An Empirical Study on Strategic Network, Relational Capability and Operating Performance of Agricultural Enterprises

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Abstract By establishing the theoretical model of "strategic network cooperation-relational capability-operating performance" and structural equation, we conduct a sampling survey on 208 agricultural enterprises, and use Spss21.0 and Amos21.0 for empirical analysis of influence of three factors in strategic network cooperation (market futurity, trusting relationship and business networks) on market relational capability and operating performance of agricultural enterprises. The results show that the establishment of trusting relationship and business networks in strategic networks has a positive impact on the operating performance of agricultural enterprises, and relational capability plays a fully mediating role while relational capability has not mediating effect on market futurity. This study provides a meaningful reference for the follow-up studies on relational capability and operating performance of agricultural enterprises, to further enhance the operating performance of agricultural enterprises and effectively improve farmers' income.

Key words Market futurity, Trusting relationship, Business networks, Relational capability, Operating performance

1 Introduction

The strategic network cooperation of agricultural enterprises is a kind of industrialized operation of agriculture, that is, farmers cooperate with other entities (such as cooperatives, other industrial enterprises and other agricultural enterprises) to carry out agricultural marketing (Huang Zuhui, 2002). The strategic cooperation of agricultural enterprises contains vertical relationship (with suppliers, customers, distributors, or market intermediaries) and horizontal relationship (with other agricultural enterprises, other industry enterprises or government departments), so it is of a strategic and long-term nature. The ordinary cooperation generally only contains one-dimensional relationship, horizontal or vertical. Here the network cooperation that we stress is the strategic network cooperation, different from the ordinary cooperation. Strategic network contains three important aspects, "market futurity", "trusting relationship" and "business networks". Strategic network cooperation often has some influence on the relational capability, and here the relational capability mainly involves how to use the advantages of resources and relations to gain competitiveness. Few studies view the agribusiness cooperation as a "strategic cooperation", and only a handful of studies are about the influence of strategic network on the operating performance and relational capability of agricultural enterprises as well as the mediating effect. Therefore, on the basis of defining the concept, we integrate the research results of strategic cooperation, empirically verify the mediating effect of relational capability of agricultural enterprises,

and probe into the influence of three factors of strategic network cooperation on the operating performance of agricultural enterprises. Based on the social relations embedded in business strategic network, this paper analyzes the influence of strategic cooperation network on business operating performance, and further perfects the study on the relational capability of agricultural enterprises, in order to provide new thinking and vision for the business strategic research.

2 Hypothesis and relational model

2.1 Hypothesis on the relationship between strategic network and business operating performance Strategic network is the long-term purposeful cooperative arrangement among differentiated but associated profit organizations, aimed at obtaining the competitive advantage relative to the external competitors of network (Jarillo, 1988). Li Haijian and Feng Li (2004) point out the competitiveness of enterprises is from the strategic network cooperation system, and the network system is the highest state of core competence. Gulati (1995) points out that the experienced business is the best partner, and it can create more values through a strategic network. In the study of strategic network, scholars only analyze the influence of strategic network on corporate behavior and performance from organizational economics, social theory, or corporate network theory, but it lacks a comprehensive and systematic analysis on the path of influence of network cooperation on performance (Lin Jian et al., 2003). This article defines strategic network of agricultural enterprises as the constantly evolving and optimizing long-term strategic economic partnership network between agricultural enterprises and other entities for the shared vision on the basis of mutual trust by formulating agreement and contract (B. Uzzi, 1997; Li Huanrong et al., 2007; Xie Hongming et al., 2003; Lin Jian et al., 2003). Strategic network can be divided into three dimensions. (i) Market futurity. The deep strate-

