

# The Influence of Boundary-spanning Search on Organizational Ambidexterity Capacity based on the Perspective of Innovation Capability Structure

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## Abstract

**This paper analyzes the boundary-spanning search behavior of Chinese enterprises from the perspective of organizational-technical dimension and reveals the impact that the strategies of boundary-spanning search (breadth and depth) have on the structure of bi-variate capacity. At the mean time, we also examined the influence that the absorptive capacity which includes potential aspect and reality aspect have on the structure of bi-variate capacity. The results show that the breadth of boundary-spanning search has a significant positive effect on the balance and interaction of the bi-variate capabilities. The depth of search has a significant positive effect on the balance of bi-variate capabilities, however the positive effect on the interaction of bi-variate capabilities has not been proved. The interactive aspect of the two capacities also have a significant positive effect on the balance and interaction of the bi-variate capabilities. We also added the absorptive capacity as the moderate variable which turned out to be a positive effect.**

## Keywords

**Boundary-spanning Search; Exploitative Capability; Exploratory Capability; Innovation Capability Structure.**

## 1. Introduction

In a dynamic competitive environment, companies need to take into account the dual capabilities of existing knowledge development and potential knowledge exploration to adapt to the discontinuous changes in technology and market environment[1]. However, due to the differences in the organizational structure and mode of thinking required for the two types of activities, the relationship between the two is universal, continuous and nested, which leads to the organization's trade-offs[2]. Therefore, how to integrate internal and external innovation resources and enhance dual-element capacity has become the focus of concern for business managers.

In order to solve this dilemma, scholars first realize the structure, situation or leadership in the organization, and strive to achieve the internal balance of dual ability[3]. Boundary-spanning search has also become a logical starting point for identifying, acquiring and integrating external resources[4]. However, the existing research on the relationship between boundary-spanning search and organizational ability mostly stays at the theoretical level, for “whether boundary-spanning search can effectively improve the dual ability of the organization” and “whether the boundary-spanning search of different dimensions has different influence on the dual-element ability”, which has not been answered, especially it is lack of theoretical and empirical tests in the Chinese context.

Based on this, this paper uses the enterprise samples from Guangdong, Shandong and other regions to deconstruct the boundary-spanning search behavior of Chinese enterprises from the organizational-technical perspective based on the perspective of innovation capability structure, and explores the impact mechanism of boundary-spanning search behaviors on organizational dual-element capabilities in emerging markets. And the relationship between exploration and exploitative capabilities. The conclusion of the study is not only a deep analysis of the collaborative

innovation behavior in the real situation, but also reveals the key issues of the difference between the competence structure and the target orientation of the cooperation subject. It also has important theoretical and practical significance.

## 2. Theoretical basis

The ability structure of innovation is a capability status of the cooperation subject in different links of the technology supply chain by participating in different types of scientific and technological activities [5]. Achieving boundary-spanning search target and content matching depends not only on the organization's own technical capabilities, but also on the constraints of the industrial environment and technology development stage.

However, the differences in organizational structure and mode of thinking required by dual-element capabilities present a general, continuous and nested tension relationship between the two capabilities, causing infinite competition for limited resources by the two types of innovation activities, which ultimately leads to organizational trade-offs. Boundary-spanning search provides a solution to alleviate corporate binary tension. The boundary-spanning search strategy is divided into two aspects: breadth and depth. These two aspects have an impact on the dual-capacity structure (balance and interaction). In addition, this paper introduces the absorptive capacity (potential and reality) as a control variable, indicating that the absorptive capacity plays a significant moderate effect in the relationship between boundary-spanning search and binary structure.

