Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

The Effects of Network Location and Compositional Capability on Cross-Channel Integration: The Moderating Mechanism of Co-opetition Balance

Weiwei Dong*, Jiahui Teng
School of Economic and Management, Shanghai Institute of Technology, Shanghai, China
*Corresponding Author.

Abstract:

Based on the social network theory, the composition-based view and the analysis paradigm of "resources-capability-growth", this paper examined the effects of network location on cross-channel integration from the perspective of manufacturers, and the mediating and moderating mechanisms of compositional capability and co-opetition balance in the above relationship. Taking manufacturers who implement cross-channel integration as the research object and 213 questionnaires, we tested the research hypotheses by multiple regression analysis. Empirical results showed that: (1) Network location has a positive influence on cross-channel integration; (2) The four dimensions of compositional capability, namely resource bricolage capability, IT capability, managerial ability and digital intelligence capability, all partially mediate the relationship between network location and cross-channel integration; (3) The co-opetition balance has a positive moderating effect on the relationship between resource bricolage capability, IT capability and digital intelligence capability and cross-channel integration. The research results enriched the theoretical literatures of cross-channel integration and also have certain practical guidance value for manufacturers to improve the level of cross-channel integration.

Keywords*: Network location, compositional capability, cross-channel integration, co-opetition balance.*

I. INTRODUCTION

The development of digital economy and digital marketing has promoted channel fragmentation and omni-channel marketing [1]. Consumers using multiple channels to purchase products and services has gradually become the norm. By December 2021, the scale of online shopping users in China reached 842 million, accounting for 81.6% of Internet users as a whole; in 2021, online retail sales reached 13.1 trillion yuan, of which online retail sales of physical goods accounted for 24.5% of the total retail sales of social consumer goods [2]. Instead of focusing on a single channel, consumers are using multiple channels such as offline stores, online networks and mobile stores to shop. Therefore, multi-channel shopping has become a mainstream consumer habit. In the face of changing consumer shopping habits, companies need to actively build a multi-channel model of "physical store, PC terminal and mobile terminal".

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

However, in many cases, in the implementation process of multi-channel mode, each channel operates separately, which leads to the lack of communication, and inconsistent information transmission between different channels, resulting in consumer cognitive distress and channel encroachment effect [3-4]. To solve these problems, enterprises implement cross-channel integration strategy of online and offline channels. This strategy can not only meet customer expectations for consistent shopping experience, but also improve channel efficiency and further improve enterprise performance [5]. Cross-channel integration refers to the mutual support and the degree of free switching between different channels. It involves diversifying access and integrating processes [6]. By collaboratively managing different channels and customer touchpoints, companies can optimise the customer experience and their market performance [7].

Reviewed the existed research on cross-channel integration, scholars have recognized the importance of cross-channel integration. A review of relevant literature at home and abroad reveals that existing cross-channel integration research has focused on the following aspects: (1) the impact of cross-channel integration, which mainly focuses on the impact on consumers and enterprises. For consumers, cross-channel integration can optimise consumers' shopping experience [7], improve their satisfaction and loyalty to retailers [8], make consumers more inclined to try various types of channels offered by retailers [9], and improve consumers retention rate and participation [10-11]. For companies, cross-channel integration can improve their profits through online and offline price consistency or synergies [12], management capabilities through channel innovation, for example, such as enhancing their development and exploration capabilities [13]. It also facilitates channel synergy [14] and improves the cost efficiency of the enterprise [15]. (2) Research on the influencing factors of cross-channel integration covers both external and internal aspects. Most external factors affecting cross-channel integration of firms focus on external environmental uncertainty, industry concentration and institutional pressure, e.g. Brynjolfsson et al.[5], Cao and Li (2018) [16], Zhang et al. (2017) [17]. Internal factors mainly focus on firm characteristics, internal firm environment and firm capabilities, e.g. Oh et al. (2012) [12], Zhu et al. (2015) [18], Wu and Wu (2015) [14], and Mirzabeikia and Saghiri (2020) [19]. (3) Boundary conditions for cross-channel integration to have an impact, as Tagashira & Minami (2019) explore the moderating role of e-business experience between cross-channel integration and firm performance [15].

The above literature review reveals the following shortcomings in cross-channel integration research: firstly, compared to the impact of cross-channel integration, existing research has paid less attention to the antecedents of cross-channel integration. However, the manufacturer's position in the channel, which is often the key to cross-channel success. Secondly, most studies on the antecedents of cross-channel integration are based on traditional western strategic theories such as transaction cost theory. They not focused on the specific situation in China, and not considered the reality of cross-channel integration of Chinese enterprises. Thirdly, existing research has mainly explored cross-channel integration from the perspective of retailers and consumers, with less focus on cross-channel integration from the perspective of manufacturers.

However, manufacturers logically design the structure and type of channels and determine the functions undertaken by different channels, so cross-channel integration study cannot ignore the

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

manufacturer's perspective. In addition, the process of cross-channel integration has multiple participants such as manufacturers and platforms, requiring manufacturers to collaborate between different channels. The influence, importance and degree of activity of manufacturers in each channel also varies to a certain extent. Based on social network theory, this paper argued that cross-channel integration is also networked, meaning that the network position in the channel where the manufacturer is located will must also have an impact on cross-channel integration. Furthermore, compositional capabilities, as the unique ability of a firm to collaboratively integrate tangible or intangible resources from both its internal and external sources [20], can reflect a firm's ability to effectively acquire, apply, integrate and allocate internal and external resources [21], and also have a significant impact on the collaborative integration between channels. However, there is a lack of attention to whether network location and compositional capabilities affect cross-channel integration and the specific processes that influence it. Finally, cross-channel integration inevitably involves competition and cooperation between channels, and the role of inter-channel co-opetition balance in cross-channel integration also deserves our attention.

In view of the above analysis, under the general trend of multi-channel operation, this paper explored the role of network location and compositional capabilities on manufacturers' cross-channel integration and their mechanisms based on the paradigm of "resource-capability -growth" from the perspectives of social network theory, composition-based view, and co-opetition theory. We examined the role of network location and compositional capabilities in the cross-channel integration of manufacturers and their mechanisms, as well as the mechanism of co-opetition balance in the above-mentioned role.

The main focus of the study is on the following: firstly, based on social network theory, we explored the influence of network location on cross-channel integration under the two dimensions of centrality and structural hole. Secondly, based on the composition-based view, we analyzd the impact of compositional capability on cross-channel integration and further explored the mediating role of compositional capabilities between network location and cross-channel integration. Finally, based on co-opetition theory, we explored the effective boundary of the effect of network location and compositional capability on cross-channel integration. The main contributions of this study are as follows: (1) Based on the network theory and the composition-based view, we focused on the impact of network location and compositional capabilities on cross-channel integration, which enriches the research on cross-channel integration from the perspective of manufacturers. (2) We proposed a research path of network location, compositional capabilities and cross-channel integration, which enriches the research scope of composition-based view. (3) The co-operation balance is introduced to expand the micro knowledge base for research on the cross-channel integration of compositional capability impacts.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Compositional Capability, Network Location and Co-opetition Balance

2.1.1 Compositional capability capability

The composition-based view argues that value creation by a firm is not merely the result of applying

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

some core competency or heterogeneous resource. The composition-based view focuses not on how different the resources or capabilities a firm possesses are compared to its competitors, but on how a firm can creatively integrate the ordinary resources it possesses and the resources it receives from external sources, which in turn gives it an advantage [20]. Compositional capability refer to the unique ability of enterprises to integrate internal and external tangible or intangible resources [21]. Based on the integration of internal resources, it emphasizes the acquisition and use of external resources, not only the integration of resources, but also the integration of "competitive attributes" [22], and the integration of imitation and innovation [23]. Enterprises with compositional capability can sensitively identify the available resources in the external environment. Moreover, they can develop and utilize the external resources obtained and creatively integrate with their resources to establish a new resource capacity collective to obtain a competitive advantage [20]. It is found that compositional capability can help enterprises improve the performance of new service development [24]. It also believed that compositional capabilities are beneficial for companies to improve their new service development performance.

