

**THE INFLUENCE OF ENTERPRISE NETWORK ON
COMPETITIVE ADVANTAGE OF HIGH TECHNOLOGY
ENTERPRISES IN CHINA: THE MEDIATING EFFECTS
OF DYNAMIC CAPABILITIES AND
AMBIDEXTERITY INNOVATION**



Huayun Wang

**A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Philosophy (Management)
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ABSTRACT

Title of Dissertation	THE INFLUENCE OF ENTERPRISE NETWORK ON COMPETITIVE ADVANTAGE OF HIGH TECHNOLOGY ENTERPRISES IN CHINA: THE MEDIATING EFFECTS OF DYNAMIC CAPABILITIES AND AMBIDEXTERITY INNOVATION
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In a dynamic environment, companies that want to gain competitive advantages need not only to integrate their internal resources but also to absorb external resources through the enterprise network and then use these resources to innovate and subsequently achieve their corporate strategic goals. However, the exploitative innovation advocated by Chinese companies has led to a serious lack of exploratory innovation capabilities, which has caused Chinese companies to fall into the trap of “lack of technology-technology introduction-lack of technology”; moreover, 80% of core technologies and key products are controlled by developed countries, and international competitors often constrain the development of Chinese companies by restricting the exports of these key products. To resolve this dilemma, Chinese companies need to pay attention to both exploitative innovation and exploratory innovation, that is, ambidextrous innovation. Therefore, that study the influence of enterprise network on competitive advantage from the perspective of dynamic capability and ambidextrous innovation have great theoretical value and practical value.

Based on the above research background, this study proposes a “resource–capacity– innovation–advantage” research framework and uses enterprise network theory, dynamic capability theory, ambidextrous innovation theory, and competitive advantage theory to analyse the impacts of tie strength/network centrality on dynamic capabilities, ambidextrous innovation, and competitive advantages and to explore the inner mechanism between enterprise networks and competitive advantages from the

perspectives of dynamic capabilities and ambidextrous innovation. Structural equation modelling was used to test all hypotheses.

384 valid questionnaires that were collected from China National High-Tech Industrial Development Zones were entered into the structural equation modelling. The result showed that enterprise networks, dynamic capabilities, and ambidextrous innovation have a significant positive impact on the competitive advantages of Chinese high-tech companies. Moreover, the influence of tie strength/network centrality has a stronger effect on the competitive advantages of manufacturing companies; However, dynamic capabilities and ambidextrous combinations have a greater effect on the competitive advantages of service companies. Our results also show that tie strength/network centrality have positive effects on dynamic capabilities, and dynamic capabilities have a partial mediating effect between tie strength/network centrality and competitive advantages, revealing the internal mechanism between enterprise networks and competitive advantages and answering the question “why do companies located in the same enterprise network have differences in their competitive advantages?”. Besides, the results show that tie strength/network centrality and dynamic capabilities have significantly positive effects on the ambidextrous combination, but not for the ambidextrous balance, excepting for the tie strength, indicating that only the ambidextrous combination has a mediating effect between network centrality and competitive advantages. Moreover, the interaction of dynamic capabilities and the ambidextrous combination also played a mediating effect between enterprise networks and competitive advantage.

These findings not only clarified the importance of enterprise networks, dynamic capabilities, ambidextrous innovation to competitive advantages but also revealed the internal mechanism between enterprise networks and competitive advantages. Besides, the results of the multi-group analysis suggested the Chinese Government encourage manufacturing enterprises with resource advantages to carry out an ambidextrous combination, but the manufacturing companies with resource advantages lack reform motivation because that most manufacturing companies focus on achieving low-cost advantages through mass production, while service companies

with strong reform motivation have difficulty achieving ambidextrous innovation due to insufficient resources, indicating the Chinese Government may encounter more difficulties in the process of promoting innovation reform.



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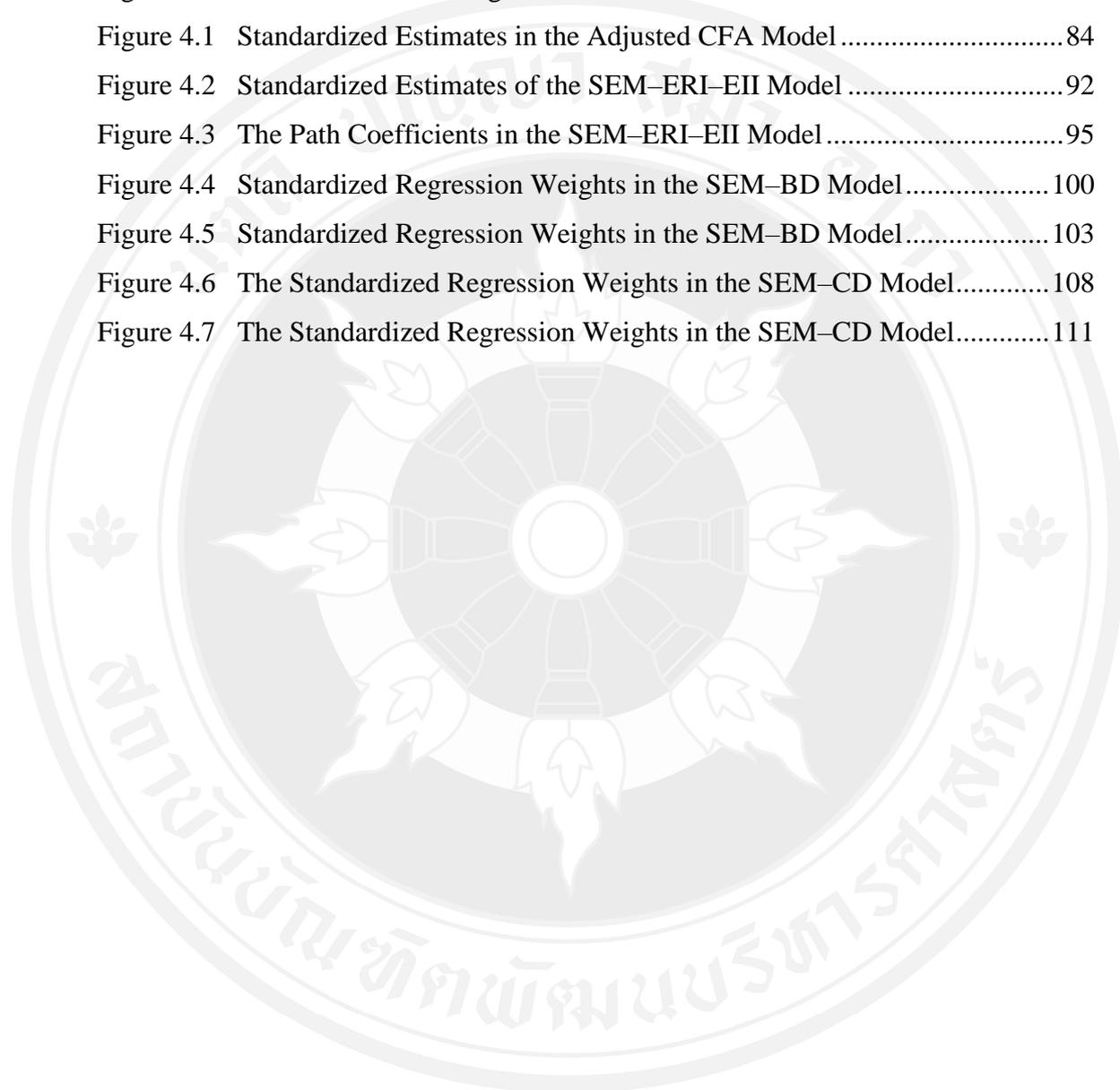
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CHAPTER 1

INTRODUCTION

This chapter contains six sections: section 1.1 introduces the background of this study; section 1.2 presents the problem statement; section 1.3 describes the research problems; section 1.4 states the research purposes; section 1.5 presents the research contribution; and section 1.6 states the research object of this study.

1.1 Background of the Study

1.1.1 Realistic Background

The development of information technology has changed the mode of competition between enterprises. Enterprises are no longer constrained by location conditions and physical space, and they can obtain strategic resources from other companies through enterprise networks (Castells, 2011), which provide great convenience for enterprises aiming to carry out strategic expansion or respond to environmental changes (Salman & Saives, 2005). In the field of strategic management, an enterprise network is defined as a network structure established by more than two enterprises or organizations based on specialized division and collaboration to reach a common goal (Johanson & Mattson, 1987). Strategic alliances, supply chains, and strategic cooperation are different forms of enterprise networks (Inkpen, 1998). Previous studies have shown that enterprise networks are an important channel through which companies can access the external resources that can enable them to achieve their corporate strategy (Gulati, Nohria, & Zaheer, 2000). When enterprises cannot create resources by themselves or obtain them through market transactions, they need to join enterprise networks and obtain these resources from other companies within them (Gulati, 1999) because the resource sharing generated by enterprise networks can improve the efficiency of the resource flow

between enterprises (Granovetter, 1985), giving the companies in the networks opportunities to obtain resources. Some literature has stated that an enterprise network enables a single enterprise to change into a network system with stronger competitiveness than a single company by superimposing the resources and capabilities of different enterprises (Miles & Snow, 1986) because other companies will jointly defend themselves against foreign competitors to overcome difficulties; therefore, an enterprise network is a more optimized organizational model than a single enterprise (Jarillo, 1988). Besides, companies located in an enterprise network can solve problems encountered in their operation with the help of other companies (Asemi, Safari, & Zavareh, 2011; Chesbrough, 2003); thus, it is easier for them to solve problems successfully or achieve strategic goals. Given the advantages of enterprise networks mentioned above, they are being used by more and more companies as a means to achieve strategic goals (Leonidou, Leonidou, Fotiadis, & Zeriti, 2013). In this context, the Chinese Government has also established national high-tech zones that concentrate on innovation-oriented enterprises to improve the innovation level.

High-tech enterprises that focus on innovation are the leading force to improve the innovation level of China. With the Chinese Government's support and the market forces, the high-tech enterprises in the national high-tech zones have achieved good innovation performance, as shown in Figure 1.1.

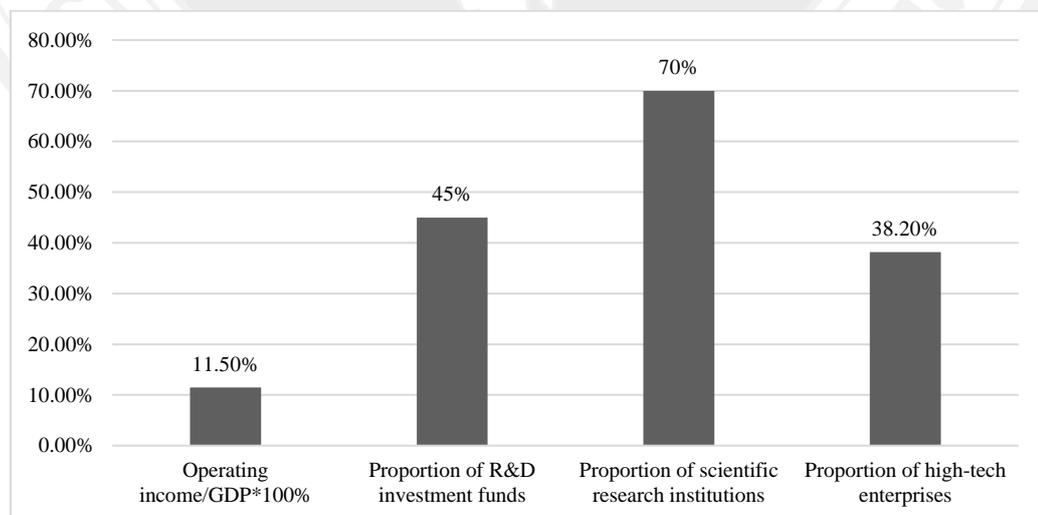


Figure 1.1 Performance of National High-Tech Zones' Innovation Capacity in 2017

As is apparent in Figure 1.1, the National High-Tech Zone Innovation Capacity Evaluation Report 2018 showed that the operating revenues produced by only 157 national high-tech zones was 307057 billion yuan, accounting for 11.5% of the gross domestic product (GDP) in 2017; the R&D investment was 616.4 billion yuan, accounting for about 45% of the national enterprises; 2,922 national R&D institutions were located in 157 national high-tech zones, about 70% of all R&D institutions, and 52265 with high-technology expertise, accounting for 38.2% of all the high-technology expertise in China; and the number of authorized patents was 112,000, which is 9.4 times the national average.

