Research on Impact of Boundry-Spanning Search on Manufactures' New Product Innovation Performance Improvement

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ABSTRACT. *This paper examines the relationship between boundry-spanning search and manufactures' new product innovation performance, putting forward a conceptual model which include boundry-spanning search, technological learning, knowledge integration mechanism, new product innovation performance, and then the hypotheses have been empirically tested by using 260 survey data from China's manufacturing enterprises.Results indicate that boundry-spanning search has not directly influence on new product innovation performance improvement, technological learning and knowledge integration mechanism plays an fully mediating role between boundry-spanning search and new product innovation performance.*

Keywords: Boundry-Spanning Search; technological learning; knowledge integration mechanism; new product innovation performance

1. Introduction

The use of external innovations helps to understand and solve problems that new product development activities can encounter, and can generate ideas through timely adjustments and improvements. New product development requires enterprises to make extensive use of external resources. Boundry-spanning search is conducive to the integration of various technical elements, and the creation of unique, scarce and non-imitation technical resources. As the main provider of product modules and important external cooperation partners, suppliers can provide a wide range of knowledge and skills required for new product development [1]. The object of

boundry-spanning search in this study refers specifically to suppliers, the search for their knowledge of new technologies and how companies can transform between existing technical knowledge and new technical knowledge.

Boundry-spanning search will promote the improvement of new product innovation performance. However, in practice, many companies cannot obtain the potential benefits of boundry-spanning search as predicted by relevant theories. How to improve the performance of new product innovation by manufacturing companies to obtain corresponding technical knowledge from innovative suppliers through boundry-spanning search is a theoretical problem that needs to be solved urgently. Based on this, the construction of relevant conceptual models to explore the mechanism of boundry-spanning search for manufacturing enterprises to enhance the performance of new product innovation, not only fill the gaps in relevant domestic theoretical research, but also provide practical guidance for suppliers to participate in new product development.

1. Proposal of research hypothesis

1.1 The impact of cross-boundary search on the improvement of new product innovation performance

When manufacturing companies lack their core knowledge and ability to innovate, they need to integrate externally acquired knowledge and technology into their own knowledge systems [2]. The key to successful new product development is to effectively identify and solve potential technical problems in the product innovation process, make full use of external expertise and resources, integrate external new knowledge and technology into internal product innovation processes, and effectively shorten new products. Creativity generates new product development time, which increases the success rate of new product development.

Enterprises use the boundry-spanning search model to integrate external knowledge into technology development. These new technology knowledge can effectively improve internal R&D, promote products to enter the market earlier. Specifically, in the first aspect, boundry-spanning search integrates external knowledge into technology development, which is conducive to the integration of

various technical elements and the creation of unique, scarce and non-imposable technical capabilities. Due to the professional advantages and technical expertise of the suppliers themselves, the search and identification of external organizational technical resources can directly provide technical knowledge that the enterprise itself does not have [3]. New technical knowledge is integrated into the existing technical knowledge structure of the enterprise in a specific direction, which is conducive to the generation of new technical knowledge clusters in the technical knowledge dimension. These technical knowledge clusters will lead to the development of complex, recessive and difficult to imitate technologies. Therefore, it is beneficial for enterprises to form technological innovation advantages in new product development [4]. Therefore, the research hypothesis 1 is proposed based on this:

Hypothesis 1: Boundry-spanning positively affects the improvement of new product innovation performance of manufacturing enterprises

1.2 Mediating role of technical learning

Enterprises search external knowledge sources to transfer external knowledge to the internal enterprises, and realize the effective accumulation of enterprise technical knowledge. However, the external technical knowledge required for new product development often has tacit knowledge characteristics that cannot be expressed by language symbols. It is difficult to transfer and internalize technical knowledge among enterprises. In the development of new products, enterprises need to continuously understand and deepen the relevant technical knowledge acquired from suppliers, and establish a common understanding of knowledge and technology evolution in specific fields to create cross-use conditions for information and knowledge, so that knowledge fields can interact with each other. Liaison to enhance knowledge understanding and efficiency.