The integration of resources by enterprises can be divided into two kinds of behaviors, namely, resource identification and resource acquisition oriented to the outside of enterprises and the combination and use of internal resources [21]. According to the internal and external behavior of enterprises based on resource integration, we consider that the compositional capability of enterprises include four dimensions: resource bricolage capability, IT capability, managerial ability, and digital intelligence capability. (1) When an enterprise obtained external resources through purchase, the ‘external resources’ become the ‘internal resources’ of the enterprise. Considering that the enterprise needs to continuously integrate the external resources with the existing resources, we propose the resource bricolage capability as one of the dimensions. Resource bricolage capability refers to the ability of enterprises to combine resources at hand to deal with new problems and take advantage of new opportunities to resolve institutional and resource constraints [25]. (2) Information resource sharing among different channels plays an important role in cross-channel collaboration. It is necessary to integrate and develop information resources obtained from outside by IT equipment with excellent performance and experienced IT personnel in the process of resource integration, to obtain new functions and applications and improve the degree of internal information sharing. Therefore, IT capabilities can have a significant impact on cross-channel integration. IT capability refers to the ability of enterprises to invoke, deploy and integrate corresponding internal IT resources, such as various application systems based on IT, to achieve optimal allocation with other types of resources [26]. (3) Managers play an important role in improving the efficiency of internal communication and collaboration, identifying new technologies and products, and integrating them with their capabilities. Therefore, we argued that managerial ability can directly affect cross-channel integration. Managerial ability refers to the ability of managers to effectively identify external resources, control internal resources of enterprises, and transform them into operational efficiency [27-28]. (4) At present, there are some problems in channel management, such as difficulty in channel integration and accuracy of customer operation. Combining with the development status of new technologies such as artificial intelligence, we believe that enterprises need to comprehensively manage and integrate the massive data resources acquired in the whole life cycle of products. Therefore, digital intelligence capability also affects cross-channel integration. Digital intelligence capability refers to the ability to acquire and apply new

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

resources and knowledge related to digital technologies [29]. The digital intelligence capability in cross-channel integration can integrate the data of customers, commodities, inventory, and orders in the whole channel. It also can improve and enrich the intelligent application of data such as channel positioning, intelligent location selection, and customer insight, help channel partners, capture customer needs, and improve the overall channel management level [30].

2.1.2 Network location

Social network theory believes that the binary relation between organizations does not exist in isolation, but is embedded in the social network composed of various entities. Enterprises obtain the required information and resources through the strength of connection with other enterprises in the network, the adjacent position, and the position of structural holes [31]. In the process of cross-channel integration, there are multiple participants such as manufacturers and platforms, which require cooperation among different channels. Therefore, we believe that cross-channel integration also has network attributes. In this paper, we refer to the study of Zhang and Tan (2014) [32] and used two variables, centrality level and structural hole, to measure firm network location.

Centrality level is the degree of proximity to the core position of the enterprise in cross-channel management, which can measure the potential of the enterprise to obtain information independent of other members in the channel, as well as the degree of resource acquisition and control [33]. Based on the research, we defined centrality level as a manufacturer's influence, importance, and activity in different channels [34]. The structural hole theory holds that if an enterprise is associated with many unrelated individuals, the structure will be very beneficial to the enterprise. If companies can act as bridges between two unrelated clusters, the benefits of this structure will be further amplified [35]. The position of structural holes occupied by enterprises can help enterprises to reach differentiated information fields promptly and achieve screening and integration, giving enterprises the right to speak and overall status in the formulation of relevant standards [36]. Based on the research, we defined the structural hole as the information flow gap between enterprises and channels [37]. When the location of the structural hole occupied by the enterprise is more abundant, it means that the enterprise is more in the position of the cluster bridge or the middleman in the channel network, and more non-redundant connections can be obtained.

2.1.3 Co-opetition balance

Co-opetition theory believes that interdependence between enterprises is not only the source of economic value creation but also can be used to share economic value [38]. The relationship between cooperation and competition among enterprises can be called a co-opetition relationship, which is manifested as the interaction between competition and cooperation across bilateral relations [39]. Cross-channel integration is a process of cooperation highly dependent on various channels, but there is also has competition. The competition and cooperation relationships among various channels are not antagonistic. They work together, influence each other, and even transform each other under certain

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

conditions [40]. A cross-channel integration organization is also a kind of organization that contains the relationship of 'competition and cooperation'. Manufacturers need to coordinate and balance the competition and cooperation relationship between various channels, and finally achieve the goal of 'win-win'. Some scholars have found that although there is an efficient cooperation mechanism in the competition-cooperation relationship dominated by co-operation, enterprises cannot promote innovation. However, in the co-opetition relationship dominated by competition, high-intensity competition improves the degree of internal efforts of enterprises. At this time, enterprises place their resources outside the scope of focus enterprises, so they no longer pay attention to the common development of competitors and partners [41]. Therefore, enterprises need to seek a balance between competition and cooperation. We refer to the viewpoint of Yao et al [42]. And defined co-opetition balance as a stable state in which competition and cooperation among channels reach equilibrium. The balance of competition and cooperation between enterprises can create a stable state by offsetting potential challenges and controlling opposing forces [43], and a cooperative competition mechanism that produces more positive results [44].

2.2 Effect of Network Location on Cross-Channel Integration

Enterprise network location can determine the quantity and quality of resources that an organization can have [45]. Enterprises with high centrality are easier to obtain information between various channels, including high-value implicit information and resources needed to judge the future market trend [46]. In the process of cross-channel integration, high-value information can help enterprises more accurately grasp the market trend, help enterprises correctly predict future development, make timely decision-making and adjustment, and provide new products and services that meet the needs of the market. Secondly, the higher the centrality of the manufacturer, the more extensive the direct contact between the manufacturer and other channels, which is conducive to the manufacturer's influence on the attitude and behavior of other channel members, improve its voice in the process of cross channel integration, and help the manufacturer control the synchronization or consistency between different channels for efficient cooperation. Thirdly, the timely received channel information can enable manu-facturers to grasp the latest trends of channel partners in a timely and accurate manner. It can quickly learn about opportunities or threats and prevent events that are not conducive to channel integration.

Moreover, effective cross-channel integration is inseparable from efficient communication between channels. Enterprises occupying rich structural holes can get close to channel partners who are not con-nected. Manufacturers can more easily obtain differentiated information and diverse information and knowledge. At this time, manufacturers can better see and capture new ideas or behaviors from different group elements [47]. At the same time, the non-redundant heterogeneous connection provided by the location of structural holes can enable enterprises to timely access information from different sources, which is conducive to the completion of information screening and integration. In the process of cross-channel integration, effective cooperation among channels is required, and the basis of cooperation is information integration [48]. Through information integration, manufacturers can accurately share information with other channels, formulate plans and channel strategies, which is conducive to cross-channel integration. Thus, we hypothesized the following:

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

H1: Under other same conditions, the manufacturer's network location has a positive impact on enterprise cross-channel integration; (1a) the higher the centrality level of the manufacturer, the higher the degree of cross-channel integration; (1b) the richer the location of structural holes occupied by the manufacturer, the higher the degree of cross-channel integration.

2.3 Effect of Composional Capability on Cross-Channel Integration

Firstly, in the compositional capability, the manufacturer's resource bricolage capability is conducive to enterprises to obtain new knowledge and resources by integrating and reconstructing existing resources [49]. Cross-channel integration means that enterprises coordinate and manage existing channels and media to keep different channels synchronized or consistent and collaborate around sales and services to achieve the purpose of improving enterprise performance and meeting consumer demand [6]. Both of them are similar in utilization methods, and they are rational utilization based on existing resources. Therefore, we can speculate that the enterprise with stronger resource bricolage capability can make better use of the existing resources for reconstruction and develop new resources that cannot be copied in the process of cross-channel integration. Accordingly, the enterprise will integrate various resources between channels better and improve the level of cross-channel integration.

Secondly, to provide a consistent cross-channel experience, manufacturers must integrate their data, which requires a high degree of information sharing within the enterprise organization. IT capability can improve the degree of internal information sharing and make up for the defects in information processing in the process of supply chain coordination and cooperation [50-51]. In the process of implementing cross-channel integration, enterprises will rely on their own capability. Enterprises with stronger IT capability will have more technical knowledge and skills to support their business activities and better carry out cross-channel integration.

Moreover, enterprises are full of uncertainty in the implementation of the cross-channel integration strategy. At this time, excellent managers have strong abilities in resource information integration and optimization, risk control, opportunity discovery, and learning [52]. They can properly evaluate, operate and allocate internal and external resources of the enterprise, to improve the cost efficiency and income efficiency of the enterprise. In addition, according to the resource dependence theory, managers' relationship networks and social resources are an important guarantee for enterprise development. Managers can not only make more effective use of their tangible resources but also make better use of intangible resources such as stakeholders. Therefore, we can speculate that the ability of enterprise managers has a positive impact on cross-channel integration.

Finally, the digital intelligence capability of manufacturers refers to the ability to acquire and apply new resources and knowledge related to digital technology [29]. As a form of digital intelligence of enterprises, digital intelligence of channel integration can integrate all channel customer, commodity, inventory, and order data, improve and enrich data intelligence applications such as channel positioning, intelligent location, and customer insight. It can help channel partners capture customer needs and improve

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

the overall channel management level [30], which is particularly important for enterprises carrying out cross-channel integration. Enterprises with digital intelligence can not only use digital intelligence to understand customers and how customers use multiple channels to search for information, but also improve the collaborative efficiency of online and offline logistics [53], so that customers can obtain a consistent shopping experience in all channels. Thus, we hypothesized the following:

H2: Under other same conditions, the compositional capability of manufacturers has a positive impact on their cross-channel integration: (2a) resource bricolage capability has a positive impact on enterprise cross-channel integration; (2b) IT capability has a positive impact on enterprise cross-channel integration; (2c) managerial ability has a positive impact on the cross-channel integration of enterprises; (2d) digital intelligence capability has a positive impact on enterprise cross-channel integration.