Though Chinese high-tech enterprises located in high-tech zones have made great progress in the past few years, there is still a big gap from their international competitors, especially in core technology. Some literature has shown that almost all core technology and key components are controlled by companies located in developed countries, such as the United States, Japan, Germany, and so on, and these international competitors often constrain the development of Chinese companies by restricting technology exports or raising tariffs, a predicament that cannot be changed in the short term (Galati & Bigliardi, 2017), in this circumstance, Chinese enterprises need ambidextrous innovation to overcome this dilemma. However, some backward technologies introduced by Chinese companies, used to develop low-end industries, cannot maintain China's advantage in the international market. In this circumstance, Chinese companies not only need to absorb the introduced technology fully to maintain their survival but also should strengthen their exploratory innovation to break the technical blockade; this is ambidextrous innovation, which encompasses exploitative innovation and exploratory innovation (He & Wong, 2004; Yan & Guan, 2018). Therefore, ambidextrous innovation should be an effective way for Chinese enterprises to solve the problem of single exploitation, but it is difficult to carry out exploitation and exploration simultaneously due to resource constraints, path dependence, and organizational rigidity (March, 1991). How can enterprises obtain sufficient resources? Some scholars have suggested that companies can obtain sufficient resources for ambidextrous innovation through enterprise networks (Chuluun, Prevost, & Upadhyay, 2017; Gulati et al., 2000) as companies located in the networks have opportunities to obtain resources from other companies (Hsu &

Wang, 2012). However, there is very little literature on ambidextrous innovation from the perspective of enterprise networks.

1.1.2 Theoretical Background

Scholars have studied the impact of enterprise networks on competitive advantages from two aspects: on the one hand, they have regarded enterprise networks as a strategic resource that can help companies to gain competitive advantages (Gulati, 1999); on the other hand, enterprise networks have been considered as an enterprise capability (Leonard-Barton, 1992). Based on these two views, management scientists have used embeddedness theory, social capital theory, the strength of weak ties, and structural holes to explain the effect of enterprise networks on competitive advantages and produced four results: a positive effect, a negative effect, no effect, and an “inverted U” effect. Most scholars have indicated that the influence of enterprise networks on competitive advantages is positive because the corporate social capital generated by enterprise networks enhances the corporate resource base, which can help companies to win advantages in market competitions (Dekker & Van Den Abbeele, 2008; Paruchuri, 2010; Siu & Bao, 2008). The negative effect of enterprise networks on competitive advantages has also been supported by some scholars because excessively strengthening the ties with other enterprises incurs high enterprise costs; besides, the central position in the network may produce unfavourable behaviours, such as opportunistic behaviour and excessive search behaviour, that hinder the flow of resources (Rubino & Vitolla, 2018; Shaarawy & Abdelghaffar, 2017; Viol & Hess, 2016; Wang, Zhao, Li, & Li, 2015). An insignificant effect of enterprise networks on competitive advantages was proposed by Koka, Madhavan, and Prescott (2006); other scholars have stated that both more and fewer ties with other companies may weaken the positive impact of enterprise networks on competitive advantages, and they have suggested that companies should keep moderate ties with other companies (Uzzi, 1997). From these four results of previous scholars, it could be seen that the impact of enterprise networks on competitive advantages is still unclear.

Nowadays, few studies are exploring why enterprise networks have different effects on the competitive advantages of different companies. Previous studies have shown that the effect of enterprise networks on competitive advantages may be influenced by many factors, such as culture, corporate ownership, the competitive environment, or structural uncertainty (Batjargal, 2007; Buccieri, Javalgi, & Cavusgil, 2020; Li, Poppo, & Zhou, 2008). Moreover, the differential effect of enterprise networks on competitive advantages may be affected by the internal capabilities, such as knowledge search capability, knowledge acquisition capability, knowledge transfer capability, knowledge diffusion capability, knowledge management capability, dynamic capability, organizational learning capability, and innovation capability (Collins & Clark, 2003; Nieves & Osorio, 2013). The literature mentioned above indicated that the influence of enterprise networks on competitive advantages is inseparable from the support of enterprises' internal capabilities and specific environment. However, few studies have focused on the impact of corporate capabilities and Chinese culture on ambidextrous innovation.

1.2 Problem Statement

Previous studies have investigated the effect of enterprise networks on competitive advantages. However, deficiencies regarding the following four aspects still need to be explored in depth.

Studies have ignored the situational factors. The previous literature has shown that the impact of enterprise networks on competitive advantages may vary considerably in different situations (Batjargal, 2007); for instance, the collectivism advocated by China is the opposite of the individualism advocated by the West, so how do enterprise networks that originated in the West affect the competitive advantages of Chinese companies? However, few studies have been conducted on the effect of enterprise networks on competitive advantages using Chinese enterprises as the research object.

Little literature has explored the internal mechanism between enterprise networks and competitive advantages from the perspective of dynamic capabilities. Corporate social resources exist between companies, but whether they can access social resources and use them internally depends on their capabilities (Gulati et al., 2000). Dynamic capabilities can absorb external resources and enable companies to gain a competitive advantage in a dynamic environment through the integration and reconstruction of external resources (Teece, Pisano, & Shuen, 1997), so what role do dynamic capabilities play between enterprise networks and competitive advantages? Unfortunately, there are few studies on this topic. The few existing studies have shown that dynamic capabilities play a full and partial mediation role between enterprise networks (tie strength/network centrality) and competitive advantages, respectively (Dong, 2012). Pinho and Prange (2016) took Portuguese exporters as examples to study the relationship between external relations, dynamic capabilities, and company performance, and the results showed that social networks have an indirect positive impact on exporters' international performance by improving their dynamic capabilities. The arguments mentioned above indicate the importance of dynamic capabilities to absorb external resources. However, studies on the relationship between enterprise networks, dynamic capabilities, and competitive advantages are scarce.

Few studies in the literature have explored the internal mechanism between enterprise networks and competitive advantages from the perspective of ambidextrous innovation. Ambidextrous innovation is an important strategy to improve China's single exploitative innovation dilemma and help companies to achieve sustainable development (Stettner & Lavie, 2014) because ambidextrous innovation not only ensures the survivability of the enterprise using exploitative innovation but also enhances its development potential in the future market using exploratory innovation (Yan & Guan, 2018); however, many companies have difficulty engaging in ambidextrous innovation due to resource constraints (Andriopoulos & Lewis, 2009). Some scholars have proposed the use of enterprise networks to break the resource constraints and enable companies to have sufficient resources to try ambidextrous innovation (Zhang, Wang, & Wei, 2019). However, studies on the relationship between enterprise networks, ambidextrous innovation, and competitive advantages

are scarce. Besides, dynamic capabilities clear obstacles to innovation by breaking the “core rigidity” of capabilities (Teece, 2018; Urbancova, 2013), but the existing research has not explored the effect of dynamic capabilities on ambidextrous innovation.

There is a lack of comparison between different companies. The industry type, company size, and company age may affect the impact of enterprise networks on competitive advantages. However, the existing research has not compared the path differences of different companies.

1.3 Research Questions

Resources are the basic elements that enable enterprises to achieve strategic goals (Barney, 1991). As a channel for enterprises to obtain external resources, enterprise networks positively affect competitive advantages by providing social capital (Cooke & Schienstock, 2000). However, the corporate social capital generated by an enterprise network is just a general external resource, which cannot directly form a competitive advantage like the key resources proposed by Barney (1991). Thus, investigating the internal mechanism of enterprise networks and competitive advantages is interesting and necessary to utilize corporate social capital. We explore the internal mechanism between enterprise networks and competitive advantages from the perspectives of dynamic capabilities and ambidextrous innovation. In summary, there are four main questions posed are the following.

How do enterprise networks affect the competitive advantages of Chinese high-tech enterprises? The influence of enterprise networks on competitive advantages is mainly reflected in two parts, namely tie strength and network centrality. The tie dimension is an important feature of Chinese society, and previous research has shown that companies with more and stronger ties find it easier to seize development opportunities (Lyons, 2002), so how does tie strength affect competitive advantages? Network centrality is associated with informal power, which can help enterprises to gain more resources from others (Zaheer & Bell, 2005); thus, how does network centrality affect competitive advantages?

What role do dynamic capabilities and ambidextrous innovation play between enterprise networks and competitive advantages? As a channel to obtain external resources, enterprise networks provide enterprises with the opportunity to obtain external resources, but whether they obtain social resources depends on their ability (Hart, 1995). Therefore, the role that dynamic capabilities play between enterprise networks and competitive advantages needs to be explored. Ambidextrous innovation is a strategy for companies to achieve sustainable development (Galati & Bigliardi, 2017); however, it is difficult to gain sufficient resources for ambidextrous innovation because it needs more resources than companies that only engage in single exploratory innovation or single exploitative innovation have (March, 1991). Previous studies have shown that enterprise networks can provide more resources for ambidextrous innovation (Simsek, 2009), so what role does ambidextrous innovation play between enterprise networks and competitive advantages? Besides, dynamic capabilities promote innovation by breaking the path dependence of capabilities (Teece et al., 1997), so how do dynamic capabilities affect ambidextrous innovation?

Are there differences in the impact of enterprise networks on competitive advantages between different companies? China is a big manufacturing country and manufacturing companies is also located in the middle of the supply chain; do manufacturing companies have advantages in the utilization of social resources compared with service companies? Besides, enterprises' size and age reflect their level of resource use. Does the impact of enterprise networks on competitive advantages differ between large companies and small companies? Does the impact of enterprise networks on competitive advantages differ between old companies and new companies?

1.4 Research Objectives

Currently, more and more companies are using enterprise networks to achieve strategic goals (Leonidou et al., 2013). In this context, this study proposes a conceptual framework including enterprise networks, dynamic capabilities, ambidextrous innovation, and competitive advantages to explore the internal mechanism between enterprise networks and competitive advantages from the

perspectives of dynamic capabilities and ambidextrous innovation. In detail, this research will achieve the following objectives by answering the four questions mentioned above:

Verify the effects of enterprise networks on the competitive advantages of Chinese enterprises using a sample collected from Zhongguancun of Beijing and Shenzhen National High-Tech Zones.

Clarify the internal mechanism between enterprise networks and competitive advantages from the dynamic capability perspective and the ambidextrous innovation perspective.

Provide path support for companies to achieve sustainable development through ambidextrous innovation.

Find the path differences between different types of companies by analysing the path differences between different companies.

Test the conceptual framework proposed by this study.

1.5 Research Contribution

1.5.1 Theoretical Contribution

The study aims to provide path support for Chinese enterprises to undertake ambidextrous innovation. Ambidextrous innovation enables companies not only to capture profits in the existing market but also to seize opportunities in the future market; however, ambidextrous innovation is difficult for enterprises to achieve due to resource constraints (March, 1991). This study will provide path support for ambidextrous innovation by testing the impact of enterprise networks and dynamic capabilities on the two dimensions of ambidextrous innovation.

