The Impact of Heterogeneous Collaboration on the Core Competitiveness from the Perspective of Organizational Learning in Yangtze river delta, China

Xiaoying Sheng*, Fuangfa Amponstira**

Ph.D. Candidate, Management, School of Management. Shinawatra University*

Ph.D. Management, School of Management, Shinawatra University**

Abstract

The heterogeneity of the actors of collaboration between industry, university and research makes them have the motivation to cooperate with each other. This study is an empirical study based on the perspective of organizational learning. The research shows that the academic team participates in the Industry-University-Research Institute collaboration, and the cooperative network enhances the core competitiveness of the academic team through two ways of organizational learning, namely explorative learning and exploitative learning.

Keywords: Organizational Learning; Core Competitiveness; Heterogeneous collaboration; Industry-University-Research Institute Collaboration

Introduction

With the acceleration of globalization, cooperative network, as an important organizational capital, contains resources such as information, technology, knowledge and

funds. Organizations need to obtain key innovation resources through inter-organizational collaboration to maintain their competitive advantages.Cross-organizational collaboration can not only integrate innovative resources and functions outside the organization , but also share the costs and risks of research (Cassiman and Veugelers, 2002). Innovation organizations are generally embedded in the huge social collaboration network, and the network has become the most important external environment for innovation organizations.Collaboration network gives organizations the ability to obtain knowledge, technology, information and other resources from outside. Academic teams, like businesses, are faced with competing for limited innovation resources, finding valuable scientific problems, and winning over the priorities of their academic peers. In this process of competition, the formation of unique core competitiveness of academic teams is the key to winning the priority competition. Organizational learning is an important source to promote continuous innovation and obtain sustainable competitive advantage .

The heterogeneous cooperative network established by academic organizations and economic organizations is characterized by the flow of different information resources between the heterogeneous subjects of the cooperative network, which sets up the main path for realizing the cross-organizational spillover of knowledge (Gilsing V, Nooteboom B. 2008).Industry-University-Research Institute collaboration is becoming increasingly networked.Industry-University-Research Institute collaboration network, different from the common collaboration network among enterprises of technical alliance, is a kind of network composed of academic organization and economic organization collaboration to promote the knowledge flow across organizations.

Since the subject of this study is the influence of collaboration network on core competitiveness of academic teams, this paper attempts to explore what kind of influence mechanism and path academic teams embedded in the Industry-University-Research Institute collaboration network will have on their own core competitiveness. The objective of this study the relationship between Industry-University-Research Institute collaboration network on core competitiveness of academic teams.

The significance of lies in this study, the academic team is embedded in the Industry-University-Research Institute collaboration network to explore the mechanism of the Industry-University-Research Institute collaboration network on the core competitiveness of academic teams .It can make up for the deficiency of the existing Industry-University-Research Institute collaboration network theoretical research, refill the gaps happen from previous researches,provide theoretical reference and reference for the optimization of the academic team construction, expands the theoretical research on IUR collaboration, and have certain practical significance for guiding the academic team to improve the core competitiveness.

Research Objectives

1. To study a significant correlation between the Industry-University-Research Institute collaboration network and core competitiveness of academic teams.

2. To study a significant correlation between the Industry-University-Research Institute collaboration network and Organizational learning.

3. To study a significant correlation between the Organizational learning and core

competitiveness of academic teams.

4. To present the Organizational learning plays an intermediary role between the Industry-University-Research Institute collaboration network and the core competitiveness of academic teams.

Literature Review

1. Organizational learning

This study is based on the perspective of organizational learning. The concept of organizational learning can be traced back to Argyris and Schon (1978), who believe that organizational learning is a process of "finding errors and correcting them by reconstructing the use theory of organization, and applying it to future actions", and it is a learning process consisting of four stages, namely Discovery, Invention, Production and Generalization.Bingham and Kahl (2013) believe that organizational learning refers to a systematic change of knowledge and behavior in previous experience.