2.4 Intermediary Role of Composional Capability

The network location can bring high-quality resources. A high level of centrality means that enterprises have a high degree of resource acquisition and control. Rich structural holes mean that enterprises can have non-redundant heterogeneous knowledge and resources. Referring to Penrose's ‘resource-capability-growth’ analysis paradigm, that is, the source of enterprise growth is the ability of the enterprise, and the ability comes from the resources owned by the enterprise [54], we believe that the enterprise has a high level of network centrality and rich structural holes, which will help to improve its compositional capability and improve the level of cross-channel integration. High-level network location can enable enterprises to obtain high-quality resources, and enterprises can search their resources and capabilities more conveniently and quickly to meet their own needs. At the same time, in order to ensure the efficient utilization of resources, enterprises will also tend to quickly improve their own ability to realize the efficient utilization of resources.

In addition, the compositional capability can further improve the manufacturer's cross-channel integration level. The enterprise obtains resources from the outside, but the lack of high-level compositional capability means that the enterprise may not be able to integrate and reconfigure these resources, and cannot effectively apply the new resource capability aggregate to the process of cross-channel integration, so it is difficult to improve the level of channel integration. Enterprises with compositional capability can not only sensitively identify externally available resources, but also develop and allocate the obtained external resources, to achieve the purpose of creative integration with internal resources. Compared with competitors, enterprises with compositional capability have the faster market response and higher cost performance [55], which is conducive to the improvement of their cross-channel integration level. Thus, we hypothesized the following:

H3: Under other same conditions, the manufacturer's resource bricolage capability plays an intermediary role between network location and enterprise cross-channel integration: (3a) resource bricolage capability plays an intermediary role between centrality and enterprise cross-channel integration; (3b) resource bricolage capability plays an intermediary role between the structural hole and enterprise

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

cross-channel integration.

H4: Under other same conditions, the IT capability owned by manufacturers plays an intermediary role between network location and enterprise cross-channel integration: (4a) IT capability plays an intermediary role between centrality and enterprise cross-channel integration; (4b) IT capability plays an intermediary role between the structural hole and enterprise cross-channel integration.

H5: Under other same conditions, the manufacturer's managerial ability plays an intermediary role between network location and enterprise cross-channel integration: (5a) managerial ability plays an intermediary role between centrality and enterprise cross-channel integration; (5b) managerial ability plays an intermediary role between the structural hole and the cross-channel integration of enterprises.

H6: Under other same conditions, the manufacturer's digital intelligence capability plays an intermediary role between network location and enterprise cross-channel integration: (6a) digital intelligence capability plays an intermediary role between centrality and enterprise cross-channel integration; (6b) digital intelligence capability plays an intermediary role between the structural hole and enterprise cross-channel integration.

2.5 Moderating Effect of the Co-opetition Balance

The process of cross-channel integration is deeply embedded in the channel network. In daily life, we can find that the channels of enterprises not only include online and offline traditional shopping platforms but also live broadcasting platforms derived from. As new channels, they also occupy an important position. The complex internal relationship between channels is also a multi-party game between channels. This paper holds that when the competition and cooperation relationship between enterprises and various channels tends to balance, the positive effect of compositional capabilities on cross-channel integration will be strengthened.

First of all, the essence of the coopetition relationship is the complementary use of advantageous elements. The combination of complementary resources and capabilities enables both competitors to make full use of their respective advantages and resources to fill resource gaps and make up for each other's shortcomings [44]. Therefore, for enterprises which integrate cross-channel, the coopetition relationship among channels will affect the circulation of resources among channels. When the competition relationship occupies the dominant position of the coopetition relationship, all channels will regard each other as strong competitors, the flow of information and resources among channels will inevitably be hindered, and the exertion of compositional capabilities will be limited to a certain extent. When the cooperative relationship is dominant, the stimulation and pressure brought by the competitive relationship will be reduced, but at this time, the dependence psychology and inertia between channels will appear [56]. At this time, the compositional demand of enterprises for resources will be reduced, which will weaken the impact of compositional capability on cross-channel Integration. When the co-opetition balance between channels is reached, enterprises with compositional capabilities can obtain external key resources between channels in

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

a more timely manner and add them to existing resources for rapid utilization and reconstruction, put new resources and capabilities into the production and service of the enterprise, create its unique competitive advantage and improve the level of cross-channel Integration. Thus, we hypothesized the following:

H7: Under other same conditions, the co-opetition balance between manufacturers and various channels will strengthen the positive impact of compositional capabilities on enterprise cross-channel integration: (7a) the co-opetition balance will strengthen the positive impact of resource bricolage capability on enterprise cross-channel integration; (7b) the co-opetition balance will strengthen the positive impact of IT capability on enterprise cross-channel integration; (7c) the co-opetition balance will strengthen the positive impact of managerial ability on the cross-channel integration of enterprises; (7d) the co-opetition balance will strengthen the positive impact of digital intelligence capability on the cross-channel integration of enterprises. Based on the hypothesis above, we construct the theoretical model. The theoretical model is shown in Fig 1.

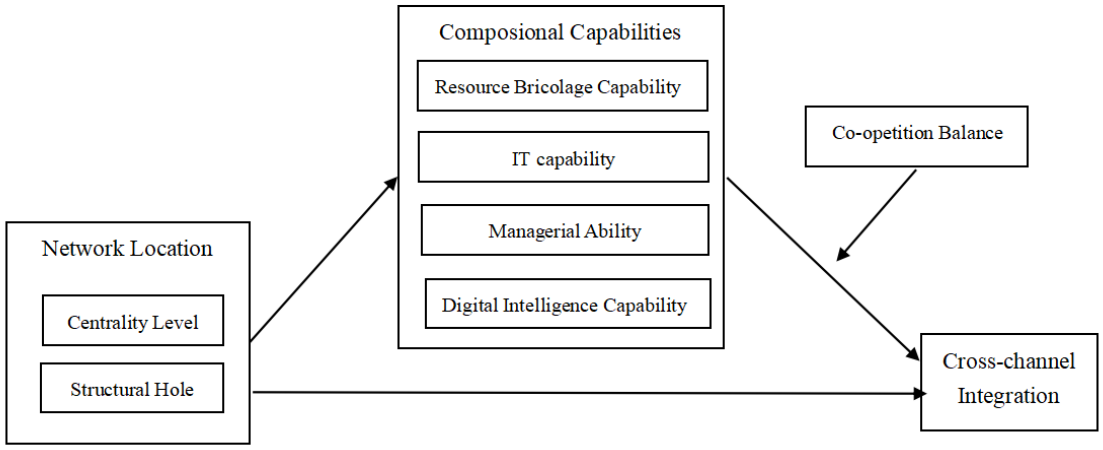

Fig 1: Conceptual model

III. METHODS AND RESULTS

3.1 Data Collection

The data collection and analysis were carried out to verify the conceptual model. The measurement of each variable is based on a mature scale. At the same time, all scales were translated and back-translated between Chinese and English. And the two researchers independently verified the translated scale to ensure accuracy. Questionnaires were mainly filled out by channel managers in manufacturing enterprises. The questionnaire was mainly collected by alumni relationship network and enterprise cooperation. After dropped those who failed the attention check, we obtained 213 valid questionnaires. Characteristics of the samples enterprises studied in this thesis are shown in TABLE I. All questionnaire respondents had been engaged in channel sales for more than 1 year, of which 19.72%, 40.85%, and 39.44% had been engaged in

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

channel sales for 1-3 years, 4-6 years, and more than 7 years respectively. The survey respondents are all channel sales managers, of which 19.25% are senior managers, 43.25% are middle managers and 37.56 are grassroots managers.

TABLE I. Sample distribution features

TYPES		SAMPLES	RATIOS/%	TYPES		SAMPLES	RATIOS/%
Gender	Female	107	50.23	Years of service	1-3	42	19.72
	Male	106	49.77		4-6	87	40.85
Age	25~35	182	85.45		7-10	67	31.46
	36~45	29	13.62		More than 10	17	7.98
	46~55	2	0.94	Competitive position	Disadvantage	1	0.47
Industry	Textile & Garment	32	15.02		No advantage	10	4.69
	Machinery	33	15.50		Small advantage	147	69.01
	Electrical	12	5.63		Large advantage	52	24.41
	Medical Equipment	17	7.98		Absolute advantage	3	1.41
	Electronics	51	23.94	Market share trend	Reduced	20	9.39
	Food & Beverage	16	7.51		Maintain Stability	91	42.72
	Software industry	27	12.68		Slight Increase	94	44.13
	Household appliances	5	2.35		Considerable Increase	8	3.76
	Others	20	9.39	Number of online platforms	Less than 3	50	23.47
Position	Top managers	41	19.25		3-5	110	51.64
	Middle managers	92	43.25		5-8	41	19.25
	Grass-root managers	80	37.56		More than 8	12	5.63

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

3.2 Measurements and Results

Measurements were completed using a 5-point Likert scale anchored by 1=strongly disagree and 5=strongly agree.

