

Research on the Influencing Factors of Cooperative Knowledge Innovation and Firm Performance in Supply Chain

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Abstract—under the current economic environment, the rapid changes of market environment, the continuous reduction of product life cycle and the uncertainty of customer demand lead to the inability of enterprises to maintain their long-term competitiveness. The emergence of supply chain environment brings new directions of innovation. This paper analyzes the relationship between knowledge innovation and firm performance in supply chain coordination. On this basis, this paper constructs the theoretical model and carries on the empirical test, which provides the guidance for the enterprise in the future knowledge innovation.

Keywords-supply chain coordination; knowledge innovation; enterprise performance

I. INTRODUCTION

With the continuous development of economic globalization, China's enterprises rely on their own limited resources and the development of cheap labor costs are gradually lost. Rapid changes in the market environment and uncertainties in customer demand lead to an urgent need for more market information. Companies must ensure that they have access to more external resources and improve their products through a combination of supply chain collaboration and knowledge innovation. Supply chain collaboration provides an opportunity for enterprise knowledge innovation, and research with node enterprises in supply chain is paid more and more attention by academia.

The research on supply chain collaborative knowledge innovation and enterprise performance is focused on the factors of knowledge sharing, the benefits and risks of collaborative innovation. The study on supply chain collaborative knowledge innovation and enterprise performance influencing factors is still relatively small. Therefore, this paper studies the influencing factors of knowledge innovation from the perspective of supply chain coordination to improve the performance of enterprises, so that enterprises can more clearly understand the key factors in the process of knowledge innovation which is beneficial to the improvement of enterprise performance.

II. LITERATURE REVIEW

A. Supply Chain Collaboration

Supply chain collaboration thought was first produced in Clark's multi-level inventory distribution system. Since the 1990s, this theory has been developed and perfected continuously. Different scholars have elaborated the theory of supply chain coordination from different angles. Beamon (1998) pointed out that supply chain coordination is to

Maximize the overall interests and if the incentive to change the behavior of corporate members [1]. Simatupang (2004) argues that supply chain collaboration refers to the process by which several nodes in the supply chain are able to increase the competitiveness of the entire supply chain through joint efforts, information sharing and common decision making, resulting in greater profits than an enterprise's profits [2]. He also divides the supply chain collaboration into three dimensions, information sharing, synchronization decision and incentive alliance. These three dimensions can explain the connotation of supply chain coordination, which is one of the indicators used by domestic scholars to study habits. Cao (2011) studied the nature of supply chain collaboration and extended the dimension of supply chain collaboration to information sharing, goal consistency, synchronization decision, collaborative communication, resource sharing, incentive alliance and common knowledge to create seven dimensions on the basis of Simatupang [3]. The Zou Huixia (2007) pointed out that supply chain collaboration is the supply chain node enterprises in order to obtain greater benefits together to develop plans and implementation, shared responsibility, so that enterprises can better communicate and coordination[4].

B. Knowledge Innovation

American scholar Amidon (1993) first proposed the concept of knowledge innovation [5]. She pointed out that knowledge innovation is for the success of the enterprise, the vitality of the national economy and social progress, to create, evolve, exchange and apply new ideas to transform it into marketed products and services. Later, the Japanese scholar Nonaka (1995) from the enterprise point of view, put forward the knowledge innovation is not simply deal with a considerable amount of information, but to explore the minds of employees in the potential ideas, intuition and inspiration, and together to be applied. He also divides knowledge into explicit knowledge and tacit knowledge,

and makes a well-known SECI model after in-depth research on the mechanism of knowledge innovation. China's scholar Lu Wei (2002) argues that knowledge innovation is the process of creating and possessing new knowledge. It runs through the process of production, dissemination and use of enterprise knowledge by acquiring explicit knowledge and tacit knowledge within the enterprise explicit knowledge and tacit knowledge to integrate to improve the core competitiveness of enterprises in the process. Liu Jingyan (2008) that the knowledge base is the key to enterprise knowledge innovation, that is, the enterprise's intellectual assets.

