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중국 중소기업의 국경간 검색과 동적역량이 비즈니스 혁신에 미치는 영향에 관한 연구

Cross-border Search and Dynamic Capability on Business Model Innovation of SMEs in China

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요약 최근 몇 년 동안 중소기업의 비즈니스 혁신 모델은 주목 받는 연구 주제로 부상하였으며, 중소기업의 혁신과 발전을 촉진하고 경제적 전환과 성장을 촉진하는 중요한 이유로 인식되고 있다. 본 논문은 중국 중소기업의 국경간 검색 및 동적 역량이 기업 비즈니스 혁신 모델에 미치는 영향을 분석하고 있다. 영향 요인과 관련하여 연구모형을 수립하고 설문 조사를 통하여 관련 데이터를 수집하였다. 연구 결과, 중국 중소기업의 국경간 검색과 동적 역량이 중소기업 비즈니스 혁신 모델에 긍정적인 영향을 미치는 것으로 나타났다. 또한 동적 역량이 국경간 검색과 기업 비즈니스 혁신 모델 사이에서 중개 효과가 있음을 확인하였다. 본 연구 결과를 토대로 중국 중소기업의 비즈니스 모델 혁신에 일정한 시사점을 제공하였다.

주요어: 국경간 검색, 동적역량, 비즈니스혁신 모델, 중국 중소기업

Abstract: In recent years, the business model innovation of small and medium-sized enterprises has become a hot research issue, and it is also regarded as an important hot issue to promote the transformation and development of small and medium-sized enterprises and promote economic transformation and development. In this study, we analyzes the influence of cross-border search and dynamic capabilities of small and medium-sized enterprises in China on business model innovation. The model of influencing factors is established. After collecting relevant data through questionnaire survey, the model is verified and analyzed. It is verified that for small and medium-sized enterprises in China, dynamic capability and cross-border search have a positive and significant impact on enterprise business model innovation, and dynamic capability plays an intermediary role between cross-border search and enterprise business model innovation. Through this paper, we can give some enlightenment to the business model innovation of small and medium-sized enterprises in China.

Key words : Cross-border Search, Dynamic Capability, Business Model Innovation, Small and Medium-sized Enterprises in China.

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1. Introduction

Schumacher E.F, a famous British economist, fully affirmed the value of small and medium-sized enterprises in his book *Small is Beautiful* published in 1973[1]. Nowadays, small and medium-sized enterprises have accounted for more than 90% of the global enterprises. They are an important force to promote the recovery of the world economy and play an irreplaceable role in increasing employment, stimulating economic growth and promoting scientific and technological innovation. Supporting the development of small and medium-sized enterprises has become the consensus of governments all over the world.

Small and medium-sized enterprises in China have ensured the stability and competitiveness of China's industrial chain and eased the employment pressure. However, a sample survey shows that the average life expectancy of small and medium-sized enterprises in China is only 2.5 years; In the United States and Japan, the average life expectancy of SMEs is 8.2 years and 12.5 years respectively. Therefore, it is very important to study small and medium-sized enterprises and ensure their stable, healthy and sustainable development.

Academic circles believe that business model innovation can reshape the industry, generate new value growth points, and even help enterprises surpass their competitors[2][3]. Business model innovation can meet the diverse personal needs of customers in a fast and high-quality way[4]; It can also give enterprises a new competitive advantage by recreating resource transactions[5]. In today's highly personalized demand and increasingly fierce competition, business model innovation is often more important than simply pursuing product innovation and technological innovation. Therefore, it is very important to study the innovation mechanism of small and medium-sized enterprises' business model and promote the innovation of small and

medium-sized enterprises' business model to enhance their competitive advantage and ensure their sustainable development.

The innovation of business model shows that enterprises seize resources under the guidance of external demand, thus turning ideas into reality[6] [7]. Resources are the key driving force for enterprises to realize business model innovation. Considering the technical ability and resource limitation of small and medium-sized enterprises, it is often difficult to succeed in independent innovation activities without seeking external resources. Therefore, it is very important for small and medium-sized enterprises to carry out business model innovation by breaking the boundaries of enterprises and obtaining external information, technology and knowledge. As far as small and medium-sized enterprises are concerned, cross-border search can promote them to acquire external heterogeneous knowledge, break the limitation of resource endowment and promote enterprises to reform their existing business models[8].

Both theory and practice have proved that business model innovation needs not only external resources, but also the ability of enterprises to perceive and identify market opportunities and apply valuable external knowledge integration to business purposes, that is, enterprises need dynamic capabilities. Cross-border search can bring external heterogeneous resources to enterprises, and dynamic capability, as the management control ability of enterprises, plays an important role in the connection between cross-border search and business model innovation. Therefore, it is of theoretical and practical significance to study the influence mechanism of cross-border search on business model innovation of SMEs, introduce dynamic capabilities and study its intermediary effect.

Relevant scholars have conducted a series of research on business model innovation and achieved

some results. However, the existing empirical research on business model innovation mostly focuses on innovative enterprises, platform enterprises and listed enterprises, ignoring a large number of ordinary small and medium-sized enterprises, which is not universally applicable.

In view of this, this study takes small and medium-sized enterprises in China as the research object, constructs a research model of business model innovation of small and medium-sized enterprises, discusses the influence of cross-border search and dynamic capability on business model innovation of small and medium-sized enterprises, and proves the choice of variables through empirical and questionnaire research. This study hopes to expand the existing research on business model innovation and provide positive theoretical guidance for enterprise business model innovation practice.