3.2.1 Independent variables

Network location of an enterprise is measured along two dimensions, namely, centrality level, structural holes. Centrality level was measured based on the scale developed by Dong (2017) [57], including three items. Structure holes was measured based on the scale developed by Wang and Xie (2012) [58], including three items.

3.2.2 Intermediary variables

Compositional capability of an enterprise is measured along four dimensions, namely, resource bricolage capability, IT capability, managerial ability, digital intelligence capability. Resource bricolage capability was measured based on the scale developed by Senyard et al. (2014) [59], including three items. IT capability was measured based on the scale developed by Zhuang et al. (2019) [60], including six items. Managerial ability was measured based on the scale developed by Carmel and Tishler (2004) [61], Jimene and Fuentes (2016) [62], including four items. Digital intelligence capability was measured based on the scale developed by Zhou (2013) [63], including three items.

3.2.3 Adjustment variables

Based on the calculation method of alance by He and Wong (2004) [64], the co-opetition balance is calculated by the absolute value of the difference between competition relationship and cooperation relationship. The smaller the value, the higher the co-opetition balance. Competition relationship was measured based on the scale developed by Fynes and Voss (2002) [65], including three items. Cooperative relationship was measured based on the scale developed by Song et al. (2006) [66] including three items.

3.2.4 Dependent variable

Cross-channel integration was measured based on the scale developed by Zhuang et al. (2019) [6], including three items.

3.2.5 Control variables

Our control variables were mainly industry (FI), years (FY), type (FT), size (FS). The enterprise year refers to the number of years the enterprise has operated. The size of the enterprise is primarily measured by the number of employees in the company.

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

3.3 Measurement Items, Reliability and Validity

Confidence and validity of the reflective scale were tested in this study using AMOS 24.0 for validation factor analysis. The results showed in TABLE II that the Cronbach's coefficient used was above 0.6, the combined reliability coefficient CR values were above 0.8, the factor load of most variable items was greater than 0.7 and the average variance extraction amount of average variance extracted (AVE) values were all above 0.5, which indicated that the reliability of the questionnaire was good, and it had sufficient unity and copolymer validity. The adaptability index values for this study model were CMIN/DF=1.319, RMESA=0.039, IFI=0.921, CFI=0.919, TLI=0.909. The results of the validation factor analysis of the questionnaire based on the evaluation criteria for each of the above indicators were ideal, that is, the questionnaire is effective.

TABLE II. Measurement items, reliability and validity

VARIABLE	ITEMS	FACTOR LOADINGS
Resource bricolage capability α=0.625 CR=0.800 AVE=0.572	When face challenges, we are confident that company can use existing resources to find viable solutions	0.795
	Companies are good at using existing resources to deal with new problems or opportunities in cross-channel integration	0.766
	By integrating the company's existing resources, we successfully deal with new challenges.	0.706
IT capability α=0.800 CR=0.858 AVE=0.505	Compared with competitors in the same industry, the company has advanced computer equipment	0.789
	The performance of the company ' s computer equipment is satisfactory (e.g. fast data processing and fast program opening)	0.802
	The company owns enterprise application software systems (e.g. Lotus Notes, self-developed manage- ment information systems)	0.693
	Our company has experienced IT technicians	0.655
	In addition to professional areas, IT technicians have knowledge and skills in other relevant areas (e.g. software developers have the ability to maintain computer networks)	0.565
	Company IT technicians can develop their own software	0.731
Managerial ability α=0.719 CR=0.826 AVE=0.543	Managers of the company can attract and retain high-quality and valuable employees	0.729
	Managers can unify conflicting opinions and strengthen coordination and effective cooperation among employees	0.737
	Managers can identify new opportunities and potential threats	0.709
	Managers can develop a more effective strategic planning system for the overall development of the enterprise	0.772
Digital intelligence capability	Through the integration and application of digital and intelligent technologies, the company centrally manages all data in the whole product life cycle	0.802

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

α=0.702 CR=0.835 AVE=0.627	The company comprehensively manages all its resources through the integration and application of digital and intelligent technologies	0.817
	Through the integration and application of digital and intelligent technologies, the company integrates information from supply decision-making to its internal departments, and then to end users	0.756
Centrality level α=0.687 CR=0.827 AVE=0.615	The central position of the company in cross channel management is obvious	0.78
	The company's position in cross channel management drives the addition of new channels	0.754
	The company's position in cross channel management has enhanced the trust of all channels in the company	0.818
Structural holes α=0.694 CR=0.829 AVE=0.618	The company can clearly identify the closeness of the relationship between different channels.	0.803
	The company often plays the role of "middleman" in the communication and exchange between different channels	0.753
	The company can divide each channel into groups according to the close relationship with each channel	0.802
Cooperation relationship α=0.671 CR=0.820 AVE=0.603	Different channels of the company are willing to share information in real time and completely	0.776
	Good communication and cooperation relations have been established between different channels of the company	0.799
	Different channels of the company are willing to jointly solve the problems in channel cooperation	0.754
Competition relationship α=0.875 CR=0.923 AVE=0.800	The relationship between different channels of the company is sometimes nervous	0.899
	There are many irreconcilable contradictions between different channels of the company	0.88
	Due to differences and tensions, channel cannibalism will occur among different channels of the company	0.904
Cross-channel Integration α=0.773 CR=0.929 AVE=0.547	The prices of products sold by the company through multiple channels are consistent	0.849
	The promotion information in multiple channels of the company is consistent	0.798
	The service level provided by multiple channels of the company is consistent	0.532
	The company's operation system supports the sharing of inventory information among various channels	0.712
	The company's operation system supports the sharing of logistics information among various channels	0.814
	The company's operation system supports the sharing of order information among users in various channels	0.802
	The company's operating system supports online purchase, pick-up, return or repair of physical stores	0.575
	The company's online channels provide 24-hour services for physical store consumers	0.712

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

	The company sells some special products through online channels (small sales in physical stores or products for specific users)	0.666
	The company's operation system supports users to query the product sales information of offline channels through online channels	0.801
	The company's operation system supports users to obtain points and coupons, which can be used in all channels	0.801
Model fit	CMIN/DF=1.319, RMESA=0.039, IFI=0.921, CFI=0.919, TLI=0.909	

Before the regression analysis, in order to avoid the effects of multi-collinearity, the independent variable and the regulated variable were separately standardized, and then the interaction terms were calculated. We tested the variance inflation factors of the independent variable and the regulated variable. The results showed the VIF values of all variables were between 1.078 and 1.964 and far below the critical value of 10, indicating that there was no serious multi-collinearity problem.

The mean, standard deviation, and correlation coefficient of variables are shown in TABLE III.

TABLE III. Means, standard deviations, and correlation coefficients of variables

VARIABLES	MEAN	SD	Cross channel integration	Resource bricolage capability	IT capability	Managerial ability	Digital intelli-gence capability	Centrality level	Struc-tural holes	Coop era-tion relati on-ship	Compe-tition relati on-ship
1	4.006	0.501	**0.740**								
2	4.161	0.504	0.490***	**0.756**							
3	3.944	0.635	0.403***	0.475***	**0.711**						
4	4.111	0.600	0.470***	0.556***	0.425***	**0.737**					
5	4.020	0.619	0.469***	0.518***	0.637***	0.368***	**0.792**				

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

6	4.034	0.535	0.469***	0.498***	0.481***	0.530***	0.493***	**0.784**			
7	4.039	0.589	0.431***	0.471***	0.354***	0.517***	0.399***	0.558***	**0.786**		
8	4.125	0.611	0.560***	0.428***	0.450***	0.422***	0.376***	0.481***	0.412***	**0.777**	
9	2.515	1.052	-0.270***	-0.176**	-0.124*	-0.169***	-0.091*	-0.128*	-0.078**	-0.240**	**0.894**

Note. ***, **, * respectively denote $p < 0.001$, $p < 0.01$, $p < 0.05$; The value on the diagonal is the square root of the corresponding variable AVE.