Under the guidance of organizational learning theory, a lot of scholars have conducted more researches on organizational learning.Most scholars dissect organizational learning from the perspective of learning process. Scholars tend to understand organizational learning as a potential process of organizational behavior change. Based on the existing research findings, any concept of organizational learning is based on "knowledge" as the most basic element, and organizational learning is the endogenous dynamic mechanism to improve the technical ability of enterprises(Zhang Y, Chen K, Zhu G. 2016).

2. Collaboration Network and Core Competitiveness

The social network theory holds that the network relationship established between active subjects is essentially a kind of social capital.Based on the theory of resource view, social capital will have an impact on the behavior of the subject, and then on the core competitiveness of the subject.(2008) used structural dimension and cognitive dimension to elaborate the network structure of inter-enterprise collaboration. The cognitive dimension was used to measure the "intangible" structural characteristics of network nodes in terms of knowledge, technology and other cognitive levels, while the structural dimension was used to measure the "tangible" network relationship structure between network nodes. Gnyawali and Madhavan (2010) believed that the collaboration network has multi-dimensional and multi-level structural characteristics. Gilsing et al.

The main findings are as follows: before 2000, the collaboration network of industry, universities and research institutes was relatively loose; after 2000, the collaboration network presented the characteristics of "double" structure without scale and clustering, and the collaboration relationship evolved from low-level point-to-point to complex network. (Giuliani E, Morrison A.2010).

The current academic understanding of core competitiveness can be summarized as eight different points of view: the view of integration, network, coordination, combination of instuction, view of knowledge carrier, component architecture, platform and technology view, but is generally believed that the competitive advantage of enterprises from the enterprise directly support capabilities and resources, and sustainable competitive advantage comes from enterprise core competitiveness, and core

competitiveness are peculiar to the organization, can the advantages of long-term benefits for the organization ability, is the organization formed in the long-term competitive force.

Some studies sorted out the logical relationship between collaboration network, organizational learning and core competitiveness, established the conceptual model of "collaboration network - organizational learning - core competitiveness", and carried out a series of empirical studies. Most existing literature directly analyze the influence relationship between "collaboration network-core competitiveness", and there are still many differences on the direction and degree of the influence of collaboration network on organizational core competitiveness, lacking empirical research.

Research Methodology

In this study, qualitative and quantitative methods were used to design a questionnaire.Through small sample prediction test and expert interview, the questions were revised and the questionnaire was improved to form a formal scale with high quality and meeting the research requirements. Then questionnaires were sent out to collect survey data.The software program was used to analyze the reliability and validity to verify the scientific rationality of the data. The regression analysis of the research hypothesis and the theoretical model was carried out by software program.

The object of this study is the academic teams of research institutes in the Yangtze river delta region, China. The statistical data of each sample are restricted to the Yangtze River delta region. The questionnaires interviewees were all the principals and researchers of the academic teams of universities and research institutes in the Yangtze River Delta.

Snowball sampling was used in this study. A total of 420 questionnaires, with the recovery rate of 100 percent. In addition, the questionnaire which was obviously unqualified was excluded, including incomplete information and no experience of Industry-University-Research Institute collaboration.A total of 21 unqualified questionnaires were excluded through the above measures. These resulted in 399 valid questionnaires.

Result and Discussion

1. Empirical research

Descriptive statistics

The number of samples investigated in this study is 399, with a relatively balanced distribution.Majority of the respondents are deputy senior 112 persons accounts for 28.07 percent, follows by Advanced 184 persons accounts for 46.12 percent, by Intermediate 92persons accounts for 23.06 percent, by Junior and below 11 persons accounts for 2.76 percent. Majority of the respondent were male 242 persons, accounted for 60.65 percent, followed by female 157 persons, accounted for 39.35 percent relatively.