II. Literature review and research hypothesis

1. Cross-border search

Cross-border search originates from the theory of organizational search, which is an information gathering process for organizations to solve problems or find opportunities in an uncertain environment[9]. The existing concept of cross-border search mainly comes from the research of Rosenkopf and Nerkar(2001), Katila and Ahuja(2002). Rosenkopf and Nerkar put forward the concept of "cross-border search" in 2001, which is defined as an external search for heterogeneous knowledge across organizational boundaries and technological boundaries[10]. Later, Katila and Ahuja(2002) applied the concept of cross-border search to the field of organizational decision-making and innovation, and thought that cross-border search was an activity that organizations creatively integrated all kinds of knowledge from different external sources to solve problems in the process of innovation[11]. On the

basis of the existing literature, this study defines the cross-border search of small and medium-sized enterprises as the search activities of technical knowledge and market knowledge carried out by small and medium-sized enterprises across their own cognitive boundaries and organizational boundaries.

At present, the measurement dimension of cross-border search focuses on two methods, one is from technical knowledge search and market knowledge search, the other is from the width and depth of search. On the basis of the existing literature, this study integrates two dimension division methods with the idea of Li Xiaoli (2022)[12], and measures cross-border search from two perspectives: technical knowledge search and market knowledge search width. When setting the scale, both depth and breadth are taken into account, and the depth, breadth, market knowledge search and market knowledge search width are measured respectively.

2. Dynamic capability

Dynamic competence is evolved from the resource-based view and the core competence theory[13]. Teece et al. (1997) defined dynamic capability as the ability of an enterprise to integrate, construct and reorganize internal and external resources to adapt to a rapidly changing environment, which comes from process, potential and path[14]. Delmas (2002) defines dynamic capability as the ability of enterprises to deeply integrate and distribute the resources they have in order to adapt to the changing market environment[15]. This study agrees with Teece and other people's point of view, and combined with the existing literature, thinks that the dynamic ability of small and medium-sized enterprises refers to the ability of small and medium-sized enterprises to constantly change their own practices and adapt to environmental changes by acquiring, integrating and utilizing internal and external resources.

On the basis of concept definition, Teece and Helfat (2007) further defined three capability elements of dynamic capability on the microscopic basis of "process, potential and path", namely, the ability to perceive opportunities and threats, the ability to grasp opportunities and the ability to reconfigure the tangible and intangible assets of enterprises[16]. Eisenhardt & Martin (2000) divides dynamic capabilities into resource integration capabilities, resource reconstruction capabilities, and resource acquisition and release capabilities[17]. Jiao Hao (2010) divided the dynamic capability of an enterprise into four dimensions: opportunity identification capability, integration and reconstruction capability, technical flexibility capability and organizational flexibility capability[18]. Zheng Shuli (2017) divided the dynamic capability into three dimensions after combing the above literature: Opportunities Sensing Capability, organizational flexibility capability and resource Integrating Capability[19]. This study agrees with the views of the above scholars, and draws lessons from Zheng Shuli's (2017) classification method, and divides the dynamic capabilities of SMEs into three dimensions: opportunity perception, organizational flexibility and resource integration.

3. Business model innovation

Existing scholars have different definitions of the concept of business model innovation. Mitchell and Coles(2004) believe that business model innovation refers to the substitution of business model, that is, the process of providing customers and end users with products or services that were not available before and developing these new substitutes[20]. Zott and Amit (2010) proposed that an organization can innovate its business model by reforming its existing operating model or creating new operating model based on the integration of its internal and external resources[21]. Liu Jianji (2018) refers to the viewpoint of Zott and Amit(2010) system integration,

and thinks that business model innovation is the improvement or redesign of business ecosystem elements such as organizational structure, operational processes and business rules with partners such as suppliers, customers and third-party institutions[22]. This study draws on the views of Zott, Amit(2010) and Liu Jianji (2018), and holds that business model innovation refers to the systematic reform activities that SMEs can create new value by implementing the content, structure and governance of their existing business models.

Like the study of concepts, scholars have measured the dimensions of business model innovation from different angles according to their respective research purposes and research objects. Osterwald, Pigneur and Tucci(2005) argue that the business model consists of three core dimensions: value proposition, value creation and income model[23]. Iesen, Berman and Bell(2007) put forward that business model innovation includes three dimensions: industrial model innovation, profit model innovation and enterprise model innovation[24]. Zott and Amit(2007) divide business model innovation into two dimensions: efficiency-centered business model innovation and novelty-centered business model innovation[25]. Subsequently, Zott and Amit(2010) proposed that business model innovation is essentially to consider designing new business models to solve existing problems, and can be realized from three dimensions: business model content, business model structure and business model governance[26]. According to Zott and Amit(2010), this study divides the business model innovation of SMEs into three dimensions: business model content innovation, business model structure innovation and business model governance innovation.

4. Cross-border search impact on business model innovation

Cross-border search has a positive impact on

business model innovation. On the one hand, the cross-border search of technical knowledge enables organizations to grasp the technical trends of the industry in a timely and extensive manner, avoid falling into the "familiar trap", and then carry out technological innovation[27]. Cross-border search of technical knowledge also provides potential opportunities for enterprises to develop new products and services, thus giving birth to new business models[28]. On the other hand, cross-border search of market knowledge can enable enterprises to find potential emerging markets and marginal customer groups, and provide a stable customer group for new product development of enterprises. Cross-border search of market knowledge can also enable enterprises to grasp competitors' information and market competition situation in time, improve market crisis awareness and timely recognize the disadvantages and deficiencies of organizations in innovation, thus effectively improving the accuracy and effectiveness of enterprise innovation[29].