3.4 Common Method Variance

The data on all variables came from the same source, therefore this suggests that CMV might be a concern. First, respondents were ensured the anonymity and confidentiality of their responses to reduce concerns about evaluation apprehension and social desirability. Second, we employed a psychometric separation by placing independent, dependent, moderator, and mediator variables into different pages of the questionnaire to minimize the respondents' perception of any direct association between these variables. Third, we performed Harman's one-factor test to address the potential influence of CMV, and the first factor explained variance of 24.487%, which could not account for the majority of the variance. The results also showed that no single factor is separated out, and the separated factor explains 62.338 % of the total variable. Fourth, we employed Common Latent Factor (CLF) approach in the model, CMV was tested by deducting standardized regression weights without CLF from the standardized regression weights with CLF. The outcomes did not exceed suggested threshold value of 0.2[67]. Finally, we performed CFA with a single latent factor, a very poor model fit was observed ($\chi 2 = 1671.267$, df =702, $\chi 2/df = 2.381$, CFI =0.629, TLI =0.608, IFI =0.634, RMSEA=0.081, RMR =0.079)

3.5 Regression Analysis

This study mainly discusses the impact of network position on cross-channel integration through the intermediary path of the compositional capability change, and the moderating effect of co-opetition balance between compositional capability and cross-channel integration. An SPSS regression was performed, and the results are shown in TABLE IV, TABLE V, Table VI and TABLE VII.

3.5.1 Mediating effects

The results of regression analysis are shown in TABLE IV. In model 1-6 showed that after the effects

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

of other variables were controlled, the two dimensions of network location, namely centrality level and structural hole was positively correlated with the extent of cross-channel integration. This indicated that the centrality level and structural hole had significant positive correlation to the extent of cross-channel integration, and thus H1a, H1b were supported.

Model 2-5 analyzed the impact of compositional capability on cross-channel integration. The results showed that resource bricolage capability had a positive effect on cross-channel integration (β= 0.299, p < 0.001). IT capability had an positive effect on cross-channel integration (β= 0.228, p < 0.01). Managerial ability had an positive effect on cross-channel integration (β= 0.262, p < 0.001). Digital intelligence capability had an positive effect on cross-channel integration(β= 0.287,p < 0.001). Therefore, H2a, H2b, H2c and H2d were supported.

TABLE IV. Regression analysis

	VARIABLES	FI	FT	FY	FS	CL	SH	RB	ITC	MA	DIC	R^2	△R^2	F
CCI	MODEL 1	0.072	-0.003*	-0.038	-0.112	0.346***	0.266***					0.282	0.277	13.485***
	MODEL 2	0.077	-0.012	-0.037	-0.104	0.242**	0.183*	0.299***				0.344	0.062	15.377***
	MODEL 3	0.052	0.002	-0.046	-0.141*	0.253**	0.240**		0.228**			0.32	0.038	13.791***
	MODEL 4	0.086	-0.022	-0.034	-0.1	0.251**	0.184*			0.262***		0.326	0.044	14.146***
	MODEL 5	0.044	-0.013	-0.036	-0.126*	0.229**	0.215**				0.287***	0.341	0.059	15.186***
	MODEL 6	0.061	-0.026	-0.035	-0.116	0.130*	0.128*	0.163*	0.143*	0.171*	0.192*	0.392	0.11	13.029***
RB	MODEL 7	-0.018	0.032	-0.004	-0.026	0.348***	0.278***					0.304	0.289	14.998***
ITC	MODEL 8	0.087	-0.022	0.033	0.126	0.407***	0.118*					0.268	0.22	12.578***
M	MODE	-0.	0.0	-0.	-0.	0.3	0.3					0.3	0.3	19.4

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

A	**L 9**	054	74	014	045	63***	14***					61	37	32***
DIC	**MODEL 10**	0.099	0.036	-0.007	0.049	0.406***	0.178*					0.279	0.261	13.285***

Notes:***p < 0.001,**p < 0.01,*p < 0.05

Then we tested whether RB, ITC, MA, DIC played a mediating role between CL and CCI, SH and CCI. Followed the method of Wen et al., the steps are as follows: (1) Tested the standardized regression coefficient c of independent variables to dependent variables, if the result was significant, continued the following test, otherwise stop the intermediary role analysis. (2) Tested the standardized regression coefficients a and b of the independent variables to the mediating variables and the mediating variables to the dependent variables. If a and b are both positive significant correlation, the standard regression coefficient c' containing independent variables to dependent variables is tested. If c' is not significant, it indicates that it has full mediation effect. If c' is significant, it indicates that has partial mediation effect. If a and b are at least one is significant, Sobel test is needed. We constructed eight models: CL→RB→CCI, CL →ITC→CCI, CL→MA→CCI, CL→DIC→CCI, SH→RB→CCI, SH→ITC→CCI, SH→ITC→CCI, SH→DIC→ CCI. We used these steps mentioned above to tested the mediating effect in our model. The results are shown in TABLE V.

TABLE V. Mediating effects

MODEL	*c*	*a*	*b*	*c'*	RESULTS
CL→RB→CCI	0.346	0.348	0.299	0.242	Partial mediation effect
CL→ITC→CCI	0.346	0.407	0.228	0.253	Partial mediation effect
CL→MA→CCI	0.346	0.363	0.262	0.251	Partial mediation effect
CL→DIC→CCI	0.346	0.406	0.287	0.229	Partial mediation effect
SH→RB→CCI	0.266	0.278	0.299	0.183	Partial mediation effect
SH→ITC→CCI	0.266	0.118	0.228	0.240	Partial mediation effect
SH→ITC→CCI	0.266	0.314	0.262	0.184	Partial mediation effect
SH→DIC→CCI	0.266	0.178	0.287	0.215	Partial mediation effect

In Model 7, it showed that centrality level and structural holes had positive effects on RB (centrality level: β=0.348,p < 0.001, structural holes: β=0.278,p < 0.001) . In Model 2, the result showed that RB had positive effects on CCI (β= 0.299, p < 0.001), and the influence of centrality level and structural holes on CCI was still significant, but the significant coefficient decreased (centrality level: β=0.242,p < 0.01 ;

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

structural hole: β=0.183,p < 0.05). It indicated that RB had partial mediation effect between DL and SH and CCI. Therefore, H3a, H3b were supported.

In Model 8, it showed that centrality level and structural holes had positive effects on ITC (Centrality level: β=0.407,p < 0.001, structural holes: β=0.118,p < 0.05). In Model 3, the result showed that ITC had positive effects on CCI (β=0.228,p < 0.01), and the influence of centrality level and structural holes on CCI was still significant, but the significant coefficient decreased (centrality level : β=0.253,p < 0.01; structural hole: β=0.240,p < 0.01). It indicated that ITC had partial mediation effect between DL and SH and CCI. Therefore, H4a, H4b were supported.

In Model 9, it showed that centrality level and structural holes had positive effects on MA (centrality level: β=0.363,p < 0.001, structural holes: β=0.314,p < 0.001). In Model 4, the result showed that MA had positive effects on CCI (β=0.262,p < 0.001), and the influence of centrality level and structural holes on CCI was still significant, but the significant coefficient decreased (centrality level :β=0.251, p < 0.01; structural hole: β=0.184,p < 0.05). It indicated that MA had partial mediation effect between DL and SH and CCI. Therefore, H5a, H5b were supported.

In Model 10, it showed that centrality level and structural holes had positive effects on DIC (centrality level: β=0.406,p < 0.001, structural holes: β=0.178,p < 0.05). In Model 5, the result showed that DIC had positive effects on CCI (β=0.287,p < 0.001), and the influence of centrality level and structural holes on CCI was still significant, but the significant coefficient decreased (centrality level :β=0.229,p < 0.01; structural hole: β=0.215,p < 0.01). It indicated that DIC had partial mediation effect between DL and SH and CCI. Therefore, H6a, H6b were supported.

Finally, in order to control the interaction between four abilities, we put the RB, ITC, MA, DIC together in Model 6. The results showed that the influence of centrality level and structural holes on CCI was significant, but the significant coefficient is lower than that of Model 1 (centrality level: β=0.130,p < 0.05; structural holes: β=0.128,p < 0.05), and the positive effect of compositional capability on CCI is still significant (RB: β=0.163, p < 0.05; ITC: β=0.143, p < 0.05; MA: β=0.171, p < 0.05; DIC: β=0.192, p < 0.05), and no multicollinearity. Therefore, H2~H6 were supported.

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

3.5.2 Moderating effect

The results are shown in Table VI. In Model 11, it showed that the interaction item of co- opetition balance and RB has a negative effect on CCI(β=-0.112,p < 0.05). It indicated that the smaller the value of co-opetition balance, the higher the value of CCI, and the smaller the value of co-opetition balance, the higher the degree of co-opetition balance. Therefore, co-opetition balance had positive moderating effect between RB and CCI, H7a were supported. Similarly, in Model 12, Model 13 and Model 14, they can be showed that co-opetition balance had positive moderating effect between ITC and CCI(β=-0.141,p < 0.05), H7b is supported. But the showed that co-opetition balance has no moderating effect between MA and CCI(β=-0.075,p > 0.05), H7c is not supported. It also showed that co-opetition balance had positive moderating effect between DIC and CCI(β=-0.128,p < 0.05), H7d was supported.