III. CONCEPTUAL MODEL AND RESEARCH HYPOTHESIS

Long Jing (2001) analyzes the influencing factors of knowledge innovation ability, and points out that resource influencing factors, organizational influencing factors and environmental factors are the key factors of innovation ability. Duan Fuxing (2005) argues that the knowledge innovation ability of enterprises can be evaluated from five aspects: enterprise knowledge stock ability, knowledge attracting ability, knowledge transformation ability, field effect stress and leadership [6]. This paper analyzes the following factors: (1) the integration of resources and capacity; (2) the establishment of information technology platform; (3) the establishment of incentive mechanism.

A. The Impact of Resource and Capacity Integration

Resource theory think that supply chain coordination is the embodiment of enterprise core competence integration, any enterprise has its own unique knowledge, generally this knowledge is difficult to be imitated and replaced, the supply chain collaboration for enterprises to internal and external resources and capacity integration maybe [7]. The resources and capabilities of the innovation subject can influence the effectiveness of knowledge innovation and further influence the performance of the enterprise. Supply chain collaborative knowledge innovation can effectively realize the supply chain enterprise resources and ability integration, and constantly enhance the competitiveness of enterprises [8]. Based on the above conclusions:

H1: The integration of resources and competencies is positively related to firm performance.

The integration of resources and capabilities can ensure that enterprises in the production of products to maintain their core position, can reduce product development cycle and R & D costs, but also for enterprise knowledge to provide direction. Based on this, we use the enterprise scale benefit, business synergy, enterprise resource complement three indicators to measure the degree of integration of resources and capacity.

B. The Impact of Information Technology Platform

Ross and Beath pioneered the concept of information technology capabilities in 1996. The ability of information technology is mainly embodied in the organic integration of human, technology and relationship. Lin Changkui and Wan Difang (2009) believe that through the coordination of

corporate strategy and information technology resources to enhance the ability of information technology, enterprises make full use of its internal and external resources can promote the enterprise's knowledge innovation, thereby improving business performance. Based on the above conclusions:

H2: The establishment of information technology platform is positively related to enterprise performance.

The establishment of information technology platform can help the rapid transfer of knowledge among supply chain enterprises, but also facilitate the exchange of employees between enterprises, for enterprises to obtain knowledge of innovative resources have a significant role. Based on this, we use information technology training, information resource access, information exchange and communication of three indicators to measure the impact of the establishment of information technology platform.

C. The Impact of the Establishment of Incentive Mechanisms

From the management point of view to explain the incentive, including motivation and encouragement in two aspects, the most basic incentives for: punishment and reward. In the collaborative innovation of supply chain, if employees are not enthusiastic about innovation, they will lead to the lack of innovation, which will affect the innovation performance of enterprises [9]. These problems need to establish a perfect incentive mechanism and create an innovative environment, ensure that every member of the active participation in innovation can get the appropriate return, so as to ensure the sustainable competitive advantage. Based on the above conclusions:

H3: The establishment of incentive mechanism is positively related to firm performance.

The incentive mechanism establishes a reasonable interest distribution mechanism from the needs of the people, creates a fair and equitable atmosphere, promotes the consistency of the employees and the enterprise goals, and promotes the employees' active participation in the enterprise's knowledge innovation by taking some incentive measures. Based on this, we use the interests of the distribution of clear, innovative activities are effective, staff innovation initiative to measure the degree of incentive mechanism to establish the impact of the degree.

IV. THE DESIGN AND EMPIRICAL ANALYSIS OF QUESTIONNAIRE

A. Questionnaire Issue and Recovery

The data of this study are mainly obtained through questionnaires, and the survey object is the middle-level leadership of enterprises in Liuzhou automobile manufacturing industry. At present, Liuzhou automobile manufacturing industry has a large number of car brands. Liuzhou automobile industry economy accounted for the proportion of the region's auto industry more than 80%, select the city of Liuzhou automobile manufacturing industry has a certain representative significance. More manufacturers of automotive industry, product substitution

is high, the market is highly competitive, and companies want to improve their competitiveness through knowledge innovation. The main body of the questionnaire consists of two parts: the basic data of enterprises, the scale of knowledge innovation among enterprises. In this study, the Likert 5-point scale was used to design the influencing factor scale, from 1 to 5, respectively, that very disagree, disagree, not sure, agree and agree very much. In order to ensure the quality of the design of the questionnaire, a small sample test ($N = 50$) was carried out, and the items of the questionnaire were adjusted and modified according to the feedback results. The questionnaire was sent to 300 different questionnaires, which were sent to Liuzhou city, and the recovery rate was 70.67%. The effective recovery rate was 60.33%. According to the survey data, the grass-roots leadership accounted for 50.79%, more than 3 years of age accounted for 80.13%, and undergraduate and above accounted for 70.26% of the qualifications and work experience and education can make the survey object has a higher degree of familiarity and sensitivity.