gic cooperation is possible when the future market is rosy, and the willingness to cooperate between organizations will be reinforced if the strategic cooperation intensifies (Dyer & Hatch, 2006). Market futurity reflects the future cooperation and development opportunities between individuals or between organizations (Park & Luo, 2001). In the process of looking for a partner, the priority will be given to the business with better market futurity for cooperation to enhance operational performance (Luo, 2003). (ii) Trust. In the area of strategic cooperation, trust is closely related to long-term organizational partnership (Aulakh et al., 1996). The formation of agricultural business cooperation is based on the informal contract on the basis of mutual trust in Chinese rural society (Huang Jun et al., 2005). Lin Jian (2003) points out that the importance of corporate strategy lies in the increase of the trust among organizations in the midst of a network through formal or informal long-term institutional arrangement. The trusting relationship has a great impact on competitive advantage, and becomes a major force for the partners to fulfill a contract rather than so-called "formal contract" (Xie Hongming et al., Luo, 2003). (iii) Business networks. Business networks are often described as two or more independent businesses working together in order to secure greater business benefits through synergies (Morgan & Hunt, 1994). Business networks, also known as the commercial networks, can help to create economies of scale (Tung & Worm, 2001). It is generally believed that the transactors establish business networks aiming to exchange information, reduce information asymmetry and lower the risk from uncertainty, and the business networks can be conducive to rational decision (Uzzi, 1997; Luo Biliang et al., 2011). In the study of cooperation between organizations, Peng &Luo (2000) find that the business networks make the partners take on commitments to mutual dependence in terms of obligations, warranties and understanding. Through study, Hippel (2001) concludes that the knowledge transfer network that suppliers, manufacturers and users take part in has stronger innovation capacity than the inefficient loose knowledge transfer network. It is further confirmed that the enterprise integration and collaborative learning help to improve customer satisfaction and promote long-term supply chain management performance (Tan & Tracy, 2007). In summary, this study applies the strategic network's influence on organizations or individuals to agricultural enterprises, and makes the following hypotheses:

H_1 The strategic network has a significant positive impact on the operating performance of agricultural enterprises;

H_{1a} The market futurity in strategic network has a significant positive impact on the operating performance of agricultural enterprises;

H_{1b} The trusting relationship in strategic network has a significant positive impact on the operating performance of agricultural enterprises;

H_{1c} The business networks in strategic network have a significant positive impact on the operating performance of agricultural enterprises.

2.2　Hypothesis on the relationship between strategic network cooperation and relational capability of agricultural enterprises　Powell et al. (1996) believes that relational capability is a combination of cooperation capability and knowledge integration capability. Dyer & Singh (1998) think relational capability is enterprises' ability to gain a competitive advantage through the formation, development, management and use of partnerships. Golicic et al. (2005) consider that relational capability is the capability of economic entities to share knowledge, integrate resources and coordinate mutually to influence each other. Lorenzon & Lipparini (1999) believe that relational capability is the capability of entities to build a trust-based relationship with partners and establish a competitive advantage of business. Zheng Jichang (2003) and Song Hua et al. (2008) think the relational capability long fostered can help to form the special resources and knowledge of enterprises, and such resources and knowledge, with a unique competitive advantage, can not be transferred to other enterprises. Zeng Fu'e (2010) reviews the previous literature and points out that the definition of relational capability should be based on its essence, namely cooperation, strategy and embeddedness. This article defines the relational capability of agricultural enterprises as the capability of agricultural enterprises and external individuals or organizations to achieve the effective linking with internal resources of agricultural enterprises so as to enhance the competitive advantage of agricultural enterprises through interaction, cooperation, knowledge sharing and other reciprocal behaviors. Numerous studies show that the relational capability is the interaction between related resources and resources members to help economic entities to get heterogeneous knowledge and ability (Dyer & Singh, 1998). Medhavan, Koka and Prescott (1998) point out that relational capability is one of the most valuable resources for the business. In the past century, the study on the determinants of relational capability is almost blank (Tsang, 1998). Only a small amount of researches discuss the factors that affect relational capability from a very narrow point of view (Kale & Singh, 2007). Based on the study of the factors that affect relational capability, this paper puts forward three dimensions of strategic network-market futurity, trust and business networks, given that the strategic organizational cooperation and resources exchange are the key prerequisite for the formation of relational capability (Dyer & Singh, 1998). (i) Market futurity. Scholars generally believe that market futurity determines both the internal and external resources (Bian & Soon, 1997; Peng & Heath, 1996; Luo & Chen, 1996). The development of market futurity is considered to be a prerequisite for the development of a company's relational capability (Hung, 2004). Bian & Soon (1997) think market futurity can bring more strategic cooperation, and the common interests from strategic cooperation lead to the development of relational capability. (ii) Trusting relationship. "Trust" is the first relationship rule presented (Macneil, 1978), and also an important component of relationship governance of agricultural enterprises (Wan Junyi, 2008; Chen Can, Luo Biliang, 2011). Espe-