The study will reveal the internal mechanism between enterprise networks and competitive advantages and clarify the importance of dynamic capabilities and ambidextrous innovation. Previous studies have shown that the impact of enterprise networks on competitive advantages is unclear. This study will explain the reasons for the differences by exploring the relationship between enterprise networks, dynamic capabilities, ambidextrous innovation, and competitive advantages, which will help to

explain why companies located in the same enterprise network have different competitive advantages.

The study aims to provide path support for Chinese enterprises to undertake ambidextrous innovation. Ambidextrous innovation enables companies not only to capture profits in the existing market but also to seize opportunities in the future market; however, ambidextrous innovation is difficult for enterprises to achieve due to resource constraints (March, 1991). This study will provide path support for ambidextrous innovation by testing the impact of enterprise networks and dynamic capabilities on the two dimensions of ambidextrous innovation.

The intention is also to enrich resource theory, such as dynamic capabilities and organizational ambidexterity. Previous studies have shown that the corporate social capital generated by an enterprise network is different from the key resources proposed by the resource-based view (Barney, 1991); therefore, our results will expand the scope of resource theory and encourage resource sharing between companies. Besides, resources are the foundation of capability and innovation, and we suggest that companies obtain sufficient resources through enterprise networks to support their dynamic capabilities and ambidextrous innovation strategy.

1.5.2 Practical Contribution

For corporate executives, this study suggests that they pay attention to the enterprise network, such as maintaining connections with other companies, expanding external ties, strengthening the corporate image, or improving the informal status; besides, our study reminds business executives to construct dynamic capabilities and implement ambidextrous innovation to increase the contribution of corporate social capital generated by the enterprise network.

This study suggests that high-tech zone managers construct a democratic and open park culture to promote resource sharing between companies; moreover, we suggest that they provide a communication platform for enterprises. High-tech zone managers should also use different methods to guide different companies or even give some companies privileges.

The study suggests that the Chinese Government should reform the university talent training system to cultivate high-quality talent and take manufacturing enterprises as a pilot for innovation reform.

1.6 Scope of the Research

We provide path support for the development of high-tech enterprises in China by exploring the relationship between enterprise networks, dynamic capabilities, ambidextrous innovation, and competitive advantages. This study collects data from high-tech enterprises located in Zhongguancun in Beijing and Shenzhen National High-Tech Zones because knowledge resources are an important element of innovation (Gulati et al., 2000) and high-tech enterprises that focus on innovation are very likely to obtain external resources through their enterprise network, which is consistent with the scenario of this study. Moreover, the business environment in Beijing and Shenzhen is changing rapidly, and companies located in these two areas are more likely to build dynamic capabilities and undertake ambidextrous innovation to respond to environmental changes compared with those companies located in other places. Besides, Beijing's Zhongguancun and Shenzhen National High-Tech Zones concentrated 11283 high-tech enterprises with a rate of 64% in municipalities and special economic zones of China by the end of 2017, making these two areas an easy location to collect data, as shown in Table 1.1. Therefore, this study takes high-tech enterprises in Beijing Zhongguancun and Shenzhen High-Tech Zones as the research objects.

Table 1.1 The List of National High-Tech Zones in China's Municipalities and Special Economic Zones as of the End of 2017

Number	Municipality	High-Tech Zone	Quantity	Number	Special Economic Zone	High-Tech Zone	Quantity
1.	Beijing	Zhongguancun	8989	1.	Shenzhen	Shenzhen CNHTIDZ	2294
2.	Tianjin	Binhai CNHTIDZ	1045	2.	Xiamen	Torch CNHTIDZ	600
3.	Shanghai	Zhangjiang CNHTIDZ	3759	3.	Zhuhai	Zhuhai CNHTIDZ	213
4.	Shanghai	Zizhu CNHTIDZ	102	4.	Shantou	Shantou CNHTIDZ	261
5.	Chongqing	Chongqing CNHTIDZ	235	5.	Hainan	Haikou CNHTIDZ	64
6.	Chongqing	Bishan CNHTIDZ	89	-	-	-	-
Sum			14219	Sum			3432

Source: CNHTIDZ = China National High-Tech Industrial Development Zone

CHAPTER 2

LITERATURE REVIEW

This chapter consists of six sections: section 2.1 mainly introduces the theories and definition of competitive advantages; section 2.2 presents the theories, definition, and dimensions of enterprise networks and develops the hypothesis between enterprise networks and competitive advantages; section 2.3 introduces the theories, definition, and dimensions of dynamic capabilities and develops the hypothesis between enterprise networks, dynamic capabilities, and competitive advantages; section 2.4 presents the methods, definition, and dimensions of ambidextrous innovation and develops the hypothesis between enterprise networks, ambidextrous innovation, and competitive advantages; section 2.5 concerns the relationship between dynamic capabilities and ambidextrous innovation; and section 2.6 develops the mediating effect of the interaction of dynamic capabilities and ambidextrous innovation.

2.1 Competitive Advantages

2.1.1 The Theories of Competitive Advantages

Competitive advantages are a core issue in the field of strategic management. Scholars hope to provide theoretical guidance for companies to obtain competitive advantages by exploring their theoretical sources. This study divides the sources of competitive advantages into three parts in the light of the boundaries of the enterprise, that is, exogenous theory, endogenous theory, and dynamic capability theory.

Exogenous Theory. The exogenous theory of competitive advantage claims that competitive advantages depend on the market structure and business environment, which are external factors. The structure–conduct–performance (SCP) model claimed that competitive advantages depend on corporate behaviour

determined by the market structure (Bain, 1951; Mason, 1939); therefore, the market structure is the fundamental source of competitive advantages. Then, the SCP model was also introduced into the field of strategic management by Porter (1981), he used it to analyse the market environment and industry environment and proposed a five-force model consisting of suppliers, customers, existing competitors, potential competitors, and substitute companies, which jointly determine the competitiveness of a company; moreover, he proposed that a differentiation strategy and a low-cost strategy are two ways to help companies gain a competitive advantage (Porter, 1981). In detail, the differentiation strategy focuses on the significant differences in products or services that help companies to achieve differentiation, while the low-cost strategy involves the cost of products or services being lower than that of competitors, which can help companies to reduce their product costs (Porter, 1985). Overall, both the SCP model and the five-force model pay attention to the influence of external factors on competitive advantages but ignore the influence of internal factors on companies' competitive advantages; therefore, the exogenous theory cannot explain the operational differences between companies facing the same external environment (Tzabbar, Aharonson, & Amburgey, 2013).

Different from exogenous theory, endogenous theory maintains that competitive advantages originate from internal resources and capabilities, such as the resource-based view and core competence theory. The resource-based view claims that resource differences are the key factors for companies to obtain excess profits and achieve a competitive advantage, and only those resources that are valuable, difficult to imitate, scarce, and irreplaceable can help companies to gain advantages in the market competition (Penrose, 1959); therefore, competitive advantages come from key resources within the enterprise but not all resources (Barney, 1991). Meanwhile, the core competence theory proposed by Prahalad and Hamel (1990) indicated that competitive advantages derived from the core capability are difficult for competitors to imitate because a core competency is a comprehensive ability comprising knowledge, special skills, and invisible resources, which is hidden in the internal operation process of the enterprise and therefore is difficult for competitors to observe and imitate (Leonard-Barton, 1992). Moreover, a core competency can bring sustainable competitive advantages for an enterprise due to its reusable nature (Hart,

1995). Previous studies have confirmed the importance of capabilities for resource operation by clarifying the relationship between resources and capabilities, claiming that capabilities can help companies to realize the value of resources; therefore, competitive advantages are results of the combined effect of resources and capabilities (Hart, 1995). Overall, both the resource-based view and the core competence theory focus on the effects of internal factors on competitive advantages but ignore the effects of external factors.

Dynamic Capability Theory. Exogenous theory and endogenous theory both unilaterally emphasize the influence of external factors or internal factors. However, as open organizations, companies will inevitably be affected by both external factors and internal factors (Robert-Baum & Wally, 2003). In this context, Teece (1994) proposed dynamic capabilities as the “bridge” linking exogenous theory and endogenous theory. Dynamic capabilities are the ability of an enterprise to integrate and reconstruct internal and external resources continuously to respond to environmental changes (Teece et al., 1997), and its core concept is to use innovation constantly to build new competitive advantages (D’aveni & Gunther, 1996). The previous literature has shown that those excellent companies are usually good at innovation and use innovation to achieve sustainable development (Bos-Brouwers, 2010). Furthermore, the values of the original resource and original capability decrease in a dynamic environment, making it difficult for companies to adapt to environmental changes; therefore, enterprises need to change their existing resource base and build new capabilities to gain a new competitive advantage through dynamic capabilities (Teece, 2018). Dynamic capabilities have gradually become a hotspot in the field of strategic management due to their strong environmental adaptability.

In summary, the literature has continuously developed and perfected the theories of competitive advantage from the external environment to the internal resources and capabilities and the dynamic capabilities that make up the internal and external factors of enterprises. However, with the rapid environmental changes, the importance of dynamic capabilities is also increasing.

2.1.2 The Definition of a Competitive Advantage

Correctly understanding and distinguishing different definitions of a competitive advantage is the base for exploring the influence factor of a competitive advantage. For this study, we searched for “competitive advantage” in Google Scholar and CNKI of China and found a series of vocabulary related to competitive advantages, such as “organized competitive advantage”, “corporate competitive advantage”, and “sustainable competitive advantage”. Different scholars have defined competitive advantages from different perspectives since the term was introduced into the field of strategic management (Schendel & Hofer, 1979); among them, the definition of a competitive advantage proposed by Porter (1985) has been cited by many studies (Barney, 1991; Grant, 1991; Porter, 1985), he stated that a competitive advantage is a better enterprise performance gained through low-cost strategies and differentiated strategies, which shows that the enterprise is the carrier of a competitive advantage, so there is no essential difference between a “corporate competitive advantage”, an “organizational competitive advantage”, and a “competitive advantage”. Furthermore, Teece (2007) proposed that a sustainable competitive advantage could help companies to gain long-term benefits by preventing competitors from copying or imitating the same competitive advantage in the short term (Barney, 1991). Thus, whether it can be copied or imitated by competitors in the short term is the essential difference between a “competitive advantage” and a “sustainable competitive advantage” (Ahmad, 2015). Given the views mentioned above, the competitive advantage of an enterprise and the competitive advantage of an organization are equal to a competitive advantage, while a sustainable competitive advantage consists of a series of short-term competitive advantages; therefore, a competitive advantage is shorter than a sustainable competitive advantage over time. This study mainly investigates how companies constantly build a new competitive advantage in a dynamic environment, and the competitive advantage mentioned here is short lived; therefore, the term “competitive advantage” is used uniformly in this study. Next, we will present the definition of a competitive advantage.

Competitive advantage was firstly defined as better performance in the book *Monopoly Competition* (Chamberlin, 1949). Some researchers have divided competitive advantages into two parts: competition and advantage. The competition is a method of gaining advantages, while the advantage is the result of the competition; therefore, a competitive advantage is an advantage that is gained through a competitive strategy (Clark, 1914). Schendel and Hofer (1979) stated that competitive advantage is a unique market position that is gained through resource allocation; Porter (1985) indicated that a competitive advantage is higher corporate performances that can be gained by providing consumers with low-cost or differentiated products or services. Besides, a competitive advantage is an enterprise strategy that uses resource allocation to create higher value for customers (Barney, 1991). Some scholars have explained a competitive advantage as an ability that can provide customers with satisfactory products or services and help companies to exceed the industry's average performance by using unique and non-imitation resource allocation methods and innovative methods (López-Gamero, Molina-Azorín, & Claver-Cortés, 2009; Mu, Hao, & Ren, 2014; Oyelaran-Oyeyinka & Lal, 2006; Xiang & Zhou, 2003); others have defined a competitive advantage as the attribute of occupying the leading position and the advantage of obtaining higher performance levels in the market competition (Dong, 2012). For comparative purposes, we present some important definitions of a competitive advantage in Table 2.1.