Table VI. Moderating effect

VARIABLE	CCI			
	MODEL 11	MODEL 12	MODEL 13	MODEL 14
Control variable				
FI	0.068	0.068	0.077	0.055
FT	-0.004	-0.014	-0.007	-0.020
FY	-0.008	0.004	0.001	0.003
FS	-0.104	-0.149*	-0.114*	-0.134*
Independent variable				
CL	0.206**	0.238**	0.223**	0.190**
SH	0.137*	0.184**	0.150*	0.164*
RB	0.201**			
ITC		0.111*		
MA			0.155*	
DIC				0.226***
Regulated variable				
CO	0.332***	0.353***	0.340***	0.337***
Interaction items				
RB*CO	-0.112*			
ITC*CO		-0.141*		
MA*CO			-0.075	
DIC*CO				-0.128*
R^2	0.439	0.428	0.422	0.447
$\triangle R^2$	0.157	0.146	0.140	0.165
F	17.641***	16.880***	16.462***	18.200***

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

Notes:***p < 0.001,**p < 0.01,*p < 0.05

In TABLE VII, it showed the moderating effect on compositional capability at different levels of co-opetition balance, and drawed the moderating effect diagram (Fig 2 ~ Fig 4). In Fig 2, it showed that the slope of the dotted line represented by co-opetition balance is greater than that represented by no co-opetition imbalance. That is, the more balanced the competition relationship and cooperation relationship between different channels is, the impact of RB on CCI showed a significant increasing trend, and H7a was supported. Similarly, in Fig 3 and Fig 4, they can be showed that the slope of the dotted line represented by co-opetition balance is greater than that represented by co-opetition imbalance. Thus, H7b and H7d were supported.

TABLE VII. Regulatory effects at different levels of co-opetition balance

REGULATION PATH	CO-OPETITION BALANCE	EFFECTS	BOOT SE	BOOT LLCI	BOOT ULCI
RB-CCI	M-1SD	0.316	0.08	0.159	0.474
	M	0.201	0.065	0.072	0.328
	M+1SD	0.084	0.094	-0.101	0.269
ITC-CCI	M-1SD	0.200	0.060	0.082	0.318
	M	0.111	0.052	0.014	0.189
	M+1SD	-0.025	0.076	-0.175	0.125
DIC-CCI	M-1SD	0.284	0.066	0.155	0.413
	M	0.226	0.051	0.083	0.283
	M+1SD	0.082	0.066	-0.048	0.212

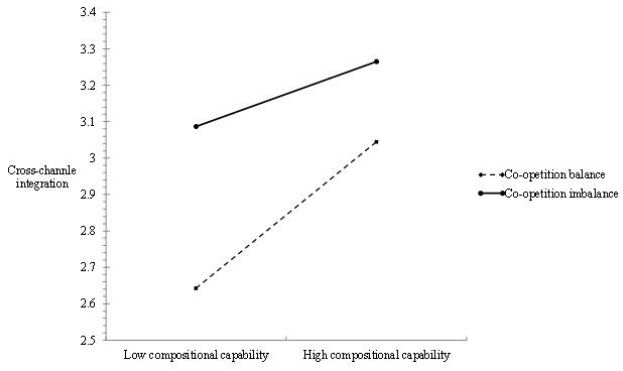

Fig 2: The regulatory role of co-opetition balance between RB and CCI

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

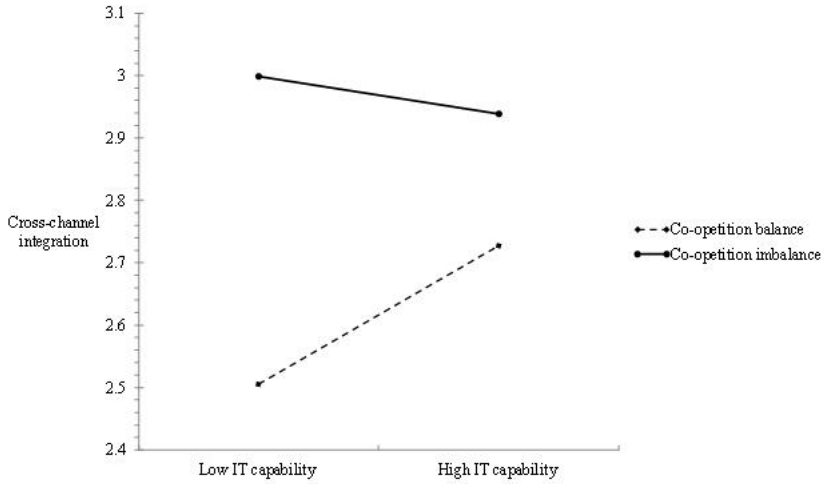

Fig 3: The regulatory role of co-opetition balance between ITC and CCI

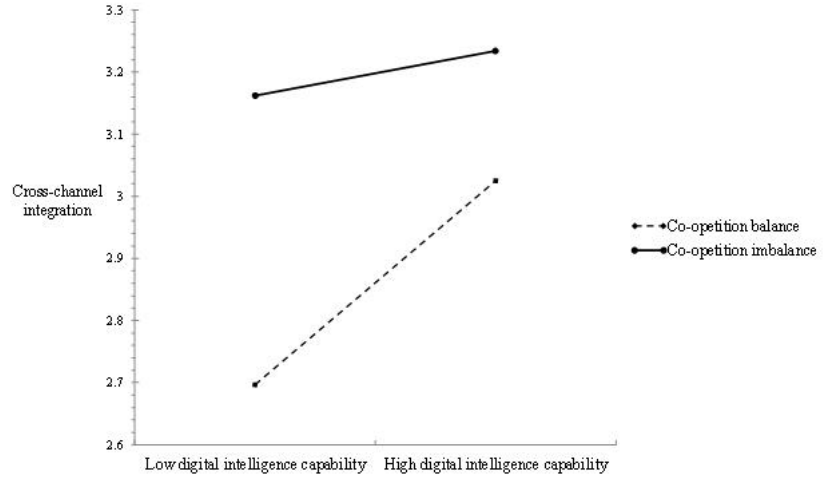

Fig 4: The regulatory role of co-opetition balance between DIC and CCI

VI. CONCLUSIONS AND DISCUSSIONS

This study examined the effects of network location and compositional capability on cross-channel integration and the moderating role of co-opetition balance between compositional capability and cross-channel integration using 213 manufacturers' managers as respondents. The empirical results showed that: network location and compositional capability are important antecedent variables to improve manufacturers' cross-channel integration. All four dimensions of compositional capability (resource bricolage capability, IT ability, managerial ability, and digital intelligence capability) partially mediate the relationship between network location and cross-channel integration. Competitive balance positively moderates the relationship between resource bricolage capability, IT ability, and digital intelligence capability and cross-channel integration. Co-opetition balance positively moderates the relationship

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

between resource bricolage capability, IT ability and digital intelligence capability and cross-channel integration.

4.1 The Impact of Network Location on Cross-Channel Integration

There is a significant positive correlation between network location and enterprise cross-channel integration, which means a high level of centrality and the position of rich structural holes are beneficial for enterprises to carry out cross-channel integration. As the coordinator of the entire cross-channel network, enterprise can acquire and integrate required resources quickly and efficiently. With the help of structural holes, enterprises can obtain the heterogeneous resources in the cross-channel integration they need in time. Enterprises can also control the transmission of resources and information among channels. All of these can have a positive effect on cross-channel integration.

4.2 The Impact of Compositional Capability on Cross-Channel Integration

There is a significant positive correlation between compound capability and enterprise cross-channel integration, which means resource bricolage capability, IT ability, managerial ability and digital intelligence capability are conducive to the cross-channel integration of enterprises. This illustrates that in the process of cross-channel integration, the resource bricolage capability can help enterprises utilize and reorganize information and resources efficiently, which is conducive to the cross-channel integration of enterprises. In addition, enterprises can make use of IT capabilities to communicate with channel partners frequently and timely, which contributes to timely information exchange and sharing among various channels. Moreover, as the direct decision-making body of the enterprise, competent managers can improve the efficiency of existing resource allocation and cooperate with all channels effectively to improve the effect of cross-channel integration. Finally, digital intelligence capability can help enterprises visualize the data of consumer behavior, so that companies can access consumer data resources at a lower cost. Meanwhile, it can help enterprises analyze and process the data and information from all channels effectively, and improve the channel cooperation efficiency and cross-channel integration effect.

4.3 The Mediating Effect of Compositional Capability

Network location can influence cross-channel integration by affecting compositional capability which plays a partial mediation effect. This indicates that network location has a positive effect on cross-channel integration through the path of compositional capability. This is not only consistent with the "resource-capability-growth" analysis paradigm proposed by Penrose, but also consistent with the view of composition-based view. That is, enterprises can make up for their lack of ability by obtaining external resources and integrating internal and external resources, in order to achieve competitive advantage.