B. Reliability and Validity Test

The reliability of this questionnaire is verified by the CronbachT coefficient. Through SPSS22.0 statistical software analysis results show that each variable are more than 0.6 (see Table1), indicating that there is a strong correlation between the corresponding variables of each factor, internal consistency is better. For the validity test, this paper uses the factor analysis method to study the factor load of each factor to the corresponding variable. In the study of social sciences, the absolute value of the factor load is greater than 0.4 can be considered to be effective. The factor load of each observation variable in this questionnaire is more than 0.6 (see Table1), so each factor has a strong explanatory power for the corresponding latent variable, the questionnaire quality is high, can be further studied.

Table1. QUESTIONNAIRE RELIABILITYANDVALIDITY ANALYSIS

<i>Latent variable</i>	<i>Observe the variables</i>	<i>Cronbach T</i>	<i>Factor load</i>
Resource and capacity integration	Enterprise scale benefit	0.715	0.815
	Business synergy		0.795
	Enterprise resource complement		0.829
Information technology platform	Information technology training	0.776	0.794
	Information resource access		0.785
	Information exchange and communication		0.825
Establishment of incentive mechanisms	The interests of the distribution of clear	0.665	0.755
	Innovative activities are effective		0.684
	Staff innovation initiative		0.689

C. Study the Hypothesis of the Test

The nine factors of three dimensions are put into the AMOS7.0 structural equation model at the same time, and the results of Table 2 are obtained. It can be seen that the six dimensions have a direct effect on the organizational knowledge innovation and also have an interaction relationship. Among them, the P value is used to test the significance of the relationship between variables, generally considered $P < 0.05$ correlation is significant, $P < 0.01$ correlation is very significant.

Table 2. STUDIES THE HYPOTHETICAL TEST RESULTS

<i>Hypothesis</i>	<i>Path direction</i>	<i>Path coefficient</i>	<i>P value</i>	<i>Result</i>
H1	Resources and capacity integration → Enterprise performance	0.475	0.007	pass
H2	Information technology platform establishment → Enterprise performance	0.015	0.005	pass
H3	Incentive mechanism establishment → Enterprise performance	0.473	0.010	pass

Through the above test results analysis, all assumptions are verified. The integration of resources and capacity and

the establishment of information technology platforms have a very significant impact on business performance. The establishment of incentive mechanism has a significant impact on business performance.

V. CONCLUSIONS AND SUGGESTIONS

In the current economic environment, if a supply chain enterprise cannot be sustained and efficient knowledge innovation, it may not be able to obtain the long-term development needs of the enterprise source of knowledge, resulting in enterprises in the industry competition loss opportunities. Therefore, the in-depth study on influencing factors of knowledge innovation in supply chain enterprises can provide reference for enterprises in the process of future knowledge innovation. Based on the empirical research, this paper puts forward the theoretical assumptions and tests the theoretical assumptions by using questionnaire. It is found that the three dimensions have different effects on enterprise performance. Based on this, the following suggestions are made in this paper.

(1) Attach importance to enterprise resources and capacity integration, enhance the level of knowledge innovation. Competition in the current enterprise is essentially the supply chain competition, enterprises should focus on the integration of resources and capacity, and knowledge innovation will become the long-term development strategy. Enterprises should be clear their own resources and what can be obtained through consultation resources, through cooperation with other enterprises to achieve knowledge innovation, thereby enhancing the competitiveness of enterprises.

(2) Make full use of information technology platform, to achieve information resources sharing. Enterprises should be under the support of information technology, the formation of a knowledge sharing system, to timely understanding of customer needs, to facilitate business

innovation, to meet customer needs, in order to improve the overall performance of supply chain enterprises.

(3) To establish a sound incentive mechanism. Enterprises need to establish a sound mechanism for the distribution of benefits to encourage employees to innovate knowledge and create a corporate innovation atmosphere, so that every employee recognizes that they are a community of interests, each employee can actively participate in the enterprise knowledge innovation go with.

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