

Evaluation Index System of Innovation Catalytic Capacity of Equipment Manufacturing Enterprises in Liaoning Province

Hui Sun, Yonghua Han*, Shuaikang Wu, Ming Liu

School of Economics and Management, Liaoning University of Technology, Jinzhou, Liaoning, 121001, China

**corresponding author*

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Abstract: Innovation catalysis is the only way to help enterprises out of traditional difficulties and open up new markets. This study qualitatively analyzes the research results of scholars on innovation catalysis, selects three first-level indicators of innovation catalytic investment, innovation catalytic operation and innovation catalytic results, five second-level indicators of innovation catalytic capital, innovation catalytic manpower, innovation catalytic environment and innovation catalytic performance, and selects enterprise innovation catalytic strategy and innovation catalytic output level. The capital investment of innovation catalysis is divided into the proportion of the cost of introducing foreign professionals to carry out innovation catalysis and the cost of enterprise innovation catalysis. The innovation catalytic ability of equipment manufacturing industry was evaluated by 12 three-level indicators such as the cost of imported innovative catalytic equipment and the proportion of total cost of imported equipment. The innovation catalytic capability evaluation system of equipment manufacturing industry constructed in this study from a qualitative perspective provides a theoretical basis and practical guidance for enterprises and governments to optimize market structure, enhance innovation capability and help enterprises out of difficulties.

1. Introduction

Liaoning province is one of the places with the most potential and development of equipment manufacturing industry in China, and equipment manufacturing industry plays an important role in the economic development of Liaoning Province [1]. The new "14th five-year plan" of Liaoning province calls for upgrading the industrial structure of equipment manufacturing industry in the province and popularizing digitalization and intelligent transformation. Although there are enough scientific research personnel and technical personnel in Liaoning Province, the relevant achievements cannot meet the development requirements. Nowadays, the innovation ability is emphasized by all industries in China. In order to realize the transformation under the new plan, equipment manufacturing enterprises must improve their own innovation ability [2].The ability of

an enterprise to provide relevant knowledge, equipment and technology [3] as a catalyst to encourage employees to innovate is called innovation catalytic capability [4]. This paper will introduce the factors that affect the innovation catalytic ability of equipment manufacturing enterprises in the new era, and determine the relevant indicators to measure the innovation catalytic ability of an enterprise. The purpose is to make the enterprise clear how to drive innovation and its own innovation direction, and achieve the development goal of the enterprise under the new policy.

2. Related concepts and components of innovative catalytic capacity

2.1. Innovative catalytic capacity

In equipment manufacturing enterprises is the same as two substances in chemical reaction, and the reaction rate will be significantly improved under the premise of catalyst. It is well known that innovation ability can be stimulated under certain conditions, including some internal and external factors. When members of an organization carry out a series of activities to motivate and help other members to carry out innovative behaviors, they play a catalytic role, and the level of innovation ability of other members reflects the level of organizational innovation catalytic ability [5].

2.2. Components of innovation catalytic capacity

2.2.1. Innovative catalytic input

Innovation capacity and innovation catalytic capacity are closely related to each other, innovation catalytic capacity is the premise of innovation capacity and the main step of innovation, innovation can react on innovation catalytic capacity, innovation can further promote innovation catalytic capacity. The most important innovation of equipment manufacturing enterprises is reflected in technological innovation, which requires coordination and cooperation of human resources and organizations [6]. Under appropriate conditions, the more attention equipment manufacturing enterprises pay to innovation, the more manpower and resources they invest, and the more innovation catalysis can play a role in it.

2.2.2. Innovative catalytic operation

Innovation is a special activity to achieve the goals of individuals or organizations. The ultimate goal is to realize the interests of individuals or organizations. In the process of innovation catalysis, the internal and external environment and corporate culture also affect the employees who participate in innovation catalysis. When external policies encourage innovation, enterprises respond to external policies to encourage employees to actively participate in innovation activities for their own development. Equipment manufacturing industry itself also attaches importance to innovation, and employees will also assist colleagues in innovation under the influence of corporate organizational culture. Establish corresponding reward mechanism for employees who participate in innovation catalysis to maximize their ability to play. Monitor changes in the internal and external environment of the enterprise and clarify the direction of innovation catalysis.