Majority of established time of academic teams less than 5 years were 40 teams, accounted for 10.03 percent, followed by 5 – 10 years were 92 teams, accounted for 23.06 percent, 10 – 15 years were 191 teams, accounted for 47.87 percent, 15 – 20 years were 68 teams, accounted for 17.04, and more than 20 years were 8 teams, accounted for 2.01 percent respectively.In the academic teams that participated in the survey, there are 186 teams working on applied research, accounted for 46.62 percent, there are 127 teams

working on experimental development research, accounted for 31.83 percen, there are 80 teams working on basic research, accounted for 20.05 percent.

Regression analysis

In order to verify Hypothesis 1 of this study, six regression models are set up to verify the impact of Industry-University-Research Institute collaboration network on the core competitiveness of scientific research teams. The regression results showed that, Model 1 Analysis of the control variables impact on Core Competitiveness of academic teams, the influence of the regression results were showed that F = 12.915, the control variables of research institutions of academic teams in the Industry-University-Research Institute collaboration in the interpretation of the Core Competitiveness level of 3.2 percent （R^2=0.032）. Model 2--6 Analysis of the independent variable impact on Core Competitiveness of academic team （R^2=0.62， $p<0.01$）. The explanatory power has increased 58.8 percent， The intensity of interpretation has increased significantly. This fully shows that the Industry-University-Research Institute collaboration network has a significant positive impact on the core competitiveness of academic teams. Hypothesis 1 is true.

In order to verify Hypothesis 2 of this study, six regression models are set up to verify the influence of Industry-University-Research Institute collaboration network on explorative learning and exploitative learning.The regression results showed that, Model 1 Analysis of the control variables impact on Explorative learning , F = 9.161 （R^2=0.023）. Model 2--6 Analysis of the independent variable impact on Explorative learning.The

explanatory power has increased 43.1 percent， The intensity of interpretation has increased significantly. This fully shows that the Industry-University-Research Institute collaboration network has a significant positive impact on the Explorative learnings.

To further verify Hypothesis 2 of this study, six regression models are set up to verify the influence of Industry-University-Research Institute collaboration network on exploitative learning.The regression results showed that, Model 1 Analysis of the control variables impact on Exploitative Learning, F = 38.743, （R^2=0.089）. Model 2--6 Analysis of the independent variable impact on Exploitative Learning.The explanatory power has increased 30.6 percent， The intensity of interpretation has increased significantly. This fully shows that the Industry-University-Research Institute collaboration network has a significant positive impact on the Exploitative Learning.

In conclusion, it can be found that the Industry-University-Research Institute cooperative network has a significant positive impact on organizational learning behavior.Hypothesis 2 is true.

In order to verify Hypothesis 3 of this study, four regression models are set up to verify the influence of organizational learning behavior on the core competitiveness of scientific research teams.The regression results showed that, Model 1 Analysis of the control variables impact on Core Competitiveness of academic teams, F = 12.915, （R^2=0.032）. Model 2-4 Analysis of the Mediating Variable Organizational learning impact on Core Competitiveness of academic teams, The explanatory power has increased 69.2 percent， The intensity of interpretation has increased significantly. This fully shows that the Organizational learning has a significant positive impact on the core competitiveness

of academic teams. Hypothesis 3 is true.

Mediating effect test

In order to further test whether organizational learning has a mediating effect between the Industry-University-Research Institute collaboration network and the core competitiveness of academic teams, it is necessary to conduct a mediating effect test.According to Baron and Kenny (1986) 's idea of mediating effect test, 5 models are established to test whether organizational learning behavior plays a mediating role between the Industry-University-Research Institute collaboration network and the core competitiveness of academic teams.