cially in the Chinese countryside, trust can reduce uncertainty about the future, and promote a more rational use of resources within the organization, resulting in organizational performance (Jun Huang *et al*., 2005). Zeng Fu'e (2010) believes that trust can reduce the probability of the occurrence of opportunism. Trust can reduce the transaction costs of inter-organizational relationships (Ireland *et al*., 2005). Luo (2003) maintains that trust appears in the organization, and when an enterprise benefits from the sharing of resources in cooperation with other enterprises, trust will occur and is possibly embedded in the organization, so cooperation can create a need for the establishment of trusting relationship. Dyer & Hatch (2006) consider that trust can enable enterprises to establish a "hand-in-hand" stance, so as to promote relational capability. (iii) Business networks. Peng & Luo (2000) consider that the business networks in cooperation enable the partners to make a commitment to the mutual dependence in terms of obligation, guarantee and understanding. It is generally believed that the business network in the area of strategic cooperation is a new form of cooperation, which makes the agribusiness partners stand in strategic height and extends the scope of cooperation to two horizontal and vertical dimensions. In summary, this study proposes the following hypotheses:

H₂ The strategic network has a significant positive impact on the relational capability of agricultural enterprises;

H₂ₐ In the relationship between market futurity and operating performance of agricultural enterprises, the relational capability of agricultural enterprises has a mediating effect;

H₂ᵦ In the relationship between trusting relationship and operating performance of agricultural enterprises, the relational capability of agricultural enterprises has a mediating effect;

H₂ᵧ In the relationship between business networks and operating performance of agricultural enterprises, the relational capability of agricultural enterprises has a mediating effect.

3 Empirical test of research hypotheses

3.1 Research methods and relationship model In this paper, theoretical research is combined with empirical research. In the theoretical research, we first conduct modeling based on the influence of strategic cooperation network on the operating performance of enterprises, and then use factor analysis and structural equation for empirical research and correction of indicators. During the period, we collect data by the questionnaire survey. Based on the above hypothesis, we build the relational model for the path of improving the business operating performance on the basis of strategic network (Fig. 1).

3.2 Variable and specific measuring items

3.2.1 Dependent variable-operating performance of agricultural enterprises. According to the acquisition situation of the expected financial benefits, we tend to choose earning rate, sales growth and other objective standards to evaluate the operating performance (Mohr & Spekman, 1994; Park & Russo, 1996; Doz & Hamel, 1998). Christopher & Martin (1994) use productivity, order ful-
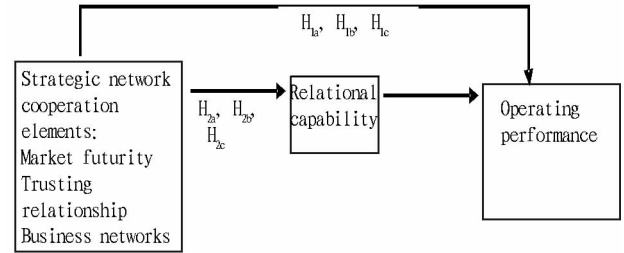

Fig. 1 **Relational model for the path of improving the business operating performance on the basis of strategic network**

fillment rate and delivery time as the indicators to measure operating performance. Zeng Fu'e (2010) believes that performance shows senior managers' perception of corporate earnings, sales growth, market share and upgrade capabilities. On the basis of a number of scholars' measuring scale, the specific measuring items are determined as profitability, sales growth, capacity, technology upgrading and productivity.

3.2.2 Independent variable-market futurity, trusting relationship, business networks. (i) Market futurity. Bian & Ang (1997) think market futurity can bring more strategic cooperation, and the common interests from strategic cooperation lead to the development of relational capability. The measuring scale on market futurity in this paper is from Park and Luo (2001), and we design, pre-test and revise the scale in accordance with the actual situation of agricultural enterprises and recommendations of experts. The measuring items include "agricultural enterprises are highly dependent on product or service", "agricultural enterprises are highly dependent on the research and development of new product or services", "agricultural enterprises are highly dependent on the innovation of product or services", and "agricultural enterprises are highly dependent on smooth business transactions". (ii) Trusting relationship. Many Chinese scholars have pointed out that in China's rural areas, interpersonal relationship is the basis of trust structure, and also an important way to obtain resources (Li Guowu, 2010). In this study, the scale is from Wong & Tjosvold (2006), and it is discussed by experts. The final measuring items include "suppliers' choice depends on the trusting relationship", "choice of distribution channels depends on the trusting relationship", and "commercial success depends on the trusting relationship". (iii) Business networks. The setting of business networks variables involves greater interest appeal of agricultural enterprises in the business process (Powell, 2002; Rangan, 2000). In this paper, the scale is adapted from the scale of Rangan (2010), and the main measuring items include "improvement of product or service depends on the partnership network", "research and development of new product or service depends on the partnership network", "product innovation depends on the partnership network", "long-term business service depends on the partnership network", and "choice of sales channels depends on the partnership network".