In addition, from the perspective of the width strategy of search, the greater the width of technical knowledge search, the more advantages enterprises have in collecting new technical information[30]. The wide search for technical knowledge can be explored in different technical fields and directions, which increases the diversity of technological evolution, thus increasing the opportunities for enterprises to discover new combinations of technical knowledge[31]. The wider the scope of market knowledge search, the more market demand information can be found. Processing and analyzing these information can predict the current customer demand, future market demand or potential customer demand [32], thus providing a favorable opportunity for enterprise business model innovation. From the depth strategy of search, the greater the depth of technical knowledge search, the more helpful it is for enterprises to improve the search efficiency and increase the quality of acquired external knowledge,

and it is also helpful for enterprises to establish and maintain a benign cooperative relationship with external partners[33]. Enterprises' in-depth search for market knowledge will help enterprises discover the potential needs of existing customers and emerging markets or dig out marginal market segments, which will prompt enterprises to find new ways to meet new needs, [34] thus promoting the innovation of business models of enterprises. Therefore, this study puts forward the following assumptions:

H1: Cross-border search has a significant impact on business model innovation.

5. the impact of dynamic capabilities on business model innovation

Most scholars have pointed out that dynamic capability can directly affect business model innovation. Dynamic capability enables enterprises to acquire and integrate resources better, which is conducive to the rapid integration of new knowledge and information with internal knowledge and information of enterprises, thus establishing the foundation for business model innovation[35]. Dynamic capabilities help enterprises to overcome operational practices and rigid capabilities, so that enterprises can dynamically coordinate, integrate and allocate resources, and then create new combinations that are difficult to be imitated by competitors[36]. Business model innovation is a strategic process based on high-level ability to cope with environmental changes. Dynamic ability is manifested in the competence of enterprises to dynamically adjust and reconstruct internal and external resources and capabilities according to environmental changes. It is a high-level ability that can change and reset the substantive ability of enterprises, and can help enterprises achieve the specific goals of business model innovation in the best way[37]. Dynamic capability improvement is the basis for enterprises to identify complex market information

and capture market opportunities, which can enable them to quickly and accurately locate customer needs, improve their own technical system and product ecology to meet the ever-changing market demand and avoid falling into the dilemma of innovators[38].

The integration ability in dynamic capability can improve the business operation process, break through the original operation convention and optimize the organizational structure by acquiring, integrating and optimizing the allocation of resources and capabilities, which is beneficial to enterprises to improve operational efficiency and implement innovative activities[39]. Therefore, this study puts forward the following assumptions:

H2: Dynamic capability has a significant impact on business model innovation.

6. The intermediary role of dynamic capabilities between cross-border search and business model innovation

Cross-border search is an effective way for enterprises to obtain external heterogeneous resources. However, whether the resources, information and knowledge obtained by enterprises through cross-border search can be effectively utilized, and then the business model innovation can be realized depends on whether enterprises can realize the effective development and value transformation of external resources through capacity reconstruction, that is, whether enterprises have corresponding dynamic capabilities. According to the theory of dynamic capability, cross-border search is the cognitive basis of dynamic capability, and external heterogeneous knowledge and information can effectively prompt enterprises to get rid of the dependence on the original path and pay attention to the reconstruction of their own resources and capabilities, so as to match internal resources with external needs, which will help enterprises to innovate. In addition, cross-border search for

resource heterogeneity obtained from the outside requires enterprises to have corresponding dynamic capabilities to absorb, internalize and integrate, so as to match the knowledge system and capability system within enterprises[40]. The success of business model innovation requires enterprises to institutionalize new market knowledge and technical knowledge to form systems, processes and structures within enterprises. Therefore, the ability of enterprises to perceive the environment, capture resources and reconstruct will have a direct impact on the choice and design of business models[41]. Both cross-border search for market knowledge and cross-border search for technical knowledge require enterprises to effectively manage external knowledge flows. As the ability of enterprises to perceive, identify external market opportunities and technical knowledge, and digest and integrate them, dynamic capabilities are the key capabilities for business model innovation[42].

By combing the above scholars' viewpoints, it can be concluded that enterprises can obtain heterogeneous resources through cross-border search, use dynamic capabilities to perceive and identify external opportunities, integrate internal and external resources, and internalize external resources into enterprise capabilities, thus improving or reconstructing the original business model. Therefore, this study puts forward the following assumptions:

H3: Dynamic capabilities play an intermediary role between cross-border search and business model innovation.

H4: Cross-border search plays a significant role in dynamic capability.

To sum up, this paper constructs a research model, as shown in the figure:

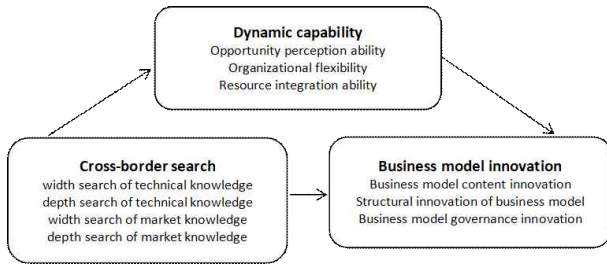


그림 1. 연구모형
 Figure 1. Research Model,

III. Research methods

1. Data collection

This study is aimed at medium-sized enterprises, small enterprises and micro-enterprises in China, and the selection of research objects is based on the Standard Provisions for Small and Medium-sized Enterprises formulated by the Ministry of Industry and Information Technology, the National Bureau of Statistics, the National Development and Reform Commission and the Ministry of Finance of China. During the investigation, the survey objects were screened in strict accordance with the Regulations, combined with indicators such as industry type, employees, operating income and total assets of enterprises.