4.4 The Moderating Effect of Co-opetition Balance

Co-opetition balance plays a moderating role among resource bricolage capability, IT capability and digital intelligence capability and cross-channel integration. This indicates that when the competition and

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

cooperation of various channels reach a balanced and stable state, the resource bricolage capability, IT ability and digital intelligence capability can maximize efficiency to meet the capacity demand of cross-channel integration. However, the co-opetition balance among channels does not significantly improve the effect of managerial ability on cross-channel integration. The possible reason is that, co-opetition balance can achieve the complementary of advantage elements of each channel, and enterprises can make use of their own advantages and resources to fill resource gap and make up for each other's deficiencies and weaknesses [44]. When the managerial ability is strong, the enterprise can adjust the co-opetition relationship among channels flexibly [68]. That is, no matter whether the co-opetition relationship among channels is balanced or not, managers can make reasonable use of advantage elements of each channel according to the actual situation, in order to make up for the inferiority and deficiencies of their own resources. At this time, co-opetition relationship among channels will also develop in a direction that is conductive to cross-channel integration. Thus, whether the co-opetition relationship among channels is balanced or not will not generate significant difference in the effect of managers' ability on cross-channel integration.

V. THEORETICAL CONTRIBUTION AND PRACTICAL ENLIGHTENMENT

The findings of this study have important theoretical contributions and managerial practical values. Theoretically, by examining the drivers affecting manufacturers' cross-channel integration and identifying the differential impact of inter-channel co-opetition balance on compositional capability on cross-channel integration, it not only deepens and enriches social network theory, composition-based view and co-opetition theory, but also helps corporate managers to develop a deep understanding of network location, compositional capability and their mechanisms of action on cross-channel integration and the underlying mechanisms.

The findings of this paper have important implications for cross-channel integration of manufacturers in China.

Companies should pay attention to the development of their own compositional capabilities. First, companies should pay attention to the role of resource bricolage capability. Companies should expand their knowledge of resources, and then creatively reorganize existing resources and realize creative use of resources as a way to deal with new problems or opportunities in cross-channel integration. Secondly, enterprises should increase the investment in IT equipment. While the equipment is updated in time, platforms such as electronic information management systems can be introduced to improve the level of enterprise network construction. At the same time, enterprises should pay attention to IT personnel training, such as regular skills training for IT personnel, so as to improve their knowledge and skills. Thirdly, companies should pay attention to the important role of managerial ability in cross-channel integration. For example, to optimize manager selection, assessment, and training mechanisms, special attention should be paid to the role played by managers in employee cooperation, opportunity and threat identification, and overall corporate strategic layout, and to select and train excellent corporate managers. The ultimate goal is to enhance their managerial capabilities. Fourth, enterprises should accelerate the construction and

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

application of digital intelligence infrastructure, especially the application of digital intelligence technology in product production and resource management. Give full play to data application scenarios. Build a digital intelligence ecosystem to connect with end-customers.

Moreover, enterprises should take the initiative to embed in the channel network. Enterprises should fully understand and pay attention to the importance of channel network. They should actively build cooperation network with each channel to gain the trust of each channel. Enterprises also should strive to occupy the central position in the channel network and drive the entry of new channels. In addition, companies need to cooperate with more heterogeneous companies and play the role of "intermediaries" in the network. It is also necessary to build a "bridge" of communication and exchange between channels, so as to obtain better resources and information.

Finally, enterprises should pay attention to the co-operation relationship with each channel partner and build a co-operation balance. Enterprises should share information and establish good communication and collaboration with each channel. However, it should be noted that in the process of cross-channel integration, carrying out a high level of cooperation with all channels but deliberately suppressing competition is not beneficial. Enterprises should maintain a dynamic balance between the two opposing forces of competition and cooperation.

VI. LIMITATIONS AND FUTURE RESEARCH

This study has some limitations that indicate promising research opportunities. Firstly, due to the limitations of research conditions, this paper only used the cross-sectional data which neglects the potential dynamic effects of compositional capability on cross-channel integration. Future studies could adopt longitudinal designs to elaborate on these effects in the temporal dimension. Secondly, as our data was collected from a single respondent, the estimated effect hence will suffer from common method bias, using multiple respondents could help validate our results. Thirdly, this research focused on the moderating role of co-opetition balance. We recognized that co-opetition balance is not the only factore for the moderating effects of compositional capability on cross-channel integration. Future research could also inspect the moderating influence of other variables (i.e. the balance of learning and dependence between channels) to deepen further understanding of the contextual mechanisms between compositional capabilities and cross-channel integration. Overall, the insights from such research will likely become very valuable as more and more manufactures make the shift toward cross-channel integration practices.

ACKNOWLEDGEMENTS

This research was supported by Chinese National Young Natural Science Foundation “Customer Relationship and Marketing Channel Management Based on New Generation Interactive Technology in Centralized Network Environment”(71132005); Shanghai Institute of Technology Young and Middle-aged Teachers Science and Technology Talent Development Fundation (ZQ2021-9)

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

REFERENCES

[1] Liu Y Z, Hu Z Y, Tang D N (2022) Research on Consumers' Online Channel Migration Intention Multi-Channel Retail Environment Based on the SOR Model. Journal of Dalian University of Technology (Social Sciences) 43: p. 38-49.

[2] China Internet Network Information Center (2021). "The 47th Statistical Report on China's Internet Development". Available at http://www.cnnic.cn/hlwfzyj/hlwxzbg/hlwtjbg/202202/t20220 22571727.htm. Accessed April 15, 2022.

[3] Verhoef P C, Kannan P K, Inman J J (2015) From Multi-Channel Retailing to Omni-Channel Retailing: Introduction to the Special Issue on Multi-Channel Retailing. Journal of Retailing 91: p. 174-181.

[4] Falk T, Schepers J, Hammerschmidt M, et al (2007) Identifying Cross-Channel Dissynergies for Multi-Channel Service Providers. Journal of Service Research 10: 143-160.

[5] BRYNJOLFSSON E, HU Y J, RAHMAN M S (2013) Competing in the Age of Omni-Channel Retailing. Mit Sloan Management Review 54: 23-29.

[6] Zhuang G J, Deng Q, Lu T Y (2019) Literature Review on Cross-Channel Integration: Concept, Dimension and Theoretical Framework. Journal of Business Economics 338: 30-41.

[7]Lee H H, Kim J (2010) Investigating Dimensionality of Multi-Channel Retailer's Cross-Channel Integration Practices and Effectiveness: Shopping Orientation and Loyalty Intention Journal of Marketing Channels 17: 281-312.

[8]Schramm Klein H, Morschett D (2006) Retail Channel Portfolios: Channel-Bttributes or Integration-Benefit-What Counts More?. European Advance in Consumer Research 7: 377-384.

[9] Herhausen D, Binder J, Schoegel M, et al (2015) Integrating Bricks with Clicks: Retailer-Level and Channel-Level Outcomes of Online–offline Channel Integration. Journal of Retailing 91: 309-325.

[10] Choi Y (2015) A Study of the Influence of Cross-Channel Integration in Customer Retention International Journal of Customer. Relationship Marketing and Management 11: 19-30.

[11] Lee Z W, Chan T K, Chong A Y L, et al (2019) Customer Engagement through Omni-Channel Retailing: The Effects of Channel Integration Quality. Industrial Marketing Management 77: 90-101.

[12] Cui X W, Shi L Y (2020) Impact of Cross-Channel Intergration on Economic Performance of Brick-And Mortar Retailers Soft Science 35: 134-139.

[13] Oh L B, Teo H H, Sambamurthy V (2012) The Effects of Retail Channel Integration through the Use of Information Technologies on Firm Performance. Journal of Operations Management 30: 368-381.

[14] Wu L, Wu S M (2015) A Strategy-Based Model for Implementing Channel Integration in E-commerce: An empirical examination. Internet Research 25: 239-261.

[15] Tagashira T, Minami C (2019) The Effect of Cross-Channel Integration on Cost Efficiency. Journal of Interactive Marketing 47: 68-83.

[16] Cao L, Li L (2018) Determinants of Retailers' Cross-Channel Integration: an Innovation Diffusion Perspective on Omni-Channel Retailing. Journal of Interactive Marketing 44: 1-16.

[17] Zhang G, Liu C, Wang H (2020) Institutional Pressures and the Extent of Cross-Channel Integration: the Moderating Effect of Enterprise's Capabilities. Journal of Contemporary. Marketing Science 3: 113-133.

[18] Zhu Z, Zhao J, Tang X, et al (2015) Leveraging E-business Process for Business Value: A Layered Structure Perspective. Information & Management 52: 679-691.

[19] Mirzabeiki V, Saghiri S S (2020) From Ambition to Action: How to Achieve Integration in Omni-Channel. Journal of Business Research 110: 1-11.

[20] Lu Y D, Sun J Y (2014) A Study on the Motive of the Composition-based View and its Effect on the Competitive Advantage. Management World 250: 93-106,188.