Table 2.1 Some Scholars' Definitions of a Competitive Advantage

Source	View
Chamberlin (1949)	A competitive advantage is defined as a better company performance in the market than competitors.
Schendel and Hofer (1979)	A competitive advantage is a unique market position obtained by enterprises using resource allocation methods.
Porter (1985)	A competitive advantage arises when

Source	View
Barney (1991)	an enterprise obtains a larger market share or higher profits by providing customers with high-quality, low-priced products.
Baron and Besanko (1999)	A competitive advantage is a strategy for an enterprise to realize value creation.
Hoffmann (2000)	A competitive advantage is the ability to surpass the performance of competitors.
Grant (1991)	A competitive advantage is the ability of a company to obtain a higher level of performance.
He (2002)	A competitive advantage is a company's ability to obtain a higher level of profit.
Oyelaran-Oyeyinka and Lal (2006)	A competitive advantage is the performance that exceeds the profit level of competitors and the industry average profit level.
López-Gamero, Molina-Azorín, and Claver-Cortés (2009)	A competitive advantage is an ability to surpass competitors.
Dong (2012)	A competitive advantage is the ability of an enterprise to use resource allocation and innovation to obtain a better performance than its competitors.
	A competitive advantage is the attribute that an enterprise can obtain higher performance and occupy a

Source	View
Mu, Hao, and Ren (2014)	<p>leading position in the market competition.</p> <p>A competitive advantage is the ability of enterprises to use unique and inimitable strategic methods to provide customers with satisfactory products/services and to obtain capabilities above the average performance level of the industry.</p>

From Table 2.1, it could be seen that different scholars have different understandings of competitive advantages but have reached a consensus on two aspects: first, a competitive advantage is the result compared with competitors or industry average levels, such as a relative advantage or a better performance than that of competitors or the industry average level (Baron & Besanko, 1999; Grant, 1991; He, 2002; Hoffmann, 2000); second, obtaining an advantage requires enterprises to adopt some unique strategies, such as innovation, resource allocation, or good production (Barney, 1991; Oyelaran-Oyeyinka & Lal, 2006).

Given the arguments mentioned above, we define a competitive advantage as a strategy of better performance and an advantageous market position in the process of resource competition.

2.2 Enterprise Networks

2.2.1 The Theories of Enterprise Networks

We introduce four theories related to enterprise networks in this study, specifically social capital theory, the strength of weak ties, embeddedness theory, and structural hole theory.

Social Capital Theory. Social capital theory, proposed by Bourdieu (1986), is a collection of actual resources and potential resources available to companies. The position of a company in a network reflects its ability to obtain social capital and power in the network; therefore, a company's position in a network is also a kind of social capital. Besides, the social structure resources owned by an individual or organization are a kind of social capital (Coleman, 1988). Therefore, Coleman (1988) claimed that the ultimate goal of social capital is to understand social structure by studying social relationships. Based on this view, Lin (2002) proposed social capital theory and divided social capital into two parts, individual capital and social capital. Individual capital refers to wealth, equipment, natural endowment, physique, knowledge, and status; social capital relates to power, reputation, and prestige. Individual capital positively affects the acquisition of social capital; in other words, the more capital a company possesses, the more likely it is to acquire more social capital. Therefore, corporate social capital is the essential cause of the existence of enterprise networks (Lin, 2008).

The Strength of Weak Ties. Granovetter (1977) divided social relationships into strong ties and weak ties in the light of the length of time, emotional intensity, intimacy, and reciprocal service. Strong ties are social relationships with familiar persons, such as relatives, friends, classmates, and colleagues, and companies with strong ties can easily obtain reliable information, but that information is repeated in most cases, which indicates that the information-processing costs of companies in strong relationships may increase (Inkpen & Tsang, 2005). Besides, strong-tie networks usually exclude foreign members, making it difficult for companies in strong-tie networks to obtain novel information resources for innovation (Chen, Zheng, Yang, & Bai, 2016; Granovetter, 1985; Grant, 1996). Compared with strong ties, weak ties are social relationships with strangers that can bring differentiated information to companies, which helps them to form new ideas and then promotes innovation (Chen et al., 2016; Granovetter, 1977); however, weak ties cannot establish trust between companies because they violate the basic conditions of economic behaviour. Therefore, weak ties will not necessarily lead to enterprises obtaining different resources, but they provide the conditions for obtaining differentiated resources (Wang et al., 2015). Overall, both strong ties and weak ties explain the

influence of social ties on enterprise behaviour.

Embeddedness Theory. Enterprises are an integral part of social relationships. No company can exist independently without social relationships; thus, embeddedness is a necessary and basic condition for any economic behaviour, and those enterprises that cannot embed social relationships are doomed to fail (Polanyi, Arensberg, & Pearson, 1958). Regarding the embeddedness of social ties, embeddedness is defined as the dependence of economic behaviours, markets, and relationships on the environment and, when an individual or enterprise uses social resources such as trust, culture, and reputation to achieve a certain economic result, embedded behaviour occurs (Granovetter, 1985; Polanyi et al., 1958). Some scholars have indicated that only proper embedding can bring benefits to the enterprise; for example, embedding improves the efficiency of resource allocation and resource acquisition. However, excessive embedding will damage the economic performance due to the costs (Uzzi, 1997), and it is possible that a rational decision maker who pursues economic interests and abides by social norms simultaneously cannot expend all his or her energy to maintain social relationships. Therefore, any individual needs to be moderately embedded in social relationships to gain the most benefit.

Structural Holes Theory. A structural hole is a hole caused by the lack of direct ties. When a company occupies structural holes, it can help non-directly connected companies to transfer information (Burt, 2004); therefore, companies located in a structural hole can have privileges to access information from non-directly connected companies and information control privileges (Burt, 2009; Karamanos, 2016). A structural hole is presented in Figure 2.1:

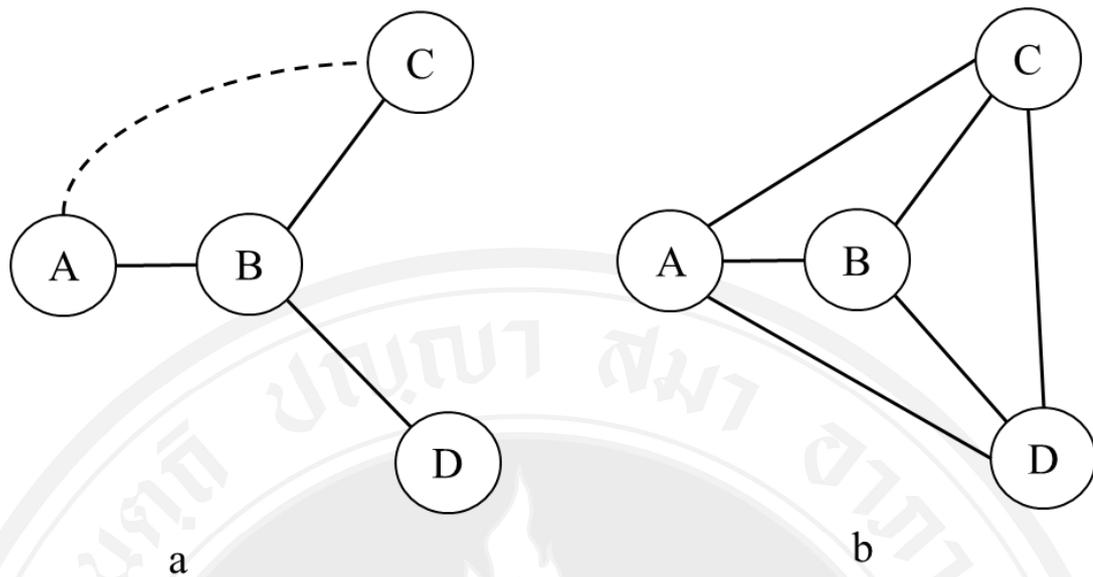


Figure 2.1 Structural Holes Model

There are four companies in Figure 2.1 (a). AC, AD, and CD cannot directly exchange information due to lacking direct ties; thus, structural holes appear between AC, AD, and CD. If AC, AD, and CD need to exchange information with others, they must rely on B to help them; thus, B occupies three structural holes. The information of A, C, and D would be aggregated to B and then transferred to A, C, or D from B, respectively. Therefore, B has the privilege of accessing and controlling information compared with A, C, and D. This information first-served advantage and control advantage are beneficial for enterprises to build a competitive advantage in markets (Grant, 1996). Previous studies have also shown that companies occupying more structural holes are usually in the central position of a network; therefore, these companies could also gain more social capital through their location advantage and prestige (Brass & Burkhardt, 1993). In Figure 2.1 (b), when all the companies have established direct ties, there are no structural holes, but this situation is extremely rare because it is very difficult to make all companies establish a direct tie; moreover, the cost is huge (Burt, 2009). Therefore, structural holes exist between companies. However, previous studies have shown that companies located in structural holes do not necessarily have resource advantages because structural holes may cause adverse effects, such as speculation, an excessive search for information, and conflicts

between enterprises, which would lead to a negative effect on the flow efficiency of social capital (Wang et al., 2015). Therefore, companies located in structural holes need to form a cooperative environment (Ahuja, Soda, & Zaheer, 2012).

In summary, the theories mentioned above explain the existence of enterprise networks and clarify the methods through which companies acquire social capital.

2.2.2 The Definition of Enterprise Networks

According to the participants in social ties, social networks can be divided into three types, personal networks, intra- enterprise networks, and extra- enterprise networks (Wilkinson & Young, 2002), of which extra- enterprise networks are social ties with companies as the research object. The main purpose of extra- enterprise networks is to explore the impact of corporate social capital on economic behaviour, such as corporate behaviour and corporate strategy (Salman & Saives, 2005). In this study, we refer to extra- enterprise networks as enterprise networks since the definitions of enterprise networks are different in different fields. For instance, in the field of strategic management, enterprise networks are defined as a new type of organization that freely combines and reorganizes enterprises to achieve strategic goals through organization, communication, integration, and cooperation (Johanson & Mattson, 1987; Michael, Yoshino, & Rangan, 1995). From the perspective of organizational structure, enterprise networks are defined as enterprise alliances that are based on division and collaboration to achieve strategic goals (Podolny & Page, 1998; Yang & Feng, 2005). From an institutional perspective, some scholars have claimed that enterprise networks are a new organizational form or hybrid governance model between the market and the enterprise, and an enterprise network is a more optimized organization model than a single company (Jarillo, 1988; Thorelli, 1986; Zenger & Hesterly, 1997). From the behavioural perspective, enterprise networks are defined as the behaviours of sharing or joint business activities between enterprises through the exchange of skills and resources (Dussauge, Garrette, & Mitchell, 2000; Gulati et al., 2000). From the perspective of agreement, enterprise networks are defined as a long-term cooperation agreement for economic benefit between enterprises (Best, 1990; Dou & Wang, 2012; Tsang & Kwan, 1999). Enterprise networks are also defined as formal or informal business cooperation relationships

established by enterprises with other organizations for the realization of economic benefits (Ahmad, 2015; Schutjens & Stam, 2003) or as competitive, dynamic, and complex network relationships established by other companies based on information technology and strategic needs (Li, 2007). To enable readers to gain a clear understanding of the definitions of company networks in different fields, we extracted some keywords and present them in Table 2.2.

