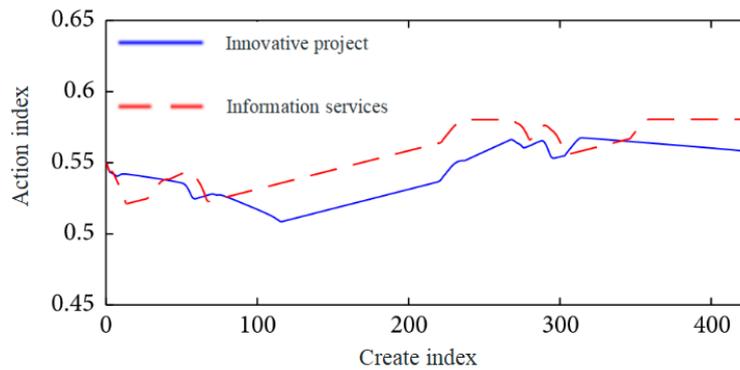


Fig.1. The functional level of the supporting system of technological innovation

3. Result Analysis and Discussion

3.1. Multi-channel development of new technological innovation model for small and medium-sized technological enterprises

In order to lay a good foundation for technological innovation, small and medium-sized enterprises should improve their abilities in various aspects, such as production capacity and profitability. At the same time, enterprises should improve the conditions of innovation, improve the performance of technological innovation and establish technological innovation mechanism. Entrepreneurship is the key to driving technological innovation. As a support system for technological innovation, the first step is to establish a market information service system, integrate consulting institutions, and provide timely market dynamic information for small and medium-sized enterprises. The government has introduced a series of measures to strengthen the transformation of scientific research achievements in order to build a supporting service system for technological innovation. As an innovative intermediary organization, business incubator plays an increasingly important role in the cultivation and development of small and medium-sized technological enterprises. Support the information obtained as a guarantee, reduce the threshold for entry of venture capital institutions, formulate tax incentives and risk compensation measures, and take measures to promote venture capital institutions to follow-up investment in technology-based SMEs and broaden their sources of risk funds.

3.2. Accelerating the construction of technological innovation system

Entrepreneurial management is an inevitable management mode adopted by enterprises at the initial stage. This management has the characteristics of individual management and extensive management under the control of centralized system, and has the characteristics of randomly capturing development opportunities and obtaining resources. Establish a personalized market positioning service system, fully mobilize the advantages of scientific and technological resources of consulting agencies, and provide strategic consulting support for small and medium-sized enterprises in how to position and segment the market, which will take the lead in the market and do a good job in marketing. At the same time, in order to enable enterprises to realize enterprise transformation and achieve sustainable development as soon as possible, enterprises are still facing new pressure of innovation and still need to invest more funds in research and development. In the

external environment, the level of industrial technology innovation and industry development strategy, economic and financial environment, science and technology environment and policy and legal environment are the industrial and environmental factors that affect the innovation capability of SMEs. It is necessary to formulate policies to attract talents, and to absorb excellent talents and intellectual resources at home and abroad; to further establish and promote good practices of respecting knowledge, respecting talents, and advocating innovation, and forming a social environment conducive to scientific and technological progress and technological innovation.

Under technological innovation, small and medium-sized technological enterprises should pay attention to and track the development trend of core technology in time, imitate and develop similar new products with the fastest speed, and make use of the market development achievements of leading enterprises. Through technological innovation to achieve differentiation, and to carry out technological innovation faster and better than competitors, the products of enterprises can stand out in the market competition and gain a good reputation in the industry. In addition, enterprises should improve their innovative management ability, enhance the innovative consciousness of entrepreneurs, establish an effective talent incentive mechanism, mobilize the innovative enthusiasm of scientific and technological talents, tap their innovative potential, and ensure that the innovative activities of enterprises continue. Choosing different development paths is not entirely the subjective product of decision makers, but the choice under a specific structure. Different structures will affect the obstacles and costs of choice, and decision makers will choose the path with lower cost. Structural factors are like orbits that determine the path of development. Give play to the supply-driven effect, guided by government project investment, and guide enterprises to actively participate in the development of industry common or industrially needed technologies, guide entrepreneurs to enhance their sense of innovation reserve, and incorporate them into the overall development strategy of enterprises, with value innovation as Orientation, which has given birth to a new impetus for technological innovation in enterprises.

4. Conclusion

This paper studies the path of technological innovation of small and medium-sized technological enterprises. The market demand of technology is the main source of technological innovation for small and medium-sized technological enterprises, and it is also the key factor for the success of technological innovation. Market demand means potential benefits and drives technological innovation for small and medium-sized technological enterprises. At the same time, it emphasizes the subjective initiative of enterprises in the support system, and the important role of entrepreneurship entrepreneurs as the key link of technological innovation support. We should create an atmosphere that encourages enterprises to engage in innovation activities and invest in innovation activities, which will encourage enterprises and relevant institutions to increase their investment in technological innovation activities of small and medium-sized enterprises, so that technological innovation activities of science and technology-based small and medium-sized enterprises can be better guaranteed. Technology-based SMEs not only face obstacles and risks of development, but also face institutional obstacles. The government's responsibility is to create conditions to promote enterprise reform, improve industrial policies, play a greater service function, create a social environment that is more conducive to the development of all enterprises, and support the continuous growth of small and medium-sized enterprises. Therefore, the government must create a fair market environment, regulate the business behavior and competitive behavior of various types of enterprises, and create a good market order.

Acknowledgement

Tianjin Philosophy and Social Science Planning and Funding Project "Innovation Driven Research on the Growth Path of Science and Technology Small and Medium Enterprises in Tianjin" (TJYY 16-022).

References

- [1] Marra A, Antonelli P, Dell'Anna, Luca, et al. A network analysis using metadata to investigate innovation in clean-tech – Implications for energy policy. *Energy Policy*, 2015, 86:17-26.
- [2] Torrent-Sellens J, Ficapal-Cusí, Pilar, Boada-Grau J, et al. Information and communication technology, co-innovation, and perceived productivity in tourism small and medium enterprises: an exploratory analysis. *Current Issues in Tourism*, 2015:1-14.
- [3] Qiao P H, Ju X F, Fung H G. Industry association networks, innovations, and firm performance in Chinese small and medium-sized enterprises. *China Economic Review*, 2014, 29:213-228.
- [4] Ji-Hoon P. Open innovation of small and medium-sized enterprises and innovation efficiency. *Asian Journal of Technology Innovation*, 2018:1-31.
- [5] Fukugawa N. Knowledge creation and dissemination by Kosetsushi in sectoral innovation systems: insights from patent data. *Scientometrics*, 2016, 109(3):2303-2327.
- [6] Guo D, Guo Y, Jiang K. Government-subsidized R&D and firm innovation: Evidence from China. *Research Policy*, 2016, 45(6):1129-1144.
- [7] Smart innovation policy: How network position and project composition affect the diversity of an emerging technology. *Research Policy*, 2015, 44(5):1094-1107.
- [8] Zabala-Iturriagagoitia, Mikel J. Innovation management tools: implementing technology watch as a routine for adaptation. *Technology Analysis & Strategic Management*, 2014, 26(9):1073-1089.
- [9] Guo B, Wang Y, Xie X Y, et al. Search more deeply or search more broadly? An empirical study of external knowledge search strategy in manufacturing SMEs. *Asian Journal of Technology Innovation*, 2015, 23(1):87-106.
- [10] Soto-Acosta P, Popa S, Daniel Palacios-Marqués. Social web knowledge sharing and innovation performance in knowledge-intensive manufacturing SMEs. *The Journal of Technology Transfer*, 2016, 42:1-16.