3.2.3 Mediating variable-relational capability of agricultural enterprises. Yanni Yan *et al*. (2010) study how the relational capa-

bility of 320 international companies effectively coordinates organizational cooperation, and perform the empirical analysis of influence of market futurity, trust and business networks on the relational capability development and performance of companies. Zeng Fu'e (2010) conducts a questionnaire survey on the enterprises in Beijing, Shanghai and Guangzhou, and finds that the relational capability of enterprises significantly affects business performance. In this paper, we study the scale of Tung (2001) and Wong & Tjosvold (2006) and make some amendments according to the actual situation. The main measuring indicators include "agricultural enterprises are highly dependent on the establishment of strategic partnership", "strategic cooperation is more important than the agribusiness resources" and "strategic partnership provides an important source of inside information", and "strategic cooperation helps agricultural enterprises to maintain resource security".

3.3 Questionnaire survey In this study, with the agricultural enterprises in the Pearl River Delta as survey objects, we adopt the random sampling survey. 300 questionnaires were sent out and 259 questionnaires were returned, with the recovery rate of 86.3%. After excluding invalid questionnaires, 208 valid questionnaires were finally obtained, with validity rate of 80.3%. In this paper, we use 7-point Likert scale for design, and the cognition of business leaders surveyed on the factors is assigned with 1 to 7 points from total inconsistency to total consistency, respectively. Respondents offer objective judgment and score according to the actual situation of their enterprises (7-fully compliant with or in favor of; 6-strongly compliant with or in favor of; 5-relatively strongly compliant with or in favor of; 4-generally in favor of; 3-non-compliant with; 2-strongly non-compliant with or disapprove; 1-totally disapprove or compliant with).

Table 1   Variable reliability and validity (exploratory factor analysis N = 208)

Latent variables	Measuring items	Mean	Standard deviation	Loading	Bartlett chi-square value	KMO value	Cronbach's α value
Market futurity	Agricultural enterprises are highly dependent on product or service	4.11	1.756	0.671	257.113***	0.641	0.769
	Agricultural enterprises are highly dependent on the research and development of new product or service	3.04	1.663	0.832			
	Agricultural enterprises are highly dependent on the innovation of product or service	3.48	1.705	0.822			
	Agricultural enterprises are highly dependent on smooth business transactions	4.51	1.791	0.751			
Trust	Suppliers' choice depends on the trusting relationship	5.04	1.516	0.869	244.950***	0.676	0.819
	Choice of distribution channels depends on the trusting relationship	4.95	1.405	0.907			
	Commercial success depends on the trusting relationship	4.79	1.561	0.800			
Business networks	Improvement of product or service depends on the partnership network	4.08	1.629	0.853	538.899***	0.804	0.872
	Research and development of new product or service depends on the partnership network	3.87	1.624	0.843			
	Product innovation depends on the partnership network	3.82	1.640	0.828			
	Long-term business service depends on the partnership network	4.75	1.770	0.821			
	Choice of sales channels depends on the partnership network	4.80	1.632	0.724			
Relational capability	Agricultural enterprises are highly dependent on the establishment of strategic partnership	3.66	1.728	0.776	280.023***	0.765	0.811
	Strategic cooperation is more important than the agribusiness resources	3.47	1.627	0.759			
	Strategic partnership provides an important source of inside information	4.16	1.759	0.865			
	Strategic cooperation helps agricultural enterprises to maintain resource security	3.94	1.627	0.793			
Operating performance	Profitability	3.88	1.485	0.840	351.120***	0.786	0.847
	Sales growth	3.54	1.407	0.859			
	Capacity and technology upgrading	3.11	1.520	0.815			
	Productivity	3.61	1.467	0.800			

Note: ** indicates that P is significant at the 0.01 level; *** indicates that P is significant at the 0.001 level.