From Table 2.2, it could be seen that, although scholars have different understandings of enterprise networks, the following two methods are consistent: a enterprise network is between the market and the organization; and cooperation and sharing are the main methods to achieve corporate goals in an enterprise network. Because the topic of this study belongs to the field of strategic management, we refer to the views of Gulati, Nohria, and Zaheer (2000); Johanson and Mattson (1987); Thorelli (1986) and define an enterprise network as a new organization between the enterprise and the market based on division and collaboration to achieve strategic goals.

Table 2.2 Definitions of Enterprise Networks by Some Scholars

Perspective	Source	Definition	Trait	Process	Aim
Corporate Strategy	Miles and Snow (1986)	New organization	Free	Combination or reorganization	Enhance competitiveness
	Johanson and Mattson (1987)	Combination	Interdependent and supportive	Organization, arrangement, coordination, communication	Obtain a competitive advantage
Organization Design	Michael et al. (1995)	Strategic alliance	-	Cooperation	Shared revenue
	Podolny and Page (1998)	Relation set	-	Transaction	Achieve strategic goals
	Yang and Feng (2005)	Consortium	-	Division and collaboration	Achieve strategic goals
Institutional Theory	Thorelli (1986)	Organization form	Between the market and the organization	Coordination, transaction	-
	Jarillo (1988)	Organization model	Optimized	-	-

Perspective	Source	Definition	Trait	Process	Aim
	Zenger and Hesterly (1997)	Governance model	Between the market and the organization	-	-
Resource Perspective	Gulati et al. (2000)	Arrangement	-	Resource exchange, sharing, union Skills and resources	Develop products and technologies Joint business
Agreement Perspective	Dussauge et al. (2000) Dou and Wang (2012)	Behaviour Cooperation agreement	- Long term	Commercial activity	Economic benefit

2.2.3 The Dimensions of Enterprise Networks

Tie dimension and structural dimension are important features of enterprise networks. The tie dimension describes the tie attributes of enterprise networks, while the structural dimension describes how companies are embedded in the network (Nahapiet & Ghoshal, 1998). Embedding theory indicates that companies need to obtain social capital through tie embedding and structural embedding (Granovetter, 1985). The “tie position” model proposed by the structural hole theory also reflects the tie and structural characteristics of enterprise networks (Burt, 2009; Gulati et al., 2000); both the embedding theory and the structural hole theory suggest that we need to consider the tie dimension and the structural dimension. Therefore, this study explores the impact of enterprise networks on competitive advantages from the tie dimension and the structural dimension. However, the previous literature has shown that there are many indicators for measuring tie characteristics and structural characteristics; adopting all of them would make our study very complicated and waste a lot of time analysing data. Therefore, we choose and use some key indicators to replace all the indicators. The indicators for measuring the tie dimension and the structural dimension are presented in Table 2.3.

Table 2.3 Indicators of the Relationship Dimension and the Structural Dimension

Source	Tie Dimension					Structural Dimension							
	Tie Quantity	Tie Quality	Trust	Tie Strength	Tie Durability	Heterogeneity	Sparsity	Hole	Centrality	Density	Scale	Openness	Position
Tichy, Tushman, and Fombrun (1979)	√	√	-	-	-	-	-	-	√	√	√	√	-
Granovetter (1985)	-	-	√	√	√	-	-	-	√	√	√	-	-
Wong and Boh (2014)	-	-	-	-	-	-	√	-	√	-	-	-	-

Source	Tie Dimension					Structural Dimension							
	Tie Quantity	Tie Quality	Trust	Tie Strength	Tie Durability	Heterogeneity	Sparsity	Hole	Centrality	Density	Scale	Openness	Position
Kim, Oh, and Swaminathan (2006)	-	√	-	√	√	-	-	-	√	-	√	-	√
Naudé and Buttle (2000)	-	√	-	√	√	-	-	-	-	-	-	-	-
Castells et al. (2004)	-	-	-	-	-	-	-	-	√	-	√	-	√
Tang, Wong, and Wu (2009)	-	-	-	-	-	√	-	-	√	√	-	-	-
Dong (2012)	-	-	-	√	-	-	-	-	√	√	-	-	-
Dou and Wang (2012)	-	-	-	√	-	-	-	-	√	-	√	-	-
Rogan and Mors (2014)	-	-	-	-	-	√	-	-	-	√	-	-	-
Ge, Sheng, and Li (2016)	-	-	-	-	-	-	√	-	√	-	-	-	-
Hou and Xue (2015)	-	√	-	√	√	-	-	-	√	-	-	-	-
Total	1	4	1	6	3	2	3	1	11	5	5	1	2

As shown in the above table, the previous literature has used the tie quantity, tie quality, trust level, tie strength, tie persistence, tie stability, tie heterogeneity, and sparseness to measure the tie dimension of the enterprise network. Among these, tie strength is the most frequently cited indicator and is mentioned six times; therefore, this study adopts tie strength to measure the tie dimension of enterprise networks. Tie strength is the strength of the corporate social relationships with other organizations. The higher the frequency of interaction, the greater the depth of feelings, the higher

the degree of intimacy, and the higher the degree of reciprocal exchange, indicating that the ties of a company are strong and suitable for the transmission of complex and invisible knowledge resources (Granovetter, 1985; Hansen, 1999; Inkpen & Tsang, 2005); otherwise, weak ties provide opportunities for companies to access new knowledge from strangers (Granovetter, 1977).

Table 2.3 shows that the previous literature has used structural holes, network centrality, network density, network scale, network openness, and network location to describe the structural dimension of enterprise networks, among which network centrality is the most-cited index, which has been mentioned 11 times. Therefore, this study adopts network centrality to measure the structural dimension of enterprise networks. Network centrality is the degree to which an enterprise's position in the entire network is close to the position of the network centre, which can reflect the importance of the enterprise in the network (Tsai, 2016). Previous studies have shown that the network centrality of an enterprise is greater the more prominent the enterprise's position in the network and the more attractive it is to other network members (Basole, Ghosh, & Hora, 2017; Krackhardt, 1999).

2.2.4 Enterprise Networks and Competitive Advantages

Here, we discuss the impact of tie strength/network centrality on competitive advantages. First, this study proposes that tie strength may have a positive effect on competitive advantages. Previous studies have shown that competitive advantages are positively related to tie strength (Dong, 2012; Ge, Sheng, & Li, 2016; Huang & Chang, 2008; Kim, Oh, & Swaminathan, 2006; Koka, Madhavan, & Prescott, 2006; Naudé & Buttle, 2000). It is possible that the key knowledge and important information that can help companies to gain a competitive advantage are only transmitted in a strong-tie network (Hansen, 1999). When enterprises cannot obtain the required resources through market transactions or mergers, a strong-tie network is an important channel through which to obtain the resources required (Gulati, 1999; Gulati et al., 2000). Moreover, the trust mechanism generated by strong ties can reduce the negotiation costs, transaction costs, and resource acquisition costs; thereby, tie strength can help enterprises to achieve low-cost advantages (Siu & Bao, 2008; Uzzi, 1997). Strong ties also help to strengthen the sense of belonging between

enterprises, making different enterprises into a “fate community” that can resist business risks, so strong ties can improve the competitiveness of individual enterprises in a dynamic environment (Hardy, Lawrence, & Grant, 2005). Previous studies have shown that companies that maintain strong ties with other companies have greater competitiveness and are more likely to gain a competitive advantage (Álvarez, Marin, & Fonfría, 2009). Compared the effects of tie strength, organizational learning, and technological innovation on the competitive advantages of Chinese textile machinery companies, and the results showed that tie strength, organizational learning, and technological innovation all positively affect competitive advantages, among which tie strength has a greater impact (Yan & Chen, 2010). Given the evidence mentioned above, we posit that:

H1a: Tie strength has a positive effect on competitive advantages.

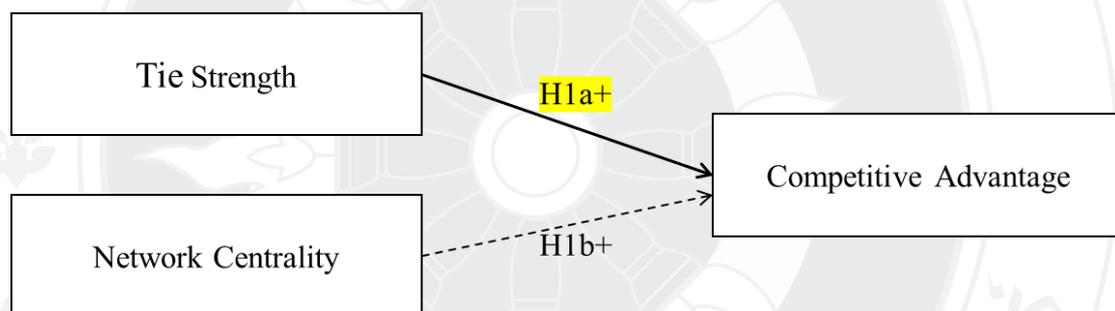


Figure 2.2 The Theoretical Hypothesis of the Effect of Tie Strength on Competitive Advantages

This study also proposes that network centrality may have a positive effect on competitive advantages. Previous studies have shown that network centrality has a positive impact on competitive advantages (Batjargal, 2005; Castells, Tubella, Sancho, De Isla, & Wellman, 2004; Freeman, 1977; Paruchuri, 2010; Powell, Machray, & Provan, 1996; Tang, Wong, & Wu, 2009; Tsai, 2001). The position of a company in the network is closely related to its corporate performance (Phelps, 2010; Tichy, Tushman, & Fombrun, 1979) because enterprises located in the central position of a network occupy more structural holes, which can bring advantages of information acquisition and information control (Burt, 1997). Moreover, enterprises at the centre

of a network can obtain more information resources than those at the edge of the network, which not only enables companies to understand business opportunities more comprehensively (Owen-Smith & Powell, 2004) but also helps them to form new ideas and new designs (Burt, 2004). Besides, the companies at the centre of a network can easily obtain help from other companies through their high reputation, wealth, and status; therefore, those enterprises can quickly solve the problems encountered in the operation process and are more likely to gain advantages (Lin, 2008; Wellman, 1982). Given the evidence mentioned above, we posit that:

H1b: Network centrality has a positive effect on competitive advantages.

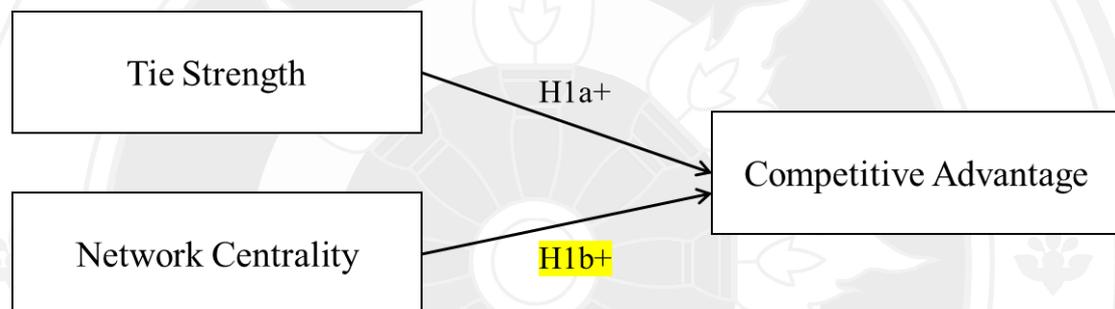


Figure 2.3 Theoretical Hypothesis of the Effect of Network Centrality on Competitive Advantages

2.3 Dynamic Capabilities

2.3.1 The Theories of Dynamic Capabilities

Technological changes have changed the original competitive mode and competitive rules between enterprises; for instance, customers pursue the individualization of commodities, the role of industrial barriers is becoming weaker, and new competitors are always snatching the profits of existing enterprises. This competitive environment is defined as a super-competitive environment (D'aveni & Gunther, 1996). In this super-competitive environment, the key resources advocated by the resource-based theory gradually deplete value with environmental change and the “core rigidity” produced by the core competence hinders enterprises’

transformation, then it unable to adapt to the changing environment. These factors make it extremely difficult for companies to maintain their existing competitive advantage (Teece & Pisano, 1994). Therefore, how do companies gain a competitive advantage in a dynamic environment?