Technological learning is a learning behavior and process in which an enterprise uses its internal and external knowledge to form its own technical capabilities. The stronger the technical learning ability, the deeper the understanding of tacit knowledge, the more likely it is to effectively transform tacit knowledge and promote knowledge creation within the enterprise [5]. Only by well understanding

the technical expertise from boundry-spanning search and colliding with the existing technical knowledge of the company to promote new ideas and ideas can effectively shorten the internal R&D cycle and promote the product to enter the market earlier , which helps to improve the performance of new product innovation. Based on this, the research hypothesis 2 is proposed:

Hypothesis 2: Technological learning plays a mediating role in the relationship between doundry-spanning search and new product innovation performance of manufacturing companies.

1.3 Mediating role of knowledge integration mechanism

Manufacturing companies only rely on boundry-spanning search to obtain relevant technical knowledge that is useful to the outside world. It does not represent the full mastery of technology. The knowledge integration mechanism creates a knowledge diffusion and knowledge sharing among the members of the network organization in the new product development stage. These new technical knowledge are successfully disseminated within the enterprise, fully absorbed and digested, and integrated with the existing technical knowledge of the enterprise, incorporating these technical knowledge into their own technical systems [6].

Through internal knowledge dissemination, manufacturing enterprises enable enterprises to timely summarize their own technical knowledge. In the new product development activities, the company acquires supplier innovation through the establishment of an efficient knowledge integration mechanism, absorbs the technical knowledge that internalization matches the manufacturing enterprise, and integrates it into the internal technical resource system[7]. Therefore, the knowledge integration mechanism among new product development enterprises can effectively promote the transfer of technical knowledge across time and space, and thus help to improve the performance of new product innovation. Based on this, the research hypothesis 3 is proposed:

Hypothesis 3: Knowledge integration mechanism plays a mediating role in the relationship between boundry-spanning search and manufacturing product new product innovation performance.
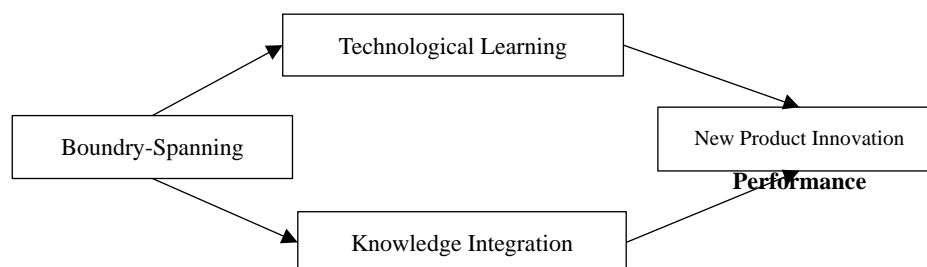
The conceptual model is shown in Figure 1:

Fig.1 Concept model

2. Methodology

2.1 Sample and data collection procedures

The research team distributed 650 questionnaires to 70 representative manufacturing enterprises in 8 provinces and cities including Shaanxi, Anhui, Sichuan, Jiangsu, Shanxi, Zhejiang, Liaoning and Shandong, and recovered 285 questionnaires. The recovery rate of valid questionnaires was 43.9%, excluding There were 25 questionnaires with missing data, and 260 valid questionnaires were finally collected, accounting for 40% of the total questionnaires.

2.2 Survey design

In order to ensure the reliability and validity of the Institute's dosage form, the research team tried to adopt a well-recognized mature scale in world-class academic journals. In order to avoid the difference between Chinese and English language, a pre-test scale is formed by means of translation and back-translation. The questionnaire uses the Likert seven-point scoring method.