3.4 Scale reliability and validity test (ⅰ) Reliability test. In this study, we use the most widely used Cronbach's α coefficient to analyze the internal consistency of the items, and usually Cronbach's α is 0.7 (Wu Minglong, 2010). As can be seen from

Table 1, Cronbach's α values range between 0.769 and 0.872, greater than 0.7, and the sample reliability passes internal consistency test. We also select CR of structural equation. Table 2 shows that CR of each latent variable is basically more than 0.8,

far exceeding the 0.6 standard, indicating that the inherent quality of model is good, and the scale measuring has good internal consistency. In this study, by consulting the agricultural economic management and strategic management experts, we pre-test the small sample, correct the scale content, and use KMO and Bartlett sphere for testing. The results are shown in the table, and KMO is higher than 0.6. At the same time, the significance probability of Bartlett statistic is 0.000, indicating that the data obtained are suitable for factor analysis. In the use of principal component analysis, based on the approach of Wu Minglong (2010), the factor standard is determined as follows: the absolute value of factor loading must be greater than 0.4. The items that do not meet these two requirements will be excluded. By principal component analysis, it is found that the factor loading of various items

in Table 1 is greater than 0.6, indicating that the items selected well represent the measured content. In addition, we use AVE (Average Variance Extracted) convergent validity index, and it is generally believed that the greater the index value, the smaller the relative measurement error. The general criterion is greater than 0.5. As can be seen from Table 2, except market futurity with AVE of slightly less than 0.5, other latent variables have AVE of greater than 0.5, indicating that the measurement in this study has convergent validity. The validity can be also judged by examining whether AVE value is greater than the square value of correlation coefficient between the variables (Shook *et al.*, 2004). According to Table 2, apparently AVE value is greater than the square value of correlation coefficient between the variables, so it passes the validity judgment test.

Table 2　Variable correlation analysis and confirmatory factor analysis

Latent variables	CR	AVE	Market futurity	Trust	Business networks	Relational capability	Operating performance
Market futurity	0.7758	0.4744	1.000	–	–	–	–
Trust	0.8320	0.6260	0.376***	1.000	–	–	–
Business networks	0.8751	0.5850	0.472***	0.504***	1.000	–	–
Relational capability	0.8141	0.5263	0.441***	0.468***	0.662***	1.000	
Operating performance	0.8471	0.5827	0.347***	0.256**	0.377***	0.484***	1

Note: ** indicates that P is significant at the 0.01 level; *** indicates that P is significant at the 0.001 level.

4　Mediating effect analysis and hypothesis testing

According to the study of Wen Zhonglin, Hou Jietai (2003) and Wen Zhonglin, Ye Baojuan (2014), we let the independent variable be X, dependent variable be Y, and mediating variable be M, and test the significance of their regression coefficients, respectively (e_1, e_2, e_3 are all error terms). (i) First we test equation 1: $Y = \beta X + e_1$. If β is significant ($H_0: \beta = 0$ is rejected), then we continue to test equation 2. If β is not significant, it indicates that X has no impact on Y, then we stop the mediating effect test. (ii) After the β significance is tested, we continue to test equation 2: $M = \alpha X + e_2$. If α is significant ($H_0: \alpha = 0$ is rejected), we continue to test equation 3; if α is not significant, we stop testing. (iii) After equation 1 and 2 pass the significance test, we test equation 3, $Y = aX + bM + e_3$, and test the significance of b. If b is significant, the mediating effect is significant; then we test a, and if a is significant, it is the incomplete mediating effect; if a is not significant, it is the complete mediating effect. The most common way to test mediating effect is gradually testing regression coefficient (Baron & Kenny, 1986; Judd & Kenny, 1981; Wen Zhonglin, Zhang Lei, Hou Jietai, Liu Hongyun, 2004). This paper also uses the stepwise regression analysis to test the mediating effect of agribusiness relational capability, and adopts the structural equation model testing method. Since SEM is widely used, people have had a newer way to study mediating effect, and generally use structural equation model to test (Liu Haijian *et al.*, 2007). This paper lists the standard of some indicators such as CMIN, CMIN/DF, GFI, RMSEA, IFI, CFI and PNFI as well as the actual fitting results of model. Table 3 shows that the degree of fitting of various indicators of measure-