Teece and Pisano (1994) proposed dynamic capabilities based on core capabilities and defined them as the ability to change capabilities. This definition of dynamic capabilities was developed into the ability of enterprises to integrate, construct, and reset internal and external resources continuously to adapt to environmental changes (Teece et al., 1997); he also proposed a “position–process–path” model (“3P” model) to analyse dynamic capabilities (Teece et al., 1997). The “3P” model is presented in Figure 2.4.

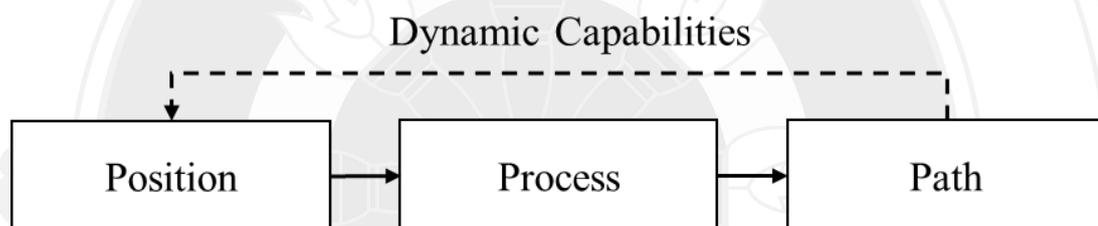


Figure 2.4 The “3P” Model of Dynamic Capabilities

In the “3P” model, the “position” is the resource base of an enterprise, which includes the resource stock, combination methods, and combination structure, while the “process” is the organization’s way of doing things and the management process through resource absorption, resource integration, and resource reconstruction. Then, the “path” is the strategic goal of the enterprise, which includes path dependence and technological opportunities. In detail, path dependence means that the current social status and future development direction of an enterprise will be affected by its past behaviour; therefore, path dependence may lead to core rigidity, which makes the company unable to adapt to the changing environment. Compared with path dependence, the technological opportunities originate from the investment, support, and innovation activities of the enterprise, which are the decisive factors in its development (Teece et al., 1997). In short, the “3P” model of dynamic capabilities

shows the ability of an enterprise to achieve its strategic goals with a specific organizational process that is based on its internal resources and capabilities.

Some scholars have explored the formation mechanism of dynamic capabilities from the learning perspective. Zollo and Winter (2002) indicated that the accumulation of experience, knowledge expression, and knowledge coding obtained through organizational learning can effectively promote process reengineering, resource integration, competence reconstruction, and the evolution of operating rules; therefore, organizational learning is the source of dynamic capabilities. Based on the study by Zollo and Winter (2002), the learning mechanism of dynamic capabilities was developed by Zahra, Sapienza, and Davidsson (2006), who claimed that, once companies are stimulated by the external environment or internal performance feedback, they will continually search for, select, copy, and retain knowledge to promote business process reengineering, resource integration, and the creation of new capabilities to change the company's operating rules through the accumulation of experience, knowledge expression, and knowledge coding, indicating that knowledge management and learning mechanisms are the driving factors of the formation of dynamic capabilities in a dynamic environment (Zahra, Sapienza, & Davidsson, 2006). The learning mechanism model of dynamic capabilities is presented in Figure 2.5.

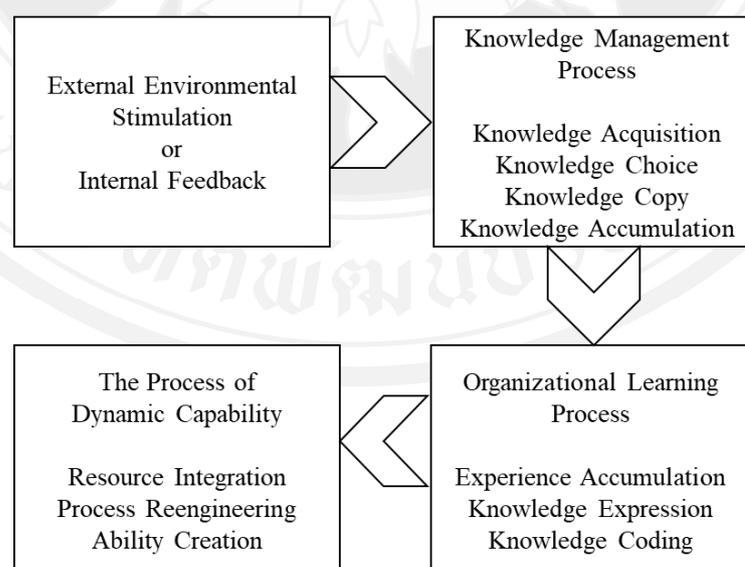


Figure 2.5 The Learning Mechanism Model of Dynamic Capability

In addition, some scholars have explored the formation mechanism of dynamic capabilities from a process perspective and proposed a dual-process model of dynamic capabilities (Schreyögg & Kliesch-Eberl, 2007). The dual-process model includes capability progression and capability monitoring, capability progression being the creation of new capabilities and capability monitoring being the consolidation of new capabilities. In a dynamic environment, companies need to improve their capabilities or create new capabilities to adapt to environmental changes. However, any new capability should be consolidated and endorsed to create value for the enterprise through capability-monitoring methods, such as path dependence and organizational inertia (Schreyögg & Kliesch-Eberl, 2007). Therefore, the dual-process model defines dynamic capabilities as the process of continuously creating new capabilities and consolidating capabilities. The dual-process model of dynamic capabilities is presented in Figure 2.6.

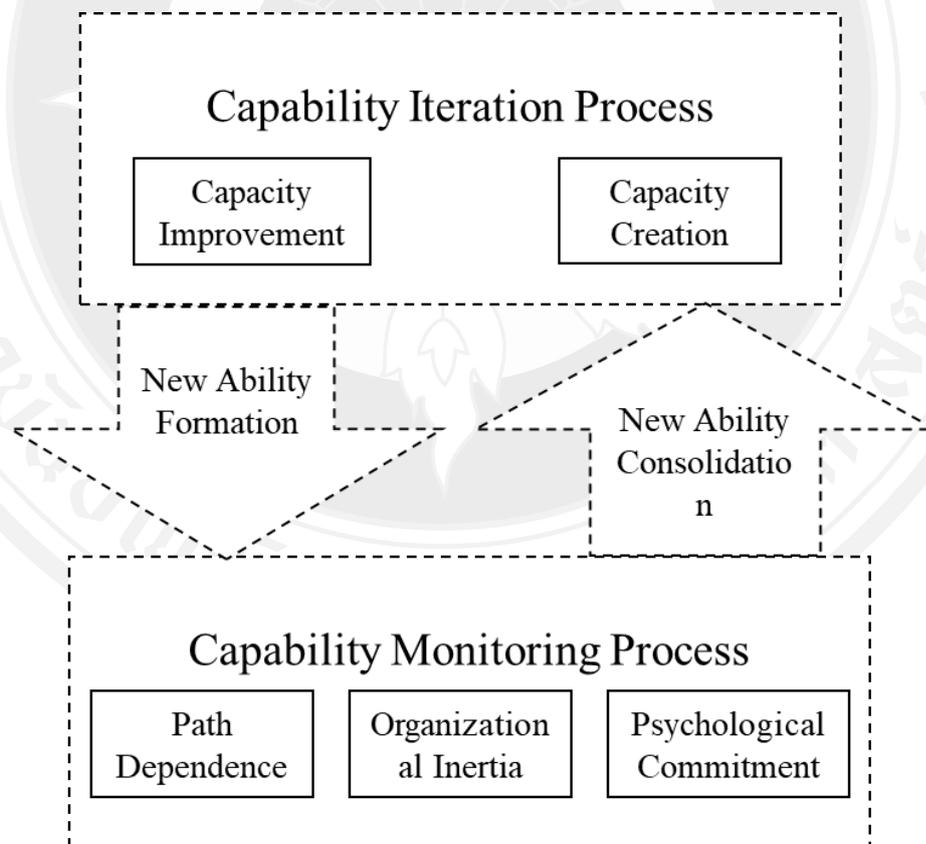


Figure 2.6 A Dual-Process Model of Dynamic Capabilities

Overall, from the perspective of the formation mechanism of dynamic capabilities, it could be seen that dynamic capabilities need to be cultivated and constructed gradually through internal management processes such as resource integration, organizational learning, and knowledge management because they cannot be obtained directly from outside the enterprise; therefore, dynamic capabilities are difficult for competitors to imitate (Winter, 2003). The value of dynamic capabilities is also reflected in extra surplus value, resource reuse, innovation, and environmental adaptability (Eisenhardt & Martin, 2000; Xu & Li, 2013). Given the above advantages of dynamic capabilities, building dynamic capabilities has also become an important way for companies to gain a competitive advantage.

2.3.2 The Definition of Dynamic Capabilities

Dynamic capabilities have mainly formed mainstream views such as “capability theory”, “organizational convention theory”, “process theory”, and “behaviour theory” in the field of strategic management, as shown in Table 2.4.

Table 2.4 Definitions of Dynamic Capabilities

Type	Definitions	Source
Capability Theory	Dynamic capabilities are the ability to change ability;	Teece and Pisano (1994)
	Dynamic capabilities are the ability to adapt to rapid environmental changes through the integration, construction, and reconstruction of internal and external resources and capabilities;	Teece et al. (1997)
	Dynamic capabilities are the ability to create or adjust the resource base in a targeted manner;	Cavusgil, Seggie, and Talay (2007)
	Dynamic capabilities are the ability to create a new competitive advantage by creating a combination of resources that is difficult for competitors to imitate;	Griffith and Harvey (2001)
	Dynamic capabilities are the strategic capability of	Zahra and George

Type	Definitions	Source
	deploying and restructuring resources to meet customer needs;	(2002)
	Dynamic capabilities are the ability to build new capabilities. Their essence is to explain why a company is better than other companies in terms of resource increase, resource integration, and resource reconstruction;	Danneels (2011)
	Dynamic capabilities refer to the ability of an enterprise to make scientific decisions based on market changes and market opportunities;	Barreto (2010)
	Dynamic capabilities are the ability of an enterprise to integrate, configure, and reorganize resources and capabilities according to environmental changes;	Dong (2012)
	Dynamic capabilities are the ability of an enterprise to achieve long-term survival and gain a competitive advantage in a dynamic environment;	Rodrigo-Alarcón et al. (2018)
Conventional Theory	Dynamic capabilities are an organizational convention for companies to allocate resources according to changes in the market, such as emergence, conflict, fission, evolution, and decline;	Eisenhardt and Martin (2000)
	Dynamic capabilities are an endogenous organizational convention of an enterprise;	Winter (2003)
	As an organizational convention, dynamic capabilities can adapt to the external competitive environment and enable an enterprise to obtain a lasting competitive advantage and good performance by constantly changing its resource base and continuously implementing new value creation strategies;	Zheng, Zhang, and Du (2011)

Type	Definitions	Source
Process Theory	Dynamic capabilities are the process by which decision makers reconstruct corporate resources, business practices, and conventions in a reasonable way;	Zahra et al. (2006)
	Dynamic capabilities refer to the process by which an enterprise quickly repositions its strategy according to the threats and opportunities that it faces;	Teece (2018a)
Process Theory	Dynamic capabilities are the process by which an enterprise realizes the dynamic updating of its capabilities and gains a competitive advantage through environmental perception, opportunity grasping, and resource integration;	Du, Jiang, and Zeng (2015)
Behavior Theory	Dynamic ability is a continuous and stable learning ability and behaviour that can help companies to improve their operational practices and efficiency;	Zollo and Winter (2002)
	Dynamic capabilities refer to the behavioral orientation of enterprises that continuously integrate, reconfigure, update, and recreate resources and capabilities, which can upgrade and restructure their core capabilities to respond to changing environments and to help them gain competitive advantages;	Wang and Ahmed (2007)
	Dynamic capabilities are a collection of knowledge management behaviors that can utilize, change, and update the existing knowledge base of an enterprise.	Nieves and Haller (2014)

As shown in the table above, “capability theory” defines dynamic capabilities as an enterprise capability, such as a capability to change (Teece & Pisano, 1994), a capability to create a new ability (Danneels, 2011), the environmental adaptability of integrating and transforming internal and external resources (Teece et al., 1997), a capability of adjusting the enterprise resource base to achieve a competitive advantage (Cavusgil, Seggie, & Talay, 2007; Griffith & Harvey, 2001; Rodrigo-Alarcón, García-Villaverde, Ruiz-Ortega, & Parra-Requena, 2018), a strategic capability to restructure resources (Zahra & George, 2002), or a market decision-making capability (Barreto, 2010). Overall, a dynamic capability is an ability.