2.2.3. Innovative catalytic achievements

The role of innovation catalysis is to accelerate the formation of innovation and it does not determine the outcome of innovation, so the outcome of innovation catalysis is not entirely predictable. During the implementation of innovation catalysis, attention should be paid to the ratio of various elements of innovation catalysis, which is a process in which multiple subjects work

together. Rational allocation of all elements of innovation catalysis will be involved to achieve the effect of accelerating innovation and test the results of innovation catalysis [7].

3. Evaluation index system of innovative catalytic capacity

3.1. Evaluation index system

The evaluation index system is conducive to intuitive detection of whether the evaluation object meets the standard, and the advantages and disadvantages of the evaluation object are clear. The establishment of the evaluation index system of innovative catalytic capacity takes the quality, effect and contribution of innovative catalytic capacity as the main content, and comprehensively reflects the level of innovative catalytic capacity of equipment manufacturing enterprises [8]. These indicators can point out the deficiency of enterprise innovation catalytic ability more objectively and rationally and provide ideas to improve the deficiency. The construction of the evaluation index system should be scientific and standardized, and each index of the evaluation object is interrelated and differentiated. The selection of the evaluation index object should be representative and conform to the reality. It reflects the dynamic conservation of ecology, society and economy. Therefore, the selected index should be able to be measured by time. The selection of indicators should not be too complicated and should be described in scientific and concise language without lack of information. The indexes of evaluation objects are comparable and operable, and the indexes are generally consistent. The purpose of establishing the index system is to improve the policy and management system, select indexes that are easy to collect, and their calculation methods should be the same [9]. The selection of indicators should not only consider a single factor, but also comprehensively consider the factors that affect the catalytic capacity of innovation, such as environment, economy, policies and employees [10]. The establishment of evaluation index system must be logical. According to the factors that affect innovation, the factors that affect enterprise innovation catalysis are deduced, and the indicators to judge the innovation catalytic ability of equipment manufacturing enterprises are selected based on these factors. Then the evaluation index system of innovative catalysis is constructed.

3.2. Index system of evaluation of innovative catalytic capacity

3.2.1. Index Determination

The innovative catalytic capacity of equipment manufacturing enterprises can be reflected in the following three aspects: investment in innovative catalytic, operation of innovative catalytic, and achievement of innovative catalytic.

(1) Innovation catalysis into equipment manufacturing enterprises to seek development in innovation, want to carry out innovation must be invested in cost, enterprise innovation is not overnight he is a slow process, although innovation catalysis can accelerate enterprise innovation, but also requires a certain amount of time. Enterprises need to continuously carry out cost input, including labor cost, capital cost, equipment cost. Tortoriello et al. [11] believed that innovation catalysis means that other employees in an enterprise start a series of innovation activities first, and these employees are called innovation catalysts, which can improve the innovation environment in the enterprise and promote the innovation of other members in the organization. Innovation needs the support of professional knowledge, professional personnel and professional equipment, and innovation catalysis also needs the same conditions. In the era of big data, enterprises are no longer just processing, absorbing and facing the information and competitive resources of The Times. Nowadays, enterprises are in a diversified world. To realize the improvement of enterprise

innovation catalytic ability, it is necessary to take the essence of external environment knowledge and information and filter out the dregs of these information and knowledge to cultivate the comprehensive knowledge ability of employees [12]. The existence of equipment manufacturing enterprises in the market must be open, innovation cannot be realized by closing the door, and innovation catalytic needs to contact the outside world to communicate with the outside world, the enterprise properly introduce foreign professional talents to prevent the enterprise to reduce the innovation catalytic capacity. Openness is not only necessary for enterprises, but also for members of various departments within an enterprise. When members of an organization are willing to share information and knowledge with each other, the innovation catalyst of an enterprise may start [13]. Innovation catalytic goal, enterprises need to inspection related professional equipment innovation, the innovation of the equipment manufacturing enterprises from the catalytic results for technology innovation and product innovation, more employees adopt innovative catalytic also need relevant auxiliary equipment, thus equipment manufacturing enterprises want to own innovative catalytic ability increase, will meet the needs of the employee to provide equipment support [14]. This not only meets the needs of enterprise innovation catalysis, but also improves the enterprise's own equipment professional level. Capital is the most basic condition for enterprise operation, and any social activities of enterprises should be supported by capital. Incentive mechanism can be set up to encourage employees to innovate and catalyze [15]. Talents and equipment introduced by enterprises for innovation and catalyze are all capital costs.