## 3. Research hypothesis

### 3.1 The relationship between boundary-spanning search breadth and bi-variate capacity

Boundary-spanning search breadth refers to the extent to which companies connect with external knowledge sources when searching for new and old knowledge inside and outside the organizational boundaries and technical boundaries. It also refers to the diversity of external channels, and usually uses the number of knowledge sources to explain [6]. These sources of knowledge usually include universities, research institutes, competitors, suppliers, and users [7]. The dual ability of an enterprise usually refers to the exploratory and exploitative capabilities of the enterprise. The essence of exploratory ability is to use new means to conduct production and experiment, on the other hand, the exploitative ability is to improve and expand the existing capabilities of the enterprise, aiming at meeting the needs of existing customers or markets [8].

When an enterprise establishes extensive contacts with external knowledge sources across organizational boundaries and technical boundaries, externally rich innovation resources will supplement and improve the limited resources of the enterprise, greatly alleviating the resource competition for both exploration and exploitation activities, reducing unbalanced state of two capabilities within an enterprise. Extensive contact with the outside world has enabled the company to further develop and improve existing capabilities, supplement new knowledge, master the trends of technology development and changes in consumer preferences, so that provide a technical knowledge base for the next step of innovation activities.

H1a Boundary-spanning search breadth has a significant positive impact on the balance of bi-variate capacities.

H1b Boundary-spanning search breadth has a significant positive impact on the interaction of bi-variate capacities.

### 3.2 The relationship between boundary-spanning search depth and bi-variate capacity

Boundary-spanning search depth refers to the level of cooperation with external knowledge sources when conducting boundary-spanning search [9]. Increasing the depth or intensity of boundary-spanning search can strengthen the understanding of existing knowledge, improve the technical capabilities of enterprises, and promote the integration of old knowledge and new

knowledge[10].Enterprises can balance exploitative and exploratory capabilities through the integration of new and old knowledge inside and outside[11].In addition, deep search helps enterprises to enhance the absorption capacity of enterprises, promote the digestion and utilization of external complex knowledge, and enhance the absorption of corporate knowledge[12].

H2a Boundary-spanning search depth has a significant positive impact on the balance of bi-variate capacities.

H2b Boundary-spanning search depth has a significant positive impact on the interaction of bi-variate capacities.

### **3.3 The relationship between boundary-spanning search strategy interaction and bi-variate capacity**

Enterprises through extensive search for knowledge have obtained rich heterogeneous resources, alleviating the dual tension caused by the competition of resources, and the competition for resources between exploitative and exploratory capabilities is weakened. Through close contact with certain types of knowledge sources, enterprises can strengthen their development capabilities. Also, through deep exploration of existing knowledge, companies can clearly understand the functions of existing knowledge and resources, so that companies can reconfigure existing knowledge and resources based on new discoveries in products and markets [13].

H3a the interaction between depth and breadth of boundary-spanning search has a significant positive impact on the balance of bi-variate capacities

H3b the interaction between depth and breadth of boundary-spanning search has a significant positive impact on the interaction of bi-variate capacities

### **3.4 The impact of absorptive capacity on boundary-spanning search strategies and bi-variate capacity**

The level of corporate screening, assessment and use of external source technologies depends on the absorptive capacity of the firm [14].The model proposed by Zahra and George, in addition to the distinction into two components or dimensions, namely, the Potential Absorptive Capacity, which covers the skills of acquisition and assimilation, and the Realized Absorptive Capacity, which includes the capabilities of transformation and exploitation of knowledge [15].

Through the transformation of knowledge, enterprises can deepen their understanding of commodity commercialization, coordinate and reorganize old and new knowledge and play a synergistic role with the core competitiveness of enterprises, and then enable enterprises to apply new resource allocations to new ones through the development of realized absorptive capacity. The combination of realized absorptive capabilities and deep search strategies enables companies to manage and leverage the ever-increasing diversity of knowledge and information, increase the utilization of new knowledge that is absorbed, and enable companies to identify and utilize more successful innovation opportunities to create more value of products[16].

H4a Potential absorption capacity has a significant moderate effect on the balance between the breadth of boundary-spanning search and the bi-variate capacities

H4b Realized absorptive capacity has a significant moderate effect on the balance between the breadth of boundary-spanning search and the bi-variate capacities

The relationship between variables is shown in the figure 1.

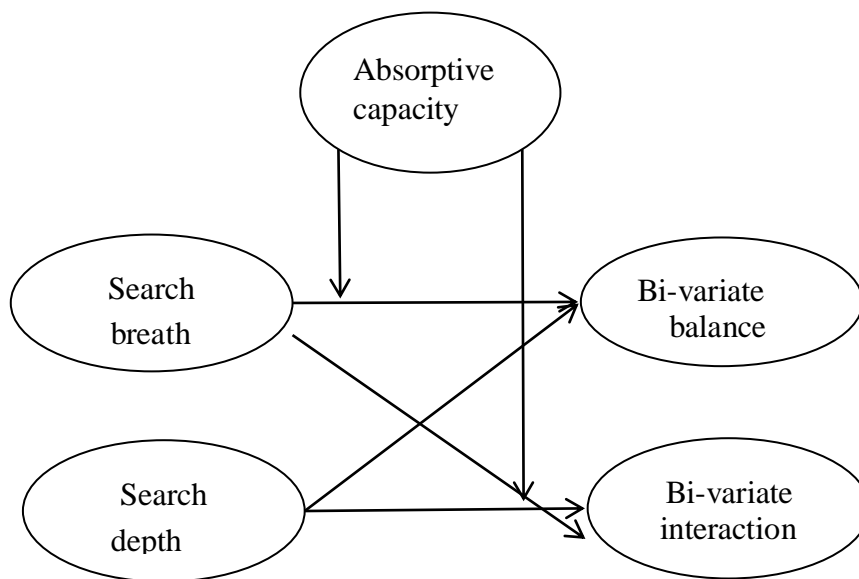


Fig. 1 The relationship between variables

#### 4. Research sample

This study uses questionnaires to collect data. In order to obtain more accurate and reliable basic data, the following criteria were set when selecting samples: First, the sample comes from the region where the science and technology economy is relatively developed and has the basis of cooperation between industry, university and research institute. Second, the enterprise belongs to the manufacturing industry engaged in certain research and development activities. Third, the person must have more than three years of R&D management experience. Based on this, this paper chooses Guangdong, Shandong and Zhejiang as sample areas. 1, 934 questionnaires were put in the questionnaire, and 432 questionnaires were collected, of which 338 were valid questionnaires, and the effective recovery rate was 17.48%. The common method deviation problem of sample data is within an acceptable range and has high reliability and validity.

#### 5. Mensuration

For the organization of dual-element ability, this paper draws on Jansen and Sidhu's scale, combines field investigations with expert advice, and adopts three items such as “the company often finds and utilizes potential opportunities in the market” to measure exploration, and adopts three items such as “the company regularly improves existing products or services” to measure exploitation.

For boulder-spinning search, this paper adopts nine items such as “the company often conducts joint talent training activities with universities and research institutions” to measure boulder-spinning search strategy. In addition, the paper also uses enterprise size, enterprise age, industry category and regional category as control variables.

#### 6. Results

In this paper, the initial structural equations are analyzed and tested by AMOS16.0. The results are shown in Table 1.

Table 1 Summary of hierarchical regression analysis results

Dependent variable	Bi-variate capacity balance				Bi-variate capacity interaction			
	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8
Constant term								

	2.89***	2.796***	2.704***	2.631***	2.714***	2.313***	2.285***	2.245***
Control variable								
Enterprise size	-0.102	-0.11	-0.124	-0.133	-0.112	-0.124	-0.095	-0.088
Enterprise age	0.15	0.178	0.162	0.159	0.162	0.184	0.153	0.108
Industry category	0.134*	0.157*	0.148*	0.116*	0.143*	0.147*	0.141*	0.137*
Regional category	0.053**	0.064**	0.066**	0.068**	0.066**	0.07**	0.084**	0.094**
Independent variable								
Search breadth		0.279**	0.274**	0.262**		0.247**	0.249**	0.254**
Search depth		0.122**	0.126**	0.126**		-0.134**	-0.122**	-0.117**
Search breadth*Search depth			0.223**	0.218**			0.137**	0.142**
Search breadth2				-0.104**				-0.096**
Search depth2				-0.024*				-0.021*
Moderator								
PACAP				0.245***				
RACAP								0.231**
Cross term								
PACAP×Search breadth				0.186*				
RACAP×Search depth								0.143*
R2	0.071	0.525	0.537	0.542	0.073	0.654	0.660	0.676
ΔR2	--	0.454**	0.012**	0.005**	--	0.112***	0.006***	0.016***
Adjusted R2	0.069	0.511	0.516	0.528	0.064	0.641	0.645	0.650
F	10.448**	15.732**	15.743**	16.073**	10.368**	17.507**	17.507**	17.535**

\*\*\* indicates  $p < 0.001$ , \*\* indicates  $p < 0.01$ , and \* indicates  $p < 0.05$ .

From the results of the hierarchical regression analysis in Table 1, the path coefficients of the exploration breadth to the bi-variate capacity balance are 0.279, 0.274, and 0.262 in Model 2, Model 3, and Model 4 respectively, and had high significance ( $p < 0.01$ ). The path coefficients for exploring breadth and bi-variate capacity interactions were 0.247, 0.249, and 0.254 in Model 6, Model 7, and Model 8 respectively, and also had higher significance ( $p < 0.01$ ). H1a and H1b are confirmed.

The path coefficient of searching depth to the bi-variate capacity balance balance is 0.122, 0.126 and 0.126 respectively in model 2, model 3 and model 4, and both have high significance ( $p < 0.01$ ). H2a are confirmed. However, the path coefficient of search depth and binary interaction was -0.134, -0.112 and -0.117, respectively, in model 6, model 7 and model 8, both of which were negative values and presented high significance ( $p < 0.01$ ). It shows that there is a negative correlation between the explore depth and bi-variate capacity interaction, thus H2b has not been confirmed.

The path coefficient of search breadth and search depth interaction and bi-variate capacity balance was 0.233 and 0.218 in model 3 and model 4 respectively, and both are significant ( $p < 0.01$ ), H3a is confirmed. The path coefficient of search breadth and search depth interaction and bi-variate capacity interaction was 0.137 and 0.142 in model 7 and model 8, respectively, and both were significant ( $P < 0.01$ ), H3b is confirmed.

The path coefficient of the potential absorption capacity and the cross-term search breadth to the bi-variate capacity balance was 0.186 ( $p < 0.05$ ), H4a is confirmed. The path coefficient of the potential absorption capacity and the cross-term search breadth to the bi-variate capacity interaction was 0.143 ( $p < 0.05$ ), H4b is confirmed.

## 7. Conclusion

The results show that the breadth of boundary-spanning search has a significant positive effect on the balance and interaction of the bi-variate capabilities. The depth of search has a significant positive effect on the balance of bi-variate capabilities, however the positive effect on the interaction of bi-variate capabilities has not been proved. The interactive aspect of the two capacities also have a significant positive effect on the balance and interaction of the bi-variate capabilities.

This study is more advanced than previous studies, existing researches focus on exploring the impact of boundary-spanning search behavior on exploitative capability and exploratory capability respectively [17], and fail to discuss the functional mechanism of boundary-spanning search strategy on bi-variate capabilities structure. In this paper, search strategies are divided into two types: depth and breadth, and the influence of depth and breadth of search on dual ability balance and interaction is introduced respectively to make up for the deficiency of previous studies. The absorptive capacity in this paper exists as a moderator, which is divided into two dimensions of potential absorptive capacity and realized absorptive capacity, and their respective regulatory effects on bi-variate capacity structure are discussed respectively, which enriches the theoretical basis of the moderate effects of absorptive capacity on enterprise innovation capacity.

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