“Organizational convention theory” defines dynamic capabilities as an organizational routine that is used to complete specific tasks (Barley & Kunda, 2001), such as an organizational routine for configuring resources (Eisenhardt & Martin, 2000; Winter, 2003) or an organizational routine that can create new value and help companies to gain a competitive advantage (Zheng, Zhang, & Du, 2011). In summary, an organizational convention is an interactive mode for enterprises to complete specific tasks.

“Process theory” defines dynamic capabilities as a process, such as a process of reconstructing resources, operating regulations, and organizational practices (Zahra et al., 2006), an innovative process of perceiving change, seizing opportunities, and integrating resources (Du, Jiang, & Zeng, 2015), or a process of repositioning strategy (Teece, 2018). These views indicate that dynamic capabilities are a process that cannot be formed overnight.

“Behaviour theory” defines dynamic capabilities as the performance or orientation of an enterprise, such as a learning behaviour (Zollo & Winter, 2002), behavioural guidance for resource integration, configuration, and updating (Wang & Ahmed, 2007), or a collection of knowledge management behaviours (Nieves & Haller, 2014).

Although the definitions of dynamic capabilities are different, they all recognize that the purpose of building dynamic capabilities is to help organizations achieve their strategic goals in a dynamic environment. This study adopts the “ability theory” because dynamic capabilities are derived from core capabilities; therefore, we define it as the ability of companies to integrate and restructure internal and external

resources continuously to adapt to environmental changes and gain competitive advantages.

2.3.3 The Dimensions of Dynamic Capabilities

The dimensional division of dynamic capabilities varies greatly between scholars due to their different understandings. The dimensions of dynamic capabilities are presented in Table 2.5.

Table 2.5 The Dimensions of Dynamic Capabilities

Source	Dimension
Teece (1994)	Integration, coordination, and reconstruction.
Teece et al. (1997)	Integration, building, and reconstruction.
Eisenhardt and Martin (2000)	Integration and reconstruction, acquisition, and release.
Luo (2000)	Get, assign, update.
Teece (2007)	Sense, seizing, integration, and reconstruction.
Borch and Madsen (2007)	Resource integration, network, resource acquisition, strategic path combination.
Wang and Ahmed (2007)	Adaptation, absorption, and innovation.
O'Reilly and Tushman (2008)	Search, innovation.
Hao (2011)	Identification, integration and reconstruction, technical and organizational flexibility.
Barreto (2010)	Perception, integration, reconstruction.
Wu (2010)	Coordination and integration, reconstruction, organizational learning.
Gong (2011)	Perception, integration, absorption, organizational flexibility, and innovation.
Dangelico et al. (2017), Xu and Li (2013)	Coordination and integration, reconstruction and transformation.
Li and Liu (2014)	Perception, decision, transformation.

Source	Dimension
Jian, Wang, and Chen (2015)	Perception, absorption, integration, and reconstruction.
Huang et al. (2016)	Integration, learning, relationship, adaptation.
Albort-Morant et al. (2016)	Perception, learning, integration, coordination.
Cao and Zhao (2014)	Adaptation, integration, and absorption.
Zheng, Zhang, and Du (2011)	Identification, integration and reconstruction, service and organizational flexibility.

From the table above, it could be seen that dynamic capabilities are the product of environmental change, which makes the building of dynamic capabilities meaningful because companies do not need to build dynamic capabilities to respond to environmental changes in static environments (Eisenhardt & Martin, 2000). However, environmental change is the subjective feeling of enterprise managers and enterprises with different sense capabilities have different forces to build dynamic capabilities (Teece, 2007); therefore, sensing capability is the primary condition for building dynamic capabilities. Secondly, companies need to absorb, integrate, and reconstruct resources to improve their environmental adaptability (Wang & Ahmed, 2007); thus, absorptive capability, integration, and reconstruction capability must be considered. Besides, innovation capacity, learning ability, knowledge transformation ability, decision-making capacity, and other capabilities are all based on absorptive capacity and integration and reconstruction capabilities. Therefore, we divide dynamic capabilities into three dimensions, sensing capability, absorptive capability, and integration and reconstruction capabilities (Jian, Wang, & Chen, 2015). Next, we will introduce sensing capability, absorptive capability, and integration and reconstruction capabilities, respectively.

Sensing Capability. Sensing capability is the ability to identify market opportunities by perceiving environmental changes, understanding potential needs, and grasping environmental change laws and development trends (Teece, 2007). In a dynamic environment, the strategic direction, path selection, and business decisions all depend on managers' understanding of the external environment and judgement of the market competition situation (Hough & White, 2003). Previous studies have

shown that companies with a weak sensing capability either cannot make accurate judgements about the competition situation or are unable to integrate resources to meet a strategic need, while companies with a strong sensing capability can gain better performance because they can better understand market changes and customer needs and discover potential market opportunities earlier (Yli-Renko, Autio, & Sapienza, 2001). Therefore, sensing capability is important to develop dynamic capabilities.

Absorptive Capability. Absorptive capability is the ability of an enterprise to acquire, digest, transform, and apply new knowledge (Cao & Zhao, 2014; Cohen & Levinthal, 1990; Wang & Ahmed, 2007). Absorptive capability can not only continuously absorb external resources to change the enterprise's resource base but also provide more opportunities for integration capabilities (Cepeda & Vera, 2007; Gong, 2011). Therefore, absorptive capability is the key to improving dynamic capabilities.

Integration and Reconstruction Capabilities. Integration and reconstruction capabilities are the ability of enterprises to reallocate internal and external resources in the light of task requirements, which is the key to transforming resources into competitive advantages (Teece, 2014). Generally, companies with strong integration and restructuring capabilities have more innovation opportunities, which make it easy for them to transform potential opportunities into competitive advantages (Jian et al., 2015; Wu, 2010).

2.3.4 Enterprise Networks and Dynamic Capabilities

Resources are the guarantee for the formation and development of dynamic capabilities (Luo, 2000; Teece, 2007). Those companies with sufficient resources usually have better dynamic capabilities (Mckelvie & Davidsson, 2009; Wu, 2010). Previous studies have shown that enterprise networks can help companies to obtain more resources, and those companies in the network may have more opportunities to obtain resources and achieve better performance of dynamic capabilities than a single enterprise (Hitt, Lee, & Yucel, 2002); therefore, enterprise networks are very important for the development of dynamic capabilities (Griffith & Harvey, 2001; Kemper, Engelen, & Brettel, 2011; Levin & Cross, 2004). Next, we will separately

demonstrate the influence of tie strength and network centrality on dynamic capabilities.

This study proposes that tie strength may have a positive effect on dynamic capabilities. The previous literature has shown that tie strength plays an important role in promoting the construction and development of dynamic capabilities (Rodrigo-Alarcón et al., 2018; Zhang & Wu, 2017). This is because frequent interactions and exchanges with other companies can help companies to gain a deep understanding of changes in customer needs and accurately identify potential market opportunities (Cao, Simsek, & Jansen, 2015); thus, tie strength positively affects sensing capability. Moreover, the trust mechanism generated by the strong-tie network helps to improve the breadth and depth of information exchange, providing more opportunities for companies to absorb knowledge (Yli-Renko et al., 2001); therefore, tie strength positively affects absorptive capability. Besides, the trust mechanism solves the difficulties of resource coordination and cooperation practices by reducing the transaction costs between enterprises, helping to overcome the obstacles to the development of integration and reconstruction capabilities (Dyer & Singh, 1998). Empirical research has shown that, when the cost of acquiring resources is low, the cost of resource integration and reorganization will also be reduced; therefore, tie strength is helpful for the development of integration and reconstruction capabilities (Alarcón, 2012; Tsai, 2016). Given the evidence mentioned above, we posit that:

H2a: Tie strength has a positive effect on dynamic capabilities.

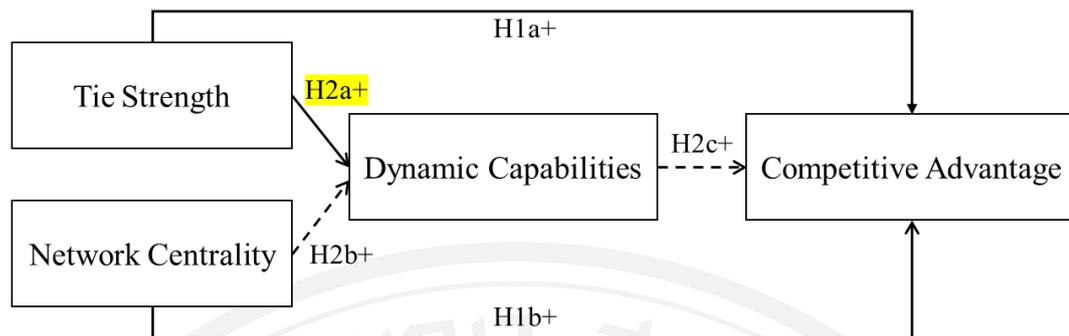


Figure 2.7 The Theoretical Hypothesis between Tie Strength and Dynamic Capabilities

This study also proposes that network centrality may have a positive effect on dynamic capabilities. Previous studies have shown that network centrality is helpful for the formation and development of dynamic capabilities (Hsu & Wang, 2012; Lee, Li, & Wu, 2018). Resources are the key to the formation of dynamic capabilities, and companies at the centre of a network can have more opportunities to access information resources and knowledge resources (Lin, 2008; Zaheer & Bell, 2005); therefore, these companies may have better dynamic capabilities. Meanwhile, those companies that are far from the centre of the network usually have difficulty developing dynamic capabilities because they lack access to resources (Batjargal, 2005). Moreover, those companies located in the central position of a network have more opportunities to absorb and integrate resources (Burt, 2009); furthermore, the new knowledge brought by the central location of the network could help to update the enterprises' method for absorbing and integrating resources, enabling them to use their absorption and integration capabilities better to create value (Moran, 2005). This evidence shows that network centrality promotes the formation and development of the abilities to sense, absorb, integrate, and restructure (Lee et al., 2018; Reed, Lubatkin, & Srinivasan, 2006). Accordingly, we posit that:

H2b: Network centrality has a positive effect on dynamic capabilities.