In order to make the research results universally applicable to small and medium-sized enterprises, the industry types of small and medium-sized enterprises were fully considered when the questionnaire was distributed, and the survey objects covered wholesale, retail, industry, transportation, warehousing and postal services, accommodation and catering, software and information technology industries. At the same time, considering that business model innovation involves systematic

change activities, ordinary employees may know less. When the questionnaire was distributed, the interviewees were screened to some extent, and the proportion of management personnel exceeded 70%. The survey used online questionnaires, distributed 700 questionnaires and recovered 457 valid questionnaires.

2. Variable measurement

In this study, cross-border search is an independent variable, business model innovation is a dependent variable and dynamic capability is an intermediary variable. The variables were measured by Likert 5 scale, mainly using the mature scale in previous studies for reference. Cross-border search refers to Li Xiaoli's (2022) measurement scale, and is carried out from two perspectives: cross-border width search of technical knowledge, cross-border depth search of technical knowledge, cross-border width search of market knowledge and cross-border depth search of market knowledge. A total of 15 items are used for measurement. Based on the research results of Barret(2009), Jiao Hao (2008), Pavlou(2011) and Zheng Shuli (2008), the dynamic ability was measured from three aspects: opportunity perception ability, organizational flexibility ability and resource integration ability, with a total of 15 items. In the measurement of business model innovation, this paper draws lessons from the research results of Zott and Amit(2010) and Liu Tianli (2018), divides the business model innovation of SMEs into three dimensions: business model content innovation, business model structure innovation and business model governance innovation, and uses the scale of Liu Tianli (2018) to measure with 13 items.

표 1. 설문지 설계
 Table 1. Questionnaire structure

Variables	Dimensions	No.	Items	Sources
Boundary-s panning	KW	KW1	Search extensively through multiple channels for recent technology and product developments of other companies in the industry.	Sidhu,etc.(2007) Lin&Li(2013)

Search(BS)	KW	KW2	Extensive search through multiple channels for the latest technology trends in other industries where companies apply similar technologies.	LiXiaoli(2022)
		KW3	Extensively search for technological developments in other industries that are technically related to the enterprise through multiple channels.	
		KW4	Extensively search for the technology research and development trends of universities, research institutes and other scientific research institutions with enterprise-related technologies through multiple channels.	
		KD	KD1	
	KD2		Strong and intensive use of a few specific search channels for technical knowledge searches.	
	KD3		Keep searching until you find a technical solution to an existing problem.	
	KD4		Frequently search and obtain technical information and knowledge in specific fields such as R&D and manufacturing.	
	MW	MW1	Search a wide range of market information for companies that provide similar products through multiple channels.	
		MW2	Extensive search for industry information offering alternative products through multiple channels.	
		MW3	Extensive search of market dynamics for companies offering complementary products via multiple channels.	
		MW4	Contact multiple customers and search for market information on customer needs and other aspects.	
	MD	MD1	Intense and intensive use of specific search channels to obtain market information.	
		MD2	Pay close attention to customers to obtain the potential needs of existing customers or discover potential markets.	
MD3		Ability to deeply search and obtain market information such as market segmentation and market structure.		
Dynamic Capability(DC)	OPC	OP1	Can quickly obtain and analyze changes in consumer demand preferences.	Barret(2009), JiaoHao(2008), ZhengShuli(2008)
		OP2	Able to quickly collect the latest market supply and demand information about products/services.	
		OP3	Ability to timely perceive industry-related technology development trends.	
		OP4	Able to accurately grasp the development trends of competitors.	
		OP5	Be able to learn about macro policy changes in a timely manner.	
	OFC	OF1	There are smooth internal communication channels, and information can be conveyed accurately and quickly among department members.	
		OF2	Each department has high autonomy and flexibility in its work.	
		OF3	It has a corporate culture that encourages innovation.	
		OF4	Allow for breaks in formal work routines.	
		OF5	Able to reposition the market according to environmental changes.	
	FIC	RI1	New knowledge and information from different departments can be integrated.	
		RI2	Cross-department business activities can be managed centrally to ensure work efficiency.	
		RI3	Production and sales activities can be adjusted in a timely manner according to market fluctuations.	
		RI4	Relationships with supply chain companies can be adjusted according to environmental changes.	
		RI5	The overall waste of resources is not serious.	
Business Model Innovation(BMI)	BMICI	CI1	Can provide new products, services and combinations.	Zott & Amit(2010), YunLexinetc.(2014), LiuTianli(2018)
		CI2	Can bring value-added products or value-added services to customers.	
		CI3	Able to cooperate or trade with new trading partners.	
		CI4	Able to meet the new needs of customers, partners and other stakeholders.	
		CI5	The risk of imitation and copying is reduced through intellectual property rights.	
	BMSI	SI1	Provides new trading methods that are different from the past.	
		SI2	Make the transaction method transparent and convenient.	
		SI3	New trading arrangements reduce transaction costs.	
		SI4	New trading mechanics implemented in trading.	
		SI5	Unique assets such as intellectual property have an important impact on transaction mechanisms.	