Boundry-Spanning Search: Drawing on the related research of Sofka and Grimpe [2] and Sidhu et al[4]. designing four items to measure cross-border search by suppliers. Technological learning: Based on the research of Gilsing et al[8]. four items are used to measure technological learning. Knowledge integration mechanism: Based on the research of Tsai and Hsu [9]. five items are used to measure the knowledge integration mechanism. New product innovation performance: draw on

the research on the innovation performance of new products by Shen Wei and Li Wei [7], adopting the four items of the new product quantity growth degree, the R&D investment growth degree, the patent quantity growth degree and the investment return rate growth degree. To measure.

2.3 Establishment and Hypothesis Testing of Structural Equation Models

To test the mediating effect of knowledge integration mechanisms and technological learning on boundry-spanning search on the innovation performance of new products in manufacturing enterprises, the mediating effect is tested using the steps of Baron and Kenny [10]: Based on this, the structural hypothesis model was tested by constructing a structural equation model from AMOS 18.0.

(1) Building a structural equation model.To validate the research hypothesis 1 to construct the first structural equation model is the direct impact of boundry-spanning search on the innovation performance of new products in manufacturing enterprises. The empirical results are shown in Fig.2.

Fig.2 The data graph of SEM 1

Constructing the second structural equation model is a full model, examining the mediating effects of technological learning and knowledge integration mechanisms, used to validate research hypotheses 2 and 3, and the empirical fit results are shown in Fig.3.
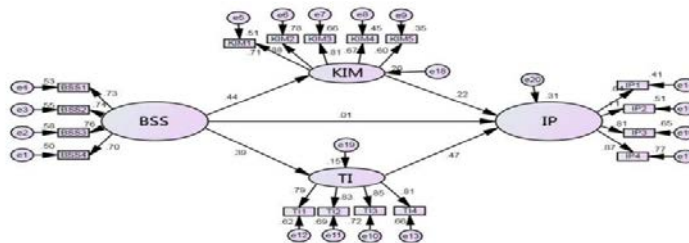

Fig.3 The data graph of SEM 2

(2) Results and analysis. Boundry-spanning search tests the relationship between new product innovation performance. The relationship between row variables is explained by standardized regression coefficients. As shown in Table 4, boundry-spanning search has a significant effect on the innovation performance of new products (coefficient value is 0.27, P=0.001), supporting hypothesis 1, boundry-spanning search for new products of manufacturing enterprises. Innovation performance has a significant positive effect.

The mediating effect of the knowledge integration mechanism. Boundry-spanning search has no direct impact on the performance of new product innovations (coefficient value is 0.014, P=0.873), indicating the existence of mediating variables. The mediation effect of the knowledge integration mechanism between boundry-spanning search and manufacturing new product innovation performance is 0.097 (0.219*0.443), and the mediation effect intensity is 0.331 (0.097/0.097+0.014+0.182), and at the level of 0.01. Significantly, it is confirmed that the knowledge integration mechanism has an influence on the relationship between the two, and the intensity of the mediation effect is 0.331, which is statistically a more obvious mediating effect, and the results support the research hypothesis 2.

The mediating effect of technological learning. The mediating effect of technological learning between boundry-spanning search and enterprise new product innovation performance is 0.182 (0.385*0.472), and the mediation effect intensity is 0.62 (0.182/0.097+0.014+0.182). The effect is obvious and the results support the research hypothesis 3.

3. Discussion

The purpose of the research is to find out the mechanism of boundry-spanning search on the performance improvement of new product innovation. The empirical results show that boundry-spanning search has a significant impact on improving the performance of new product innovation without introducing the two variables of technological learning and knowledge integration mechanism. The empirical results show that boundry-spanning search is an effective way to search for external technology. However, manufacturing companies can only improve their new product

innovation performance by effectively integrating and reconstructing professional technological learning derived from suppliers. Therefore, for enterprises, based on the knowledge integration mechanism of information sharing and two-way communication, build a cross-organizational learning culture between enterprises and suppliers and create a good cooperation atmosphere to promote technology learning, thus ensuring cross-border The external technical knowledge acquired by the search is effectively disseminated internally.

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