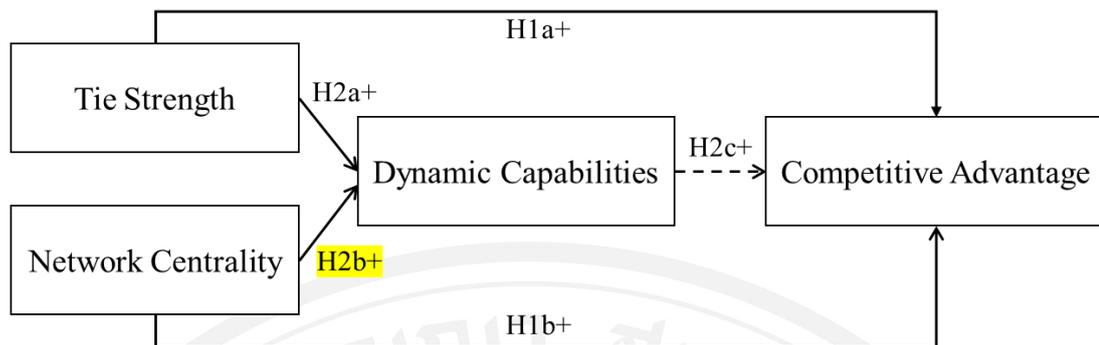


Figure 2.8 The Theoretical Hypothesis between Network Centrality and Dynamic Capabilities

2.3.5 Dynamic Capabilities and Competitive Advantages

We propose that dynamic capabilities positively affect competitive advantages. Previous studies have shown that dynamic capabilities are an effective method for companies to obtain or maintain a competitive advantage in a dynamic environment (Dangelico, Pujari, & Pontrandolfo, 2017).

First, environmental uncertainty requires companies to use evidence provided by their sensing capability to make strategic decisions (Teece, 2007); therefore, enterprises need to scan, search, and explore technical and market information continuously to identify market opportunities and guide strategic adjustments (Kwon, 2013; Mikalef & Pateli, 2017; Nelson & Winter, 1982). The previous literature has shown that the products or services developed by companies with a strong sensing capability can better meet customer needs, helping them to form unique competitiveness (Griffin & Hauser, 1993), while companies with a poor sensing capability may fail to grasp new market opportunities, leading to the failure of the corporate strategy (Teece, 2007). Empirical studies have also shown that a strong sensing capability can significantly improve a company's financial performance and the probability of market success (Hallen, Johanson, & Seyed-Mohamed, 1991; Mu, 2017). Therefore, competitive advantages are positively associated with sensing capability.

Second, absorptive capacity is the key to the formation of dynamic capabilities (Zahra et al., 2006). Absorptive capacity not only changes the original resource base by absorbing more resources but also can plunder competitors' performance through innovation (Xue, Boadu, & Xie, 2019; Zahra & George, 2002). Empirical research has shown that those companies with higher absorptive capacity can win higher performance in market competitions (Xue et al., 2019); moreover, enterprises with high absorptive capacity have a diversified knowledge structure, which provides a broad knowledge base for acquiring or maintaining a competitive advantage (Lane, Koka, & Pathak, 2006). This evidence shows that competitive advantages are positively associated with absorptive capacity.

Third, integration and reconstruction capabilities play a vital role in the process of transforming resources into competitive advantages (Dangelico et al., 2017; Jiao, 2011). Integration and reconstruction capabilities contribute to the synergy of scattered resources through resource combination and reuse (Borch & Madsen, 2007; Wang & Ahmed, 2007); Besides, integrating external information can promote innovation and then help enterprises to respond to small environmental changes through innovation (Teece, 2007). Thus, integration and reconstruction capabilities also positively affect competitive advantages.

Overall, as important parts of dynamic capabilities, sensing capability, absorption capability, and integration and reconstruction capabilities all positively affect competitive advantages. Thus, we posit that:

H2c: Dynamic capabilities have a positive effect on competitive advantage.

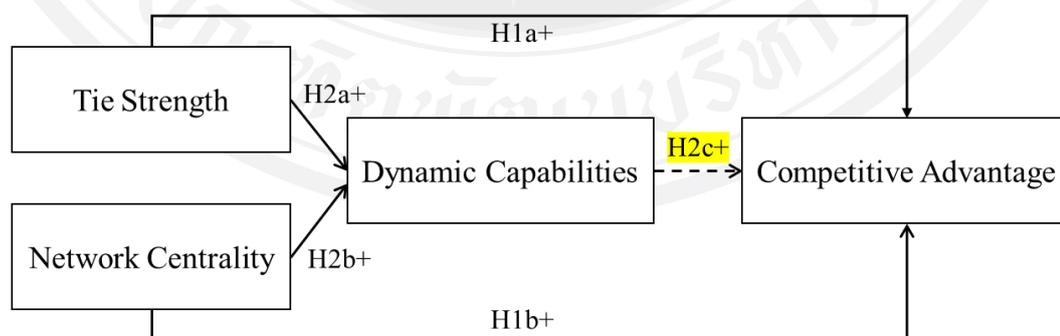


Figure 2.9 The Theoretical Hypothesis between Dynamic Capabilities and Competitive Advantages

2.3.6 The Mediating Effect of Dynamic Capabilities

As an important channel for companies to obtain external resources, enterprise networks can help companies to gain a competitive advantage by promoting innovation (Pinho & Prange, 2016). Previous studies have shown that the indirect impact of dynamic capabilities on the corporate strategy is significantly greater than the direct impact of enterprise networks on the corporate strategy (Rodrigo-Alarcón et al., 2018), indicating that dynamic capabilities play an important role in the process of transforming corporate social capital into competitive advantages.

We propose that dynamic capabilities mediate the relationship of tie strength and competitive advantages. Resources cannot exist independently of capacity; thus, the resources brought by strong ties also cannot directly serve competitive advantages, especially repetitive resources. Therefore, resource integration is a main means of transforming external resources into competitive advantages (Hart, 1995). Moreover, only valuable resources will be absorbed and used by the company, and sensing capability provides more opportunities for absorbing resources and motivates companies to internalize these valuable external resources by deeply understanding and identifying the value of resources (Lengnick-Hall & Lengnick-Hall, 2002). Companies with better absorptive capacity tend to convert corporate social capital into higher business performance, while companies with weak absorptive capacity encounter obvious difficulties in the process of converting resources into competitive advantages (Woiceshyn & Daellenbach, 2005). Given the evidence mentioned above, we posit that:

H2d: The relationship between tie strength and competitive advantages is mediated by dynamic capabilities.

We also propose that dynamic capabilities mediate the relationship between network centrality and competitive advantages. Previous studies have shown that dynamic capabilities play an intermediary role between network centrality and competitive advantages (Dong, 2012). Companies at the centre of a network use their information first-mover advantage to help them identify and take advantage of market opportunities (Teece, 2007); therefore, those companies located in the central position of a network are more likely to enter a new market first. Besides, companies need to integrate their resources to respond to new opportunities in future markets (Buhler,

2002), and empirical research has shown that companies with strong integration capabilities have the ability to turn resources into advantages (Du et al., 2015). Given this evidence, we posit that:

H2e: The relationship between network centrality and competitive advantages is mediated by dynamic capabilities.

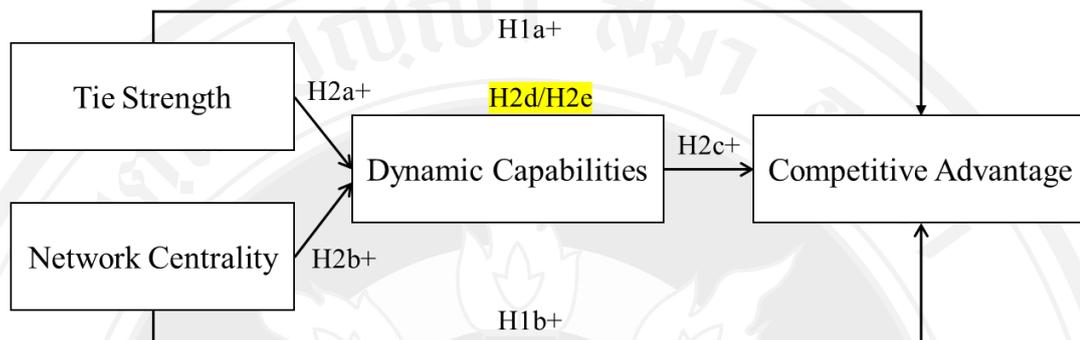


Figure 2.10 The Theoretical Hypotheses between Enterprise Networks, Dynamic Capabilities, and Competitive Advantages

2.4 Ambidextrous Innovation

2.4.1 The Basis of Ambidextrous Innovation

As the basis of ambidextrous innovation, exploration and exploitation, proposed by March (1991), were introduced into the field of innovation (Benner & Tushman, 2003). Since then, exploratory innovation and exploitative innovation have been widely cited by scholars (Calantone & Rubera, 2012; Colombo, Doganova, Piva, D'adda, & Mustar, 2015; He, Huang, Chau, Shen, & Zhu, 2019; Saunila, Ukko, & Rantala, 2018). Exploratory innovation can help enterprises to seize opportunities in the future market by exploring new knowledge, developing the production of new products, and opening new markets based on new knowledge; therefore, those companies that engage in exploratory innovation are more likely to earn excess profits, but they also bear a high failure risk (He & Wong, 2004; Jansen, Van Den Bosch, & Volberda, 2006; March, 1991). Meanwhile, exploitative innovation can help enterprises to win short-term profits in the existing market by improving the product quality, reducing the product cost, and strengthening the existing markets based on the

existing knowledge or skills; therefore, those companies that engage in exploitative innovation may be unable adapt to the new market (Gupta, Smith, & Shalley, 2006; Kollmann & Stöckmann, 2014; March, 1991). To make it easier for readers to distinguish between exploratory innovation and exploitative innovation, we have extracted their keywords and we present them in Table 2.6.

Table 2.6 The Differences between Exploratory Innovation and Exploitative Innovation

Item	Exploratory Innovation	Exploitative Innovation
Basic	New knowledge.	Existing knowledge and technology.
Method	Design new products Develop new markets and explore new distribution channels.	Improve product quality, reduce product costs, and strengthen existing markets.
Result	Adapt to the needs of emerging markets and potential customers.	Meet existing market and customer needs.
Aim	Gain excess profits.	Normal profit.
Organizational Structure	Flexible and decentralized.	Mechanized and centralized.

Source: O'Reilly and Tushman (2013)

Some scholars have indicated that exploratory innovation and exploitative innovation cannot coexist in an enterprise (Benner & Tushman, 2003; Gupta et al., 2006; Li, Chu, & Lin, 2010; March, 1991; Tushman & O'reilly, 1996). This is because engaging in exploratory innovation and exploitative innovation requires a lot of resources, and it is difficult for companies to obtain enough resources to satisfy exploratory innovation and exploitative innovation simultaneously (March, 1991). Moreover, exploratory innovation and exploitative innovation form different paths in

the process of self-reinforcement, which means that companies focused on exploratory innovation cannot engage in exploitative innovation and companies engaged in exploratory innovation cannot conduct exploitative innovation (Li et al., 2010). Besides, exploratory innovation requires a flexible organizational structure to encourage companies to explore new things while exploitative innovation requires a stable organizational structure to improve organizational efficiency; however, the organizational structure is difficult to convert freely according to innovation needs (Andriopoulos & Lewis, 2009). Given this evidence, the competitive relationship between exploratory innovation and exploitative innovation is recognized (Benner & Tushman, 2003; Gupta et al., 2006).

However, some scholars have also suggested that exploratory innovation and exploitative innovation can promote each other under certain conditions (Birkinshaw & Gupta, 2013; Gupta et al., 2006). It is possible that information resources and knowledge resources can be reused, and enterprises can also use their enterprise network to obtain more resources, which can help them to overcome resource constraints (Xie & Gao, 2018; Yan & Guan, 2018); moreover, exploring new knowledge can help to enhance the existing knowledge base for exploitation, and the reuse of existing knowledge enables enterprises to gain an in-depