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## Organizational innovation and organizational performance: A empirical study based network and knowledge's perspective

Liang Wenguang, Xu Yufa\*

School of Business Administration, South China University of Technology,  
Guangzhou, 510640, (CHINA)  
E-mail: 13422118275@139.com

### ABSTRACT

The purpose of this study is to evaluate the interrelationships between network structure, knowledge management, organizational innovation and organizational performance. A 56-item survey questionnaire was developed and 138 manufacturing and service firms in China were selected as the samples of this study. The results conclude: the emphasis of network structure is associated with the levels of knowledge management and organizational innovation; the emphasis of knowledge management is associated with the levels of organizational innovation; and organizational innovation may enhance organizational performance. Since very limited studies have concentrated on above issues, the results of this study can provide important references to academicians and practitioners in the developing of organizational innovation and enhancing organizational performance.

### KEYWORDS

Network structure; Knowledge management; Organizational innovation; Organizational performance.



## INTRODUCTION

With the economic globalization and the development of science and technology, China's economy has gone through 30 years' rapid development. The business environment for Chinese enterprises has changed sharply because of the reform and opening up, on the one hand, the competition has increased, on the other hand, cooperation. The increased competition makes the enterprise face threats. The innovation network resulting from the prevalent form of cooperation has created many opportunities for the enterprise. The trend of the development of the knowledge economy and the modern science and technology, economic globalization and the modern information technology revolution consist of the era background of the form and development of the enterprise innovation network. Therefore, the research on the innovation of the enterprise from the Angle of network problem is of important theory value and the positive practical significance.

In the context of the developing of enterprise organization network and enterprise network innovation paradigm, the research topic how network structure characteristics affects the enterprise innovation and enterprise performance is of great interest. This paper thoroughly explores the following research questions one by one : (1)How does the network structure characteristics affect the knowledge management, organizational innovation and organizational performance? (2) how does the knowledge management affect the organizational innovation and the organizational performance? (3) How does the organizational innovation affect the organization performance?

## THEORETICAL BACKGROUNDS AND HYPOTHESIS

Enterprises improved innovation performance via using the network capability is the manifestation of the enterprise competitive advantage theory which is built based on the network in this study. Through the theory of enterprise competitive advantage based on network, we can get to know clearly about the inner mechanism of network capability's positive impact on the innovation performance. The enterprise innovation performance's improvement is the result of a better use of network capabilities and the configuration of network resources; it is the manifestation of the enterprises gaining competitive advantage through the network resources and network ability. As the characterization of economic rent competitive advantage :network rent, which will eventually by improving the innovation, and becomes the leader of the market and introduces more new products, reduces operational costs and expand the customer base, finally, it will increase the profits for specific implementation. Network capability is the important link in the logic chain, and is complementary for the other ability of the enterprise, also, it utilize and realize the value of the enterprise internal and external resources, winning the competitive advantage for the enterprise.

The network provides a "common identity for members of the network. Common identity" can not only reduce the communication cost, but also establish explicit and tacit coordination rules, enabling the members in the organization to create, merger and transfer knowledge more effectively (Kogut, 1988)<sup>[1]</sup>.

The flexibility of the innovation network makes for the absorption of tacit knowledge. The cooperative relations in the innovation network mainly consists of two dimensions: vertical relationship and horizontal relationship. The horizontal relationship enable the enterprise encounter a variety of ideas and knowledge resources, and the vertical relationship can deepen professional knowledge, giving the innovation network stronger ability of knowledge acquisition than the hierarchical organization.

Facing fierce competition and uncertain competitive environment, the enterprises innovation has become more and more important. In the research in field of enterprise innovation , the empirical research of many scholars has supported that enterprise innovation has positive impact on performance .the research of Damanpour and Evan (1984)<sup>[2]</sup> points out that the performance of organizations with the management and technology innovation is higher than others .Yamin, Gunasekaran and Mavando (1999)<sup>[3]</sup>,while discussing the relationship between innovation indicators and performance , have also found that the enterprise innovation(management innovation and technological innovation) is associated with performance significantly.

Knowledge is the foundation of innovation, while continuous innovation is the power of enterprise's sustainable development. Enterprises will succeed in global competition environment only when they can integrate related resources, innovate fast.The ability to integrate relevant resources and to innovate comes from the knowledge (Teece and Pisano, 1994)<sup>[4]</sup>. Different scholars discusses the impact on enterprise knowledge management from different angles. Teece, et al.(1997)<sup>[5]</sup>emphasis that knowledge is more and more important in the competitive environment ,based on the Dynamic capability (Dynamic capability). it is very important for an organization to capture and integrate external knowledge more effective than other enterprise, then produce the concept of innovation, and to utilize internal integration to improve the execution efficiency of new product commercialization, and to develop new products more and faster. This means that the knowledge integration provides product innovation, or the innovation of the technology for the production of products, or the opportunity for management innovation.

Accordingly, the following hypothesis is advanced:

- H1: Network structure is positively relative knowledge management
- H2: Network structure is a function of its organizational innovation
- H3: Network structure will significantly impact on i organizational performance
- H4: Knowledge management is a function of its organizational innovation
- H5: Knowledge management will significantly impact on organizational performance
- H6: Organizational innovation will significantly impact organizational performance

## METHODS

### Sample

This study employed a questionnaire survey methodology and used Structural Equation Modeling (SEM) to analyze data. We received responses from 168 of 600 firms, a response rate of 28.0 percent. Of the 168 returned questionnaires, 12 were excluded because they did not meet all sampling criteria and 18 were excluded because of incomplete answers, leaving 138 usable responses. Hence, our usable response rate was approximately 23.0 percent.

The sample provided a variety of firm characteristics. Years established for the firm were as follows:  $\leq 6$ , 46.6 percent; 7-12, 22.4 percent; 13-20, 14.3 percent;  $\geq 21$ , 16.7 percent. The firms represented in the sample varied in size, as measured by number of employees ( $\leq 100$ , 31.7 percent; 101-200, 18.0 percent; 201-300, 7.5 percent; 301-500, 4.3 percent; 501-1000, 3.7 percent; 1001-2000, 4.3 percent;  $\geq 2000$ , 30.5 percent). The firm spent their revenue on R&D ( $\leq 0.9$  percent, 14.2 percent; 1.0-2.9 percent, 30.4 percent; 3-4.9 percent, 17.4 percent;  $\geq 5.0$  percent, 38.0 percent).

### Reliability and validity

We took several steps to ensure data validity and reliability. Firstly, The initial questionnaire was further developed and refined through a process of in-depth interviews and testing, which included selective second visits, extensive debriefing and extensive pre-testing of the questionnaire. Second, in the instrument itself, we used previously validated measurement items wherever possible to help ensure the validity of our measures. Finally, all of our constructs achieved Cronbach's  $\alpha$  of 0.74 or higher, indicating strong internal consistency (Table 1).

### Measures

The Network structure was measured by items used in the study by Ronald(1992)<sup>[6]</sup>. This is a multi-item scale comprising three-constructs: network density is measured by eight-item scale; network centrality is measured by one-item scale; network intensity is measured by eight-item scale. Confirmatory factor analyses (CFA) utilizing covariance matrices were utilized to assess the unidimensionality of the scales. Results of a second-order CFA suggest that the hypothesized model fits the data well (GFI=0.958, CFI=0.954, NFI=0.925,  $\chi^2(9)=21.740$ , RMR=0.030, RMSEA=0.088).

The knowledge management was measured by items used in the study by Nonaka and Takeuchi(1995)<sup>[7]</sup> and Leonard-Barton(1995)<sup>[8]</sup>. This is a multi-item scale comprising three-constructs: knowledge acquire is measured by five-item scale; knowledge storage is measured by four-item scale; knowledge creation is measured by six-item scale. Confirmatory factor analyses (CFA) utilizing covariance matrices were utilized to assess the unidimensionality of the scales. Results of a second-order CFA suggest that the hypothesized model fits the data well (GFI=0.731, CFI=0.765, NFI=0.701,  $\chi^2(166)=570.404$ , RMR=0.080, RMSEA=0.088).

Organizational innovation was adapted from the scale developed by Damanpour(1991)<sup>[9]</sup>. The constructs was measured by means of multi-item scales comprising two-constructs: technology innovation is measured by a seven-item scale; management innovation is measured by eight-item scale. confirmatory factor analyses (CFA) utilizing covariance matrices were utilized to assess the unidimensionality of the scales. Results of a second-order CFA suggest that the hypothesized model fits the data well (GFI=0.849, CFI=0.865, NFI=0.832,  $\chi^2(89)=262.954$ , RMR=0.024, RMSEA=0.089).

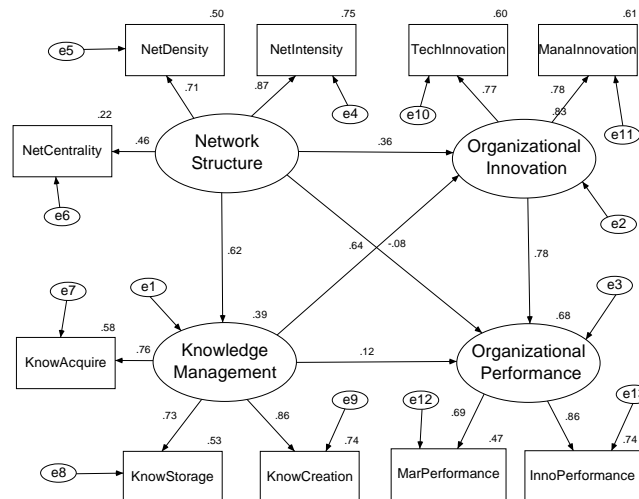
**Table1. Results of reliability test**

Variables	Reliability	Extraction
Network Structure	0.77	0.79
Network Density	0.75	0.66
Network Intensity	0.83	0.58
Network Centrality	0.89	0.72
Knowledge Management	0.87	0.76
Knowledge Acquire	0.78	0.61
Knowledge Storage	0.83	0.73
Knowledge Creation	0.85	0.63
Organizational Innovation	0.85	0.83
Management Innovation	0.92	0.68
Technology Innovation	0.85	0.79
Organizational Performance	0.74	0.67
Market Performance	0.85	0.62
Innovation Performance	0.89	0.74

**Table2. Parameter estimates for causal paths**

Structural path	Coefficient	T-value	P-value	Parameter	Hypothesis	Results
Network Structure→ Knowledge Management	0.62***	5.786	0.000	$\gamma_1$	H1	Support
Network Structure→ Organizational Innovation	0.36***	3.442	0.000	$\gamma_2$	H2	Support
Network Structure→ Innovation Performance	-0.08	0.610	0.249	$\gamma_3$	H3	Not Support
Knowledge Management→ Organizational Innovation	0.64***	5.666	0.000	$\beta_1$	H4	Support
Knowledge Management→ Innovation Performance	0.12	0.863	0.564	$\beta_2$	H5	Not Support
Organizational Innovation →Innovation Performance	0.78***	6.667	0.000	$\beta_3$	H6	Support

Note: The route coefficient is standardization value.



**Fig1. The overall theory model and parameter**

Organizational performance and Huselid et al.(1997)<sup>[11]</sup>. The constructs were measured by means of multi-item scales comprising two-constructs: market performance is measured by a four-item scale; innovation performance is measured by a six-item scale. Confirmatory factor analyses (CFA) utilizing covariance matrices were utilized to assess the unidimensionality of the scales. Results of a second-order CFA suggest that the hypothesized model fits the data well (GFI=0.854, CFI=0.899, NFI=0.835,  $\chi^2(34) = 126.358$ , RMR=0.049, RMSEA=0.085).

**ANALYSIS AND RESULTS**

A structural equation modeling approach was applied to the data using the AMOS version 17.0 software package. Fit indices suggest that the model fits the data well:  $\chi^2=62.434$ ; d.f.=29; GFI=0.925; TLI=0.928; NFI=0.918; CFI=0.925; IFI=0.955; RMR=0.024; RMSEA=0.085;  $\chi^2/df=2.153$ .

Figure 1 shows the overall theory model and parameter. The parameter estimates for the causal paths are shown in Table 2. The parameter estimates for the structural paths  $\gamma_1$ ,  $\gamma_2$ ,  $\beta_1$  and  $\beta_3$  are all positive and statistically significant, which is consistent with the effects posited in the hypotheses H1, H2, H4 and H6. The results provided that Hypothesis H3 and H5 are not significant.

**CONCLUSION AND DISCUSSIONS**

This article set up a bridge of the link among enterprise network theory, organizational learning theory, the knowledge management theory and innovation theory by studying the relationship among the network structure characteristic, organizational learning, knowledge management, enterprise innovation and enterprise performance. It also extends and deepens the related theory, the main theoretical contributions of this article include the following aspects:

(1) This study breaks the traditional research methods with the perspective of the entire enterprise network, by analyzing the access mechanism of enterprise knowledge resources in the network, the study explains how enterprises obtain and maintain competitive advantage in the network from the angle of view of a single enterprise. This research is the further extension and the perfection of the related research on how to innovate in the network environment.

(2) This article verifies the theories about the characteristics of network structure and discusses the theories further. In order to solve the riddle of enterprise how to innovate under the network environment, this paper tries to open the black box of the mechanism of the characteristics of network structure, conduct a normative analysis and empirical research on the mechanism of characteristics of network structure's impact on the enterprise innovation and enterprise performance. The

study confirmed the positive correlation between the network structure characteristics and enterprise innovation, and further clarified the influence mechanism of the dimensions of network structure characteristics on enterprise innovation, and explained the mechanism of the network structural characteristics affecting the enterprise innovation and enterprise performance more complete and clearly, providing theoretical support and guidance for the cultivation, maintain and management of the enterprise innovation ability in the network.

(3) This article perfects the knowledge management theory through theoretical construction, and constructs the measure scale of knowledge management from the knowledge acquisition, knowledge storage, knowledge absorption and knowledge creation four aspects by exploratory factor analysis and confirmatory factor analysis on the basis of literature study and exploratory case study, and further combine knowledge management into the framework of innovation analysis in the network. The empirical research shows that knowledge management has an important influence on the innovation of the enterprises in the network environment.

(4) This study confirmed the important role of enterprise innovation in enterprise performance. Enterprise innovation is the intermediary variable between network structure and corporate performance, enterprise innovation is the intermediary variable between organizational learning and enterprise performance, enterprise innovation is the intermediary variable between knowledge management and enterprise performance. Therefore, if the enterprises want to improve enterprise performance through the network structure characteristic, organizational learning and knowledge management, they must attach great importance to the important role enterprise innovation plays in the enterprises.

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