(2) Innovation catalysis operation Innovation catalysis is a process of comprehensive coordination and management. The cooperation of members within an organization, the degree of information sharing, the competition of innovation catalysis within each group, and the concept of leaders within an organization are all factors affecting innovation catalysis [16]. Innovation catalysis uses the internal and external environment of enterprises to stimulate enterprise innovation. The organizational system of equipment manufacturing enterprises needs to be constantly improved to adapt to innovation catalysis, recognize the innovation position of enterprises, and adjust the strength and intensity of innovation catalysis [17]. Enterprise innovation catalysis set up full-time staff to keep track of the progress of catalytic feedback, timely adjust the direction of innovation catalysis. Innovation catalysis in the organization should focus on the initiative of employees or departments, which is conducive to the enterprise to cross to a new stage. In the selection of leaders supervising innovation catalysis in the organization, we can choose those who are willing to bear innovation risks and explore new knowledge. Equipment manufacturing enterprises should choose whether to become an innovative enterprise and how to adjust enterprise innovation in the market from the direction of strategic management of innovation catalysis. Enterprise innovation driving force is also a major factor affecting innovation catalysis. Market demand guides enterprise innovation direction and leads enterprises to carry out innovation catalysis to meet the market and launch new products [18]. Some habitual choices and decisions in organizations also affect innovation catalysis [19].

(3) The most direct method to evaluate the innovation catalytic capacity of an equipment manufacturing enterprise is to test the results and efficiency of innovation catalytic [20], and whether the innovation ideas obtained by the enterprise after innovation catalytic can be applied to the actual production and operation; Whether it meets the desired results of the enterprise; Whether it is conducive to the future innovation and development of enterprises; Whether it can bring profits to the enterprise is a problem that needs to be considered in the catalytic stage of innovation.

3.2.2. Determination of Other Indicators

The above is the determination of first-level indicators. Second-level evaluation indicators can be determined according to the selection of first-level indicators. The second-level indicators of

innovation catalytic input of first-level evaluation indicators are: innovation catalytic capital, innovation catalytic manpower, innovation catalytic environment. The three levels of indicators are as follows: the capital investment in innovation catalysis is divided into the proportion of the cost of introducing foreign professionals to carry out innovation catalysis and the cost of innovation catalysis of the enterprise; The cost of introducing innovative catalytic equipment and the proportion of total equipment cost; The proportion of R&D costs and revenue of innovation catalysis invested by enterprises [21]. Innovation catalyst manpower refers to the number of enterprise personnel involved in innovation catalysis. Innovation catalytic environment is divided into the proportion of government innovation funds and other project funds. Proportion of enterprise innovation catalytic training time and other project training time. First-level evaluation index the second-level index of innovation catalytic operation is: enterprise innovation catalytic strategy. The three-level indicators are as follows: the intensity of the enterprise's incentive to the employees who engage in innovation catalysis (the ratio of the bonus of the employees who participate in innovation catalysis to the bonus of the total activities of the enterprise); The risk intensity of enterprise undertaking innovation catalysis (the ratio between the risk of enterprise willing to undertake innovation catalysis and the total risk of enterprise willing to undertake organization operation). First-level evaluation index The second-level evaluation index of innovative catalytic results is: innovative catalytic output level. The three-level indicators are: the number of innovation catalyzed by innovation; Innovation catalytic efficiency (ratio of the time of innovation after innovation catalysis to the time of innovation after innovation catalysis); The ratio of total economic profit and total profit amount brought by innovative catalytic output innovation adoption; The number of patents filed for innovation catalyzed by innovation.

4. Conclusions

If equipment manufacturing enterprises want to have a long-term foothold in the market, they should pay more attention to the road of innovation and development of enterprises. Innovation catalysis can accelerate the innovation of enterprises, and the level of innovation catalysis ability of enterprises reflects the innovation speed of enterprises. In this paper, three first-level indicators of innovative catalytic input, innovative catalytic operation and innovative catalytic achievement are selected, and five second-level indicators of innovative catalytic capital, innovative catalytic manpower, innovative catalytic environment, enterprise innovative catalytic strategy and innovative catalytic output level are selected. The capital investment of innovation catalysis is divided into the proportion of the cost of introducing foreign professionals to carry out innovation catalysis and the cost of innovation catalysis of the enterprise. The innovative catalytic capacity of equipment manufacturing industry was evaluated by twelve three-level indexes, including the cost of imported innovative catalytic equipment and the proportion of total cost of imported equipment. However, the selection of indicators in this paper is not very comprehensive, and the evaluation index system still has some defects. In the future, I will learn more about the perfection of the content of innovation catalysis.

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