BMGI	GI1	New trading incentive or penalty systems are applied.
	GI2	A new safeguard mechanism has been established to prevent foreign imitation.
	GI3	New income distribution methods and rules are provided.
	GI4	A new profit mechanism was established.
	GI5	A new transaction trust mechanism was established.
	GI6	Set up processes and rules recognized by traders.
	GI7	Change the internal form of the organization to adapt to the needs of transactional activities.

IV. Empirical analysis

In order to ensure the internal consistency of the questionnaire, Kehlenbach α method and corrected Item–Total Correlation (CITC) were used to analyze the reliability. Then KMO value and Bartlett’s test were used to test the structural validity of the scale. When KMO value passed the test and Bartlett’s test index reached a significant level, the structural validity of the scale was measured by exploratory factor analysis (EFA).

1. Reliability and validity analysis of the scale

Cronbach- α of cross-border search scale, dynamic capability scale and business model innovation scale are 0.919, 0.938 and 0.917, respectively, which are all greater than the standard 0.7. When any item is deleted, the new Cronbach’s α decreases, and the CITC value of any item is greater than 0.5, which meets the research requirements. Therefore, the research data of the scale has high reliability and can be used for further analysis.

KMO values of cross-border search scale, dynamic capability scale and business model innovation scale are 0.925, 0.952 and 0.934, respectively, which are all greater than 0.7; In Bartlett spherical test, the approximate chi-square values are 3882.584, 4339.779 and 3203, respectively. 581, the significance is less than 0.001, which shows that the original data structure of the cross-border search scale is valid and very suitable for subsequent factor analysis.

2. Exploratory factor analysis of the scale

2.1. Exploratory factor analysis of cross-border search scale

표 2. 국경간 검색의 탐색적 요인분석 결과
 Table 2. EFA result of the Boundary-spanning Search scale

	Items	Component				Extraction
		1	2	3	4	
KW	KW1	0.206	0.198	0.748	0.223	0.691
	KW2	0.252	0.221	0.760	0.182	0.723
	KW3	0.268	0.244	0.767	0.154	0.744
	KW4	0.176	0.224	0.765	0.21	0.711
KD	KD1	0.215	0.784	0.203	0.161	0.729
	KD2	0.203	0.755	0.248	0.192	0.709
	KD3	0.186	0.802	0.191	0.136	0.734
	KD4	0.127	0.800	0.202	0.195	0.734
MW	MW1	0.771	0.236	0.231	0.185	0.737
	MW2	0.777	0.147	0.255	0.126	0.705
	MW3	0.832	0.168	0.146	0.129	0.758
	MW4	0.808	0.171	0.209	0.118	0.741
MD	MD1	0.189	0.268	0.261	0.770	0.768
	MD2	0.182	0.173	0.153	0.841	0.794
	MD3	0.11	0.163	0.229	0.825	0.772
Total		2.971	2.930	2.818	2.332	
% of Variance		19.805	19.531	18.785	15.545	
Cumulative %		19.805	39.337	58.112	73.667	

The principal component method and the maximum variance method are used to analyze 15 items of the cross-border search scale. As shown in the table, there are four characteristic roots greater than 1 in cross-border search, which together explain the total variance of 73.667%, which is greater than the critical value of 50%. In addition, the factor load of each item in the cross-border

search scale is greater than 0.5, and the cross load is less than 0.4, which indicates that the cross-border search scale has high structural effectiveness.

2.2. Exploratory factor analysis of dynamic capacity scale

The principal component method and the maximum variance method are used to analyze 15 items of the dynamic ability scale. As shown in the table, there are three characteristic roots of dynamic capability greater than 1, which together explain the total variance of 70.450%, which is greater than the critical value of 50%. In addition, the factor load of each item in the cross-border search scale is greater than 0.5, and the cross load is less than 0.4, which indicates that the cross-border search scale has high structural effectiveness.

표 3. 동적역량의 탐색적 요인분석 결과
 Table 3. EFA result of the Dynamic Capability scale

Items		Component			Extraction
		1	2	3	
OP	OP1	0.224	0.241	0.737	0.652
	OP2	0.237	0.224	0.753	0.673
	OP3	0.215	0.321	0.717	0.663
	OP4	0.245	0.184	0.783	0.707
	OP5	0.251	0.29	0.733	0.684
OF	OF1	0.730	0.339	0.234	0.702
	OF2	0.796	0.249	0.278	0.773
	OF3	0.753	0.280	0.240	0.703
	OF4	0.748	0.219	0.255	0.671
	OF5	0.808	0.242	0.216	0.758
RI	RI1	0.292	0.756	0.218	0.705
	RI2	0.237	0.794	0.251	0.749
	RI3	0.259	0.745	0.269	0.695
	RI4	0.262	0.764	0.287	0.735
	RI5	0.284	0.733	0.282	0.697
Total		3.577	23.850	23.85	
% of Variance		3.569	23.793	47.643	
Cumulative %		3.421	22.807	70.450	

2.3. Exploratory Factor Analysis of Business Model Innovation Scale

The principal component method and the maximum variance method are used to analyze 15 items of the business model innovation scale. As shown in the table, there are three characteristic roots of the business model greater than 1, which together explain the total variance of 69.555%, which is greater than the critical value of 50%. In addition, the factor load of each item in the cross-border search scale is greater than 0.5, and the cross load is less than 0.4, which indicates that the cross-border search scale has high structural effectiveness.

표 4. 비즈니스 혁신 모델의 탐색적 요인분석 결과
 Table 4. EFA result of the Business Model Innovation scale

Items		Component			Extraction
		1	2	3	
CI	CI1	0.293	0.263	0.737	0.719
	CI2	0.284	0.248	0.732	0.688
	CI3	0.318	0.184	0.772	0.766
	CI4	0.223	0.275	0.791	0.788
SI	SI1	0.248	0.765	0.229	0.661
	SI2	0.226	0.776	0.193	0.714
	SI3	0.286	0.736	0.219	0.709
	SI4	0.232	0.752	0.27	0.685
GI	GI1	0.743	0.216	0.221	0.651
	GI2	0.737	0.182	0.254	0.649
	GI3	0.725	0.241	0.27	0.696
	GI4	0.746	0.249	0.173	0.676
	GI5	0.707	0.23	0.246	0.641
Total		3.281	25.239	25.239	
% of Variance		2.896	22.276	47.516	
Cumulative %		2.865	22.040	69.555	

3. Confirmatory Factor Analysis

In order to further test the reliability and validity of the questionnaire, the confirmatory factor analysis of the scale was carried out by AMOS 24.0. Before confirmatory factor analysis, the fitting degree of the given scale is analyzed first.

3.1. Fitting degree analysis of each scale

표 5. 척도 적합도

Table 5. Model fit results of the scale

Fit Indices	Evaluation Criteria	Fit Result		
		Boundary spanning Search	Opportunity Capability	Business Model Innovation
CMIN		94.665	105.121	74.037
DF		84	87	62
CMIN/DF (x2/df)	<3	1.127	1.208	1.194
GFI	>0.80	0.973	0.97	0.976
AGFI	>0.80	0.962	0.959	0.965
RMR	<0.08	0.024	0.022	0.025
RMSEA	<0.08	0.017	0.021	0.021
IFI	>0.90	0.997	0.996	0.996
TLI	>0.90	0.997	0.995	0.995
CFI	>0.90	0.997	0.996	0.996

The fitting results of the measurement model are shown in Table 5, in which the χ^2/df values of all scales are less than 3, and the absolute goodness of

표 6. 국경간 검색의 확인적 요인분석 결과

Table 6. CFA results of the Boundary-spanning Search scale

			Estimate	S.E.	C.R.	P	Estimate	SMC	1-SMC	CR	AVE
KW	→	KW1	1				0.764	0.584	0.416	0.8675	0.6210
KW	→	KW2	1.075	0.063	17.116	***	0.797	0.636	0.364		
KW	→	KW3	1.128	0.064	17.542	***	0.816	0.666	0.334		
KW	→	KW4	0.997	0.060	16.589	***	0.774	0.600	0.4		
KD	→	KD1	1				0.800	0.640	0.36	0.8731	0.6324
KD	→	KD2	1.009	0.056	18.055	***	0.798	0.637	0.363		
KD	→	KD3	1.002	0.056	17.86	***	0.791	0.626	0.374		
KD	→	KD4	0.983	0.055	17.89	***	0.792	0.627	0.373		
MW	→	MW1	1				0.826	0.682	0.318	0.8779	0.6427
MW	→	MW2	0.929	0.051	18.195	***	0.777	0.604	0.396		
MW	→	MW3	0.924	0.049	18.907	***	0.801	0.642	0.358		
MW	→	MW4	0.967	0.051	18.935	***	0.802	0.643	0.357		
MD	→	MD1	1				0.852	0.726	0.274	0.8519	0.6576
MD	→	MD2	0.916	0.05	18.36	***	0.799	0.639	0.361		
MD	→	MD3	0.866	0.048	17.883	***	0.780	0.608	0.392		

fit GFI and AGFI values are greater than 0.90, indicating that the model has a good fitting degree; The relative goodness of fit of IFI, TFI and CFI all exceeded 0.90, which indicated that the model had a good degree of fit. RMSEA value also meets the requirement of less than 0.08. All parameters prove that the measurement model is in good agreement with the data..

3.2. Confirmatory factor analysis of the scale

1) Confirmatory factor analysis of cross-border search scale.

Table 6 shows the results of confirmatory factor analysis of cross-border search scale. The results show that the questionnaire structure is reasonable and all four dimensions have good structural validity. The combined reliability CR values are all greater than 0.7, and the average variance extraction AVE values are all greater than 0.5. The convergence validity of the scale is good, and the model is tested by confirmatory factor analysis.

2) Confirmatory factor analysis of dynamic ability scale.

Table 7 shows the confirmatory factor analysis results of the dynamic capacity scale. The results show that the questionnaire structure is reasonable and all three dimensions have good structural validity. The combined reliability CR values are all

greater than 0.7, and the average variance extraction AVE values are all greater than 0.5, which shows that the internal consistency and convergence validity of the dynamic ability questionnaire are good, and the model is tested by confirmatory factor analysis.

표 7. 동적역량의 확인적 요인분석 결과

Table 7. Model fit results of the Dynamic Capability scale

			Estimate	S.E.	C.R.	P	Estimate	SMC	1-SMC	CR	AVE
OP	→	OP1	1				0.747	0.558	0.442	0.8788	0.5919
OP	→	OP2	1.040	0.065	16.049	***	0.762	0.581	0.419		
OP	→	OP3	1.012	0.062	16.269	***	0.772	0.596	0.404		
OP	→	OP4	1.002	0.061	16.324	***	0.775	0.600	0.400		
OP	→	OP5	1.068	0.064	16.662	***	0.790	0.624	0.376		
OF	→	OF1	1				0.797	0.636	0.364	0.9028	0.6503
OF	→	OF2	1.037	0.051	20.392	***	0.852	0.726	0.274		
OF	→	OF3	0.971	0.052	18.550	***	0.792	0.627	0.373		
OF	→	OF4	0.879	0.050	17.552	***	0.759	0.575	0.425		
OF	→	OF5	1.046	0.053	19.678	***	0.829	0.687	0.313		
RI	→	RI1	1				0.789	0.622	0.378	0.9011	0.6457
RI	→	RI2	1.057	0.055	19.094	***	0.821	0.673	0.327		
RI	→	RI3	0.964	0.053	18.029	***	0.784	0.615	0.385		
RI	→	RI4	1.078	0.056	19.213	***	0.825	0.680	0.320		
RI	→	RI5	1.011	0.055	18.445	***	0.798	0.637	0.363		

3) Confirmatory factor analysis of business model innovation scale.

Table 8 shows the confirmatory factor analysis results of the Business Model Innovation Scale. The results show that the questionnaire structure is reasonable and all three dimensions have good structural validity. The combined reliability CR

values are all greater than 0.7, and the average variance extraction AVE values are all greater than 0.5, which shows that the internal consistency and convergence validity of the business model innovation questionnaire are good, and the model is tested by validation factor analysis.

표 8. 비즈니스 혁신 모델의 확인적 요인분석 결과

Table 8. CFA results of the Business Model Innovation scale

			Estimate	S.E.	C.R.	P	Estimate	SMC	1-SMC	CR	AVE
CI	→	CI1	1				0.813	0.662	0.338	0.8808	0.6490
CI	→	CI2	0.912	0.051	17.817	***	0.768	0.589	0.411		
CI	→	CI3	0.977	0.051	19.031	***	0.808	0.653	0.347		
CI	→	CI4	1.040	0.053	19.748	***	0.832	0.693	0.307		
SI	→	SI1	1				0.745	0.555	0.445	0.8515	0.5892

SI	→	SI2	0.976	0.063	15.613	***	0.770	0.593	0.407	0.8706	0.5740
SI	→	SI3	0.982	0.062	15.743	***	0.777	0.604	0.396		
SI	→	SI4	1.009	0.064	15.754	***	0.778	0.605	0.395		
GI	→	GI1	1				0.751	0.565	0.435		
GI	→	GI2	0.962	0.063	15.297	***	0.730	0.533	0.467		
GI	→	GI3	1.070	0.063	16.926	***	0.804	0.646	0.354		
GI	→	GI4	0.982	0.062	15.760	***	0.751	0.564	0.436		
GI	→	GI5	0.971	0.062	15.756	***	0.750	0.563	0.437		

4.4. Discriminant validity analysis

In this study, SPSS27.0 was used to analyze the correlation of each latent variable, and AVE method was used to evaluate the discriminant validity. The bold numbers in diagonal lines in the table are the

square root values of the corresponding variables, and the rest are the correlation coefficients of the corresponding variables. The results show that there is discriminant validity among the variables studied in this paper, which meets the research requirements.

표 9. AVE 점수의 구조간 관련성

Table 9. Inter construct correlation with $\sqrt{\text{AVE}}$ scores

	KW	KD	MW	MD	OP	OF	RI	CI	SI	GI
KW	0.788									
KD	.568**	0.795								
MW	.562**	.489**	0.802							
MD	.537**	.497**	.429**	0.811						
OP	.325**	.330**	.305**	.342**	0.769					
OF	.397**	.381**	.295**	.358**	.617**	0.806				
RI	.387**	.332**	.286**	.375**	.645**	.655**	0.804			
CI	.409**	.319**	.358**	.360**	.287**	.375**	.374**	0.806		
SI	.350**	.336**	.274**	.289**	.282**	.328**	.330**	.553**	0.768	
GI	.399**	.385**	.389**	.352**	.266**	.343**	.330**	.600**	.550**	0.758
Mean	3.309	3.340	3.191	3.194	3.230	3.259	3.233	3.294	3.271	3.316
Standard deviation	0.851	0.864	0.836	0.853	0.803	0.864	0.839	0.871	0.831	0.837

** P<0.01

4.5. Structural Equation Model Analysis

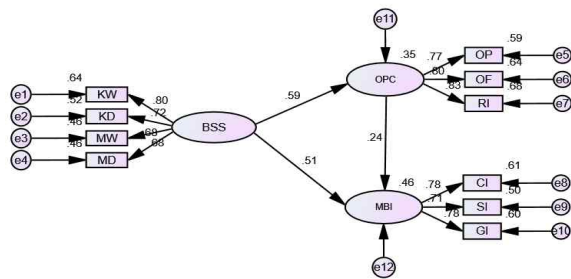


그림 2. 구조방정식 모형의 표준화된 경로
 Figure 2. Standardized Estimates of Structural Equation Modeling

표 10. 구조방정식 모형의 모형 적합지표

Table 10. Model fit indices of the structural equation model

Fit Indices	Evaluation Criteria	Fit Result
CMIN		70.899
DF		48
CMIN/DF(x ² /df)	<3	1.477
GFI	>0.80	0.984
AGFI	>0.80	0.974
RMR	<0.08	0.015
RMSEA	<0.08	0.026
IFI	>0.90	0.994
TLI	>0.90	0.992
CFI	>0.90	0.994

The structural equation model analysis results of the influence of cross-border search on the business model innovation of small and medium-sized enterprises are shown in the table.

As can be seen from the following table, the standardized estimate of cross-border search on dynamic capability is 0.351(S.E.= 0.067, P<0.001), which indicates that cross-border search has a significant positive impact on dynamic capability, and the hypothesis of cross-border search's impact on dynamic capability (H1) is verified. The standardized estimate of dynamic capability to business model

innovation is 0.431(S.E.= 0.072, P<0.001), which indicates that dynamic capability has a significant positive impact on business model innovation, and the hypothesis (H2) of the impact of dynamic capability on business model innovation is verified. The standardized estimate of cross-border search for business model innovation is 0.365(S.E.=0.086, P<0.001), which shows that cross-border search has a significant positive impact on business model innovation, and the hypothesis (H4) of the impact of network embedding on business model innovation is verified.

표 11. 구조 모형의 경로 계수

Table 11. Path coefficients for the structural model

Path			Unstandardized	Standardized	S.E.	C.R.	P
			Estimate	Estimate			
Boundary-spanning Search	→	Opportunity Capability	0.636	0.351	0.067	9.431	***
Opportunity Capability	→	Business Model Innovation	0.261	0.431	0.072	3.631	***
Boundary-spanning Search	→	Business Model Innovation	0.598	0.365	0.086	6.986	***

Note: *** P<0.001, ** P<0.05

4.6. Analysis of Intermediary Effect

In this study, Bootstrap test is used to evaluate the intermediary role of dynamic capabilities in the relationship between cross-border search and business model innovation. 2000 self-help samples (N=457) were extracted from the original data by repeated random sampling, and 95% confidence intervals were set. Then, according to these samples, 2000 intermediary effect estimates were generated, forming an approximate sampling distribution. As shown in the following table, the dynamic capability

partially mediates the relationship between cross-border search and business model innovation. When cross-border search affects business model innovation, 21.70% of the variation is caused by the dynamic capability of intermediary variables, so H3 is accepted.

To sum up, this study tests all the research hypotheses based on the results of structural equation path analysis. H1, H2, H3 and H4 are all accepted.

표 12. 국경간 검색과 비즈니스 혁신 모델사이의 동적역량의 매개효과

Table 12. The mediating effects of Boundary-spanning Search and Business Model Innovation

Parameter	Estimate	SE	95%CI		P	Effect ratio (%)
			Lower	Upper		
Standardized total effect	0.6506	0.0523	0.5383	0.7497	***	100
Standardized total indirect effect	0.1412	0.0551	0.0680	0.2360	***	21.70
Boundary-spanning Search → Dynamic Capability → Business Model Innovation	0.1412	0.0551	0.0278	0.2465	***	21.70
Standardized direct effect	0.5094	0.0875	0.3405	0.6805	***	78.30

V. Conclusion and suggestion

1. Conclusion

This study is based on organizational search theory and dynamic capabilities theory, and uses normative and empirical analysis methods to examine the impact of cross-border search and dynamic capabilities on business model innovation. The main conclusions drawn are as follows:

- 1) Cross-border search has a significant impact on the dynamic capabilities of SMEs;
- 2) Cross-border search has a significant positive impact on business model innovation of small and medium-sized enterprises;
- 3) Dynamic capabilities mediate the relationship between network embeddedness and business model innovation.

On the one hand, cross-border search can bring rich heterogeneous knowledge resources to small and medium-sized enterprises, increase the enterprise's knowledge stock, and provide a resource base for the construction of dynamic capabilities; On the other hand, the process of active knowledge search by small and medium-sized enterprises can generate valuable new knowledge or turn old knowledge into new knowledge, and achieve adaptive adjustments to existing routines, which is the ultimate embodiment of dynamic capability improvement. As a high-order capability, dynamic capabilities can ensure that enterprises make timely adjustments according to environmental changes, enhance corporate strategic flexibility, overcome innovation obstacles, and have a

significant role in promoting enterprise business model innovation. Therefore, cross-border search can effectively enhance the business model innovation of small and medium-sized enterprises through dynamic capabilities.

2. Suggestion

Recommendations for the government. The government can promote the construction of knowledge flow channels such as public information platforms, enterprise alliances and other related social networks to ensure smooth information communication channels between enterprises and suppliers, scientific research institutions and enterprises, and customers and enterprises. This can reduce the cost for SMEs to obtain heterogeneous information, improve the efficiency of SMEs in obtaining heterogeneous information, improve the knowledge stock of SMEs, and increase the possibility and success rate of SMEs to carry out business model innovation.

Recommendations for SMEs. In the context of enterprises with limited innovation resources, insufficient R&D capabilities, changing consumers, and fierce market competition, searching for technical knowledge and market knowledge in the external environment by crossing organizational boundaries is an inevitable choice for small and medium-sized enterprises to practice innovation. Therefore, small and medium-sized enterprises should pay attention to the search for external technical knowledge and market knowledge to make up for their own lack of

strength and improve the possibility and success rate of business model innovation. At the same time, business model innovation not only requires access to external resources, but also requires companies to have the ability to perceive and identify market opportunities, and integrate valuable external knowledge for business purposes, which requires companies to have dynamic capabilities. Therefore, SMEs should also focus on cultivating their own dynamic capabilities.

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