ment model is very good, indicating that the overall fitting effect of measurement model and data is good (Hair, Anderson, Tatham and Black, 1998; Bentler, 1990). We can further verify the hypothesis. Model 1 shows that market futurity has a significant positive impact on the operating performance of agricultural enterprises, and it meets the first condition of mediation effect analysis, that is, the independent variable coefficient of equation 1 is significant, and hypothesis H_{1a} holds. Similarly, Model 2 and 3 verify that trusting relationship and business networks have a significant positive impact on the operating performance of agricultural enterprises, respectively, so hypotheses H_{1b} and H_{1c} hold, that is, H_1 is validated, and meets the conditions of continuing to conduct mediation effect test in equation 1. Model 4 shows that trusting relationship and business networks have a significant positive impact on the operating performance of agricultural enterprises, so it meets the conditions of continuing to conduct mediation effect test in equation 2, and H_2 partially holds. Market futurity does not significantly affect the relational capability of agricultural enterprises, so H_{2a} validation fails. Model 5 indicates that after the variable agribusiness relational capability is added, trusting relationship does not significantly affect the operating performance of agricultural enterprises, that is, H_{1b} does not hold. However, the relational capability of agricultural enterprises still has a significant positive impact on the operating performance of agricultural enterprises, indicating that the relational capability of agricultural enterprises has complete mediating effect between trusting relationship and operating performance of agricultural enterprises, meeting the judgment of compete mediating effect in equation 3, so H_{2b} is verified. Similarly, Model 6 shows that the relational capability of agricultural enterprises has complete mediating effect between bus-

iness networks and operating performance of agricultural enterpri-ses, so H_{2c} is verified.

Table 3 Regression analysis results (N = 208)

Variable	Farmers' operating performance			Farmers' relational capability	Farmers' operating performance	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Independent variable						
Market futurity	0.307 ***			0.112		
Trust		0.260 **		0.167 *	0.054	
Business networks			0.370 ***	0.519 ***		0.094
Mediating variable						
Relational capability					0.469 ***	0.438 ***
Absolute fitting index						
GFI (standard: > 0.9)	0.975	0.964	0.961	0.883	0.941	0.927
RMSEA (standard: < 0.08)	0.035	0.072	0.060	0.079	0.061	0.064
Relative fitting index						
CFI (standard: > 0.9)	0.993	0.977	0.981	0.921	0.968	0.962
IFI (standard: > 0.9)	0.993	0.977	0.982	0.922	0.969	0.963
Simple fitting index						
CMIN/DF (standard: between 1 and 3)	1.247	2.079	1.742	2.292	1.772	1.861
PNFI (standard: > 0.5)	0.587	0.592	0.612	0.695	0.677	0.686

Note: ** indicates that P is significant at the 0.01 level; *** indicates that P is significant at the 0.001 level.

5 Conclusions and recommendations

This paper conducts the regression test on the mediation effect of relational capability of agricultural enterprises, and the results show that in the mediation model, trusting relationship and business networks do not have a direct significant positive impact on the operating performance of agricultural enterprises like in Mode 1 and 3, indicating that agricultural enterprises' active establishment of trusting relationship and business networks does not have an expected impact on the operating performance of agricultural enterprises, and there is a need to strengthen the relational capability of agricultural enterprises to promote the operating performance of agricultural enterprises. The trusting relationship is based mainly on the agricultural enterprises' trust in providers (such as seed suppliers) and channel merchants. In agriculture, due to farmers' education level and limited choice of suppliers, the channel merchants tend to be in a strong position, and we can further improve the operating performance of agricultural enterprises by enhancing the partnership capacity. Therefore, agricultural enterprises should also pay particular attention to developing strategic network partnership, and establish a trusting relationship with suppliers, distributors, rural cooperatives and the government, to enhance the effect of operating performance. In addition, the business network cooperation is also the key to improving relational capability of agricultural enterprises, that is, participating in the establishment of business networks can help agricultural enterprises to realize the importance of strategic cooperation and resource sharing, and its impact on operating performance is based on the relational capability of agricultural enterprises. Market futurity has a significant positive impact on the operating performance of agricultural enterprises, but market futurity and operating performance of agricultural enterprises are not affected by the relational capability of agricultural enterprises. It does not mean that it is no longer af-fected by other mediating variables, and the fact is that from the data fitting, market futurity has a direct impact on the operating performance of agricultural enterprises. So, we will continue to further explore this issue in subsequent studies.

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