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

[21] Lu Y D, Sun J Y, Wu Y J (2015) A Theory of Amalgamation (He): A New Paradig of Strategic Theory Based on Oriental Culture. Foreign Economics & Management 37: 3-25, 38.
[22] Luo Y, Child J (2015) A Composition-Based View of Firm Growth. Management and Organization Review 11: 379-411.
[23] Sun J, Maksimov V, Wang S L, et al (2020) Developing Compositional Capability in Emerging-Market SMEs. Journal of World Busines 56: 101-148.
[24] Jian Z Q, Kuang Z (2020) Collaborative Innovation Network, Compositional Capability and New Sevice Development Performance. Chinese. Journal of Management 17: 1498-1505.
[25] Chittoor R, Sarkar M B, Ray S, et al (2009) Third-world Copycats to Emerging Multinationals: Institutional Changes and Organizational Transformation in the Indian Pharmaceutical Industry. Organization Science 20: 187-205.
[26] Bharadwaj A S (2000) A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. MIS Quarterly 24: 169-196.
[27] Leverty J T, Grace M F (2012) Dupes or Incompetents? An Examination of Manage- ment's Impact on Firm Distress. Journal of Risk and Insurance 79: 751-783.
[28] Sirmon D G, Hitt M A, Ireland R D (2007) Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. Academy of Management Review 32: 273-292.
[29] Manasia L, Parvan A, Ianos G Memories from the Future (2018) Is Digital Intelligence What Matters in the Forthcoming Society. 10th International Conference on Education and New Learning Technology Conference: 7899-7906.
[30] Guo J J (2019) White Book on Digital Intelligent Transformation of Consumer Goods Ecological Whole Link. Available at: https://download.csdn.net/download/weixin_41429382/2297 4119
[31] Tan J, Zhang H, Wang L (2015) Network Closure or Structural Hole? The Conditioning Effects of Network–Level Social Capital on Innovation Performance. Entrepreneurship Theory and Practice 39: 1189-1212.
[32] Zhang H J, Tan J S (2014) Alliance Network and Enterprise Innovation Performance: Cross Level Analysis. Management World 246: 163-169.
[33] Freeman L C (1978) Centrality in Social Networks Conceptual Clarification. Social Networks. 1: 215-239.
[34] Zhang C, Zhang T, Zhuang G J (2015) Channel Power, Conflict and Cooperation: The Effects of Channel Network Structural Embeddedness. Journal. of. Business. Economics 280: 57-67.
[35] Uzzi B (1997) Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness. Administrative. Science. Quarterly 42: 35-67.
[36] Wen J Y, Zeng D M, Xu L Y, et al (2020) Structural Holes, Network Diversity and Firms' Technological Standardization Capability. Science Research Management 41: 195-203.
[37] Li G H, Zhao S, Wang Y (2020) Supply Network Position, Absorption Capacity and Firms' Innovation Performance. Soft Science 34: 1-7.
[38] Dorn S, Schweiger B, Albers S (2016) Levels, Phases and Themes of Coopetition: A Systematic Literature Review and Research Agenda. European Management Journal 34: 484-500.
[39] Bengtsson M, Raza-Ullah T (2016) A Systematic Review of Research on Coopetition: toward a Multi-level Understanding. Industrial. Marketing. Management 57: 23-39.
[40]Liu H, Wang L W, Li H (2009) On the Research Frontier of Competition and Cooperation Theory. Foreign Economics & Management 31: 1-8.
[41] Park B J R, Srivastava M K, Gnyawali D R (2014) Walking the Tight Rope of Coopetition: Impact of Competition and Cooperation Intensities and Balance on Firm Innovation Performance. Industrial. Marketing Management 43: 210-221.

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

[42] Yao Y H, Song X P, Chen H H (2020) Co-opetition Relationship, Oganization Routine updating and breakthrough Innovation. Science & Technology Progress and Polic 37: 1-9.
[43] Park B J, Srivastava M K, Gnyawali D R (2014) Impact of Coopetition in the Alliance Portfolio and Coopetition Experience on Firm Innovation. Technology Analysis & Strategic Management 26: 893-907.
[44] Huang H C, Chu W (2015) Antecedents and Consequences of Co-Opetition Strategies in Small and Medium-Sized Accounting Agencies. Journal of Management & Organization 21: 812-834.
[45] Ahuja G, Soda G, Zaheer A (2012) The Genesis and Dynamics of Organizational Networks. Organization Science 23: 434-448.
[46] Sparrowe R T, Liden R C, Wayne S J, et al (2001) Social Networks and the Performance of Individuals and Groups. Academy of Management Journal 44: 316-325.
[47] Burt R S (2004) Structural Holes and Good Ideas. American Journal of Sociology 110: 349-399.
[48] Zhou S H, Wan G H (2017) The Impact of E-Business on Supply Chain Performance of Manufacturing Enterprises: An Empirical Study from Information Integration Perspective. Management Review 29: 199-210.
[49] Welter C, Mauer R, Wuebker R J (2016) Bridging Behavioral Models and Theoretical Concepts: Effectuation and Bricolage in the Opportunity Creation Framework. Strategic Entrepreneurship Journal 10: 5-20.
[50] Olhager J, Selldin E (2003) Enterprise Resource Planning Survey of Swedish Manufacturing Firms. European Journal of Operational Research 146: 365-373.
[51] Bharadwaj S, Bharadwaj A, Bendoly E (2007) The Performance Effects of Complementarities Between Information Systems, Marketing, Manufacturing, and Supply Chain Processes. Information Systems Research 18: 437-453.
[52] He W F, Liu W, Huang K L (2016) Managerial Ability and Corporate Risk-taking. China Soft Science 305: 107-118.
[53] Wang B Y (2020) Logical Deduction, Influence Factors and Construction Strategies of Online Off-line and Logistics Coordination. China Business and Market 34: 22-31.
[54]Dong B B, Li Q X (2013) A Review of Research Context of Competitived Advantage and the Construction of Intergrated Research Framwork: From the Angles of Resources and Capabilities. Foreign. Economics & Management 35: 2-11.
[55] Sun J Y, Lu Y D (2017) The Way of the Rise of Chinese Enterprises-Compositional Innovation. Tsinghua Business Review 52: 81-87.
[56] Deluca L M, Atuahene-Gima K (2007) Market Knowledge Dimensions and Cross-Functional Collaboration: Examining the Different Routes to Product Innovation Performance. Journal of Marketing 71: 95-112.
[57] Dong B B (2013) Network Centrality, Strategic Isolation and Start-ups Competitive Advantage: An Empirical Study on High-Tech Firms. Chinese Journal of Management 10: 1478-1484.
[58] Wang H H, Xie F J (2012) Research on the Structure and Measurement of Corporate External Knowledge Network Capability Based on the Structural Holes Theory. China Industrial Economics 28: 134-146.
[59] Senyard J, Baker T, Steffens, P, et al (2014) Bricolage as a Path to Innovativeness for Resource-Constrained New Firms. Journal. of. Product. Innovation. Management 31: 211-230.
[60] Zhuang G J, Li R Q, Feng C, et al (2019) IT Capability, Channel Governance, and Inter-Firm Collaboration. Journal of Systems & Management 28: 467-475.
[61] Carmeli A, Tishler A (2004) The Relationships Between Intangible Organizational Elements and Organizational Performance. Strategic Management Journal 25: 1257-1278.
[62] Ruiz-Jiménez J M, Del Mar Fuentes-Fuentes M (2016) Management Capabilities, Innovation, and Gender Diversity in the Top Management Team: An Empirical Analysis in Technology-Based SMEs. BRQ. Business Research Quarterly 19: 107-121.
[63] Zhou J (2013) Digitalization and Intelligentization of Manufacturing Industry. Advances in Manufacturing 1: 1-7.

Forest Chemicals Review
www.forestchemicalsreview.com
ISSN: 1520-0191
July-August 2022 Page No. 1277-1305
Article History: Received: 30 March 2022, Revised: 8 April 2022, Accepted: 15 April 2022, Publication: 30 April 2022

[64] He Z L, Wong P K (2004) Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. Organization Science 15: 481-494.

[65] Fynes B, Voss C (2002) The Moderating Effect of Buyer-Supplier Relationships on Quality Practices and Performance. International. Journal. of. Operations & Production. Management 22: 589-613.

[66] Song M, Dyer B, Thieme R J (2006) Conflict Management and Innovation Performance: An Integrated Contingency Perspective. Journal of the Academy of Marketing Science 34: 341-356.

[67] Podsakoff P M, Mackenzie S B, Lee J Y, et al (2003) Common Method Biases in Behavioral Research: a Critical Review of the Literature and Recommended Remedies. J Appl Psychol 88: 879-903.

[68] Bengtsson M, Johansson M (2014) Managing Coopetition to Create Opportunities for Small Firms. International Small Business Journal 32: 401-427.