Table 1 Mediating effect test of organizational learning

		Model1	Model2	Model 3	Model 4	Model 5
		Core Competitiveness	Explorative learning	Explorative learning	Core Competitiveness	Core Competitiveness
Control Variable						
Control Variable		0.041	0.029	0.238	0.027	0.036
Independent Variable and mediating variable						
A	Center of Position	0.203***	0.181***	0.141***	0.114***	0.093***
B	Connection Strength	0.183***	0.205***	0.034***	0.083**	0.111**
C	Network Size	0.311***	0.268***	0.358	0.179***	0.107***
D	Knowledge Distance	0.263***	0.163***	0.187***	0.183***	0.147***
F	Explorative learning				0.491***	0.397***
G	Exploitative Learning					0.273***
R^2		0.62***	0.454***	0.395***	0.752***	0.792***
F		128.1543***	65.45***	51.3285***	197.724***	212.404***

Note: *P Value ≤ 0.1;**P Value ≤ 0.05; ***P Value ≤ 0.01; N = 399

Source: Respondent's questionnaire

Result and Discussion

1. Four variables of the Industry-University-Research Institute collaboration network

This study confirms that four variables of the Industry-University-Research Institute collaboration network: the centrality of the research team's location, the strength of the connection between the research team and the enterprise, the size of the network, and the knowledge distance between the research team and the industry, all have a significant impact on the improvement of the core competitiveness of the research team in the process of participating in the Industry-University-Research Institute collaboration(Banal-Estanol A, Jofre-Bonet M, Lawson C. 2015) .

2. Organizational learning plays a partial mediating

This study confirms that organizational learning plays a partial mediating role between the IPR network and the core competitiveness in the process of collaboration between research teams and enterprises, which indicates that IPR network has an impact on the core competitiveness of academic teams through organizational learning.Organizational learning plays an intermediary role between the Industry-University-Research Institute collaboration network and the core competitiveness.This is because the Industry-University-Research Institute collaboration network will affect the amount of material and knowledge resources that the research team obtains from the network, and then affect the organizational learning of the research team, thus influencing its core competitiveness.

3. Explorative learning and Exploitative learning

This study also found that academic teams can improve their core competitiveness through explorative learning and exploitative learning in the collaboration between industry, university and research. With the goal of creating new knowledge, explorative

learning focuses on the integration and learning of relevant resources in the industry for the explorative research of basic generic technologies and the scientific principles behind cutting-edge technologies (Ozcan P, Eisenhardt KM. 2009). Therefore, explorative learning belongs to the type of organizational learning in the upper link of the knowledge chain(Aguiar-Díaz I, Díaz-Díaz NL.2015).When to carry out explorative learning and research institutions of scientific research team, help to grasp the forefront of academic research in the related technology development trends and the latest research results, then can be targeted and research institutions of scientific research team, concentrate on a new breakthrough in science, to open up new fields and interdisciplinary created new opportunities for development, which would be helpful to the construction of edge discipline and academic research level of ascension.

Management policy recommendations

Industry-University-Research Institute collaboration network's influence on the core competitiveness of the team is realized through organizational learning, embedded in the network, the innovation organization or team helps innovation resources provided by the integrated use of the parties, so as to promote organization to efficiently carry out organizational learning, so as to promote the performance of the organization(Paruchuri S. 2010).How to effectively manage and configure the network relationship with other organizations is the key to improve the learning ability and achieve good performance of innovative organizations or teams.

For the research team, it is necessary to make clear its own positioning and role in the process of participating in the Industry-University-Research Institute collaboration, and

make full use of the network relationship with the industry to serve for the organization's learning and create conditions for enhancing the core competitiveness.

Conclusion

This paper builds and verifies the theoretical model of "Industry-University-Research Institute collaboration network-organizational learning-core competitiveness" from the perspective of research teams of academic institutions, and makes some useful empirical explorations to open the "black box" between the Industry-University-Research Institute collaboration network and the core competitiveness of organizations.

In the future, we can consider collecting data in a larger scope to build an overall collaboration network. From the perspective of the overall network, we can pay attention to the interaction between members of the IUR collaboration network and the operation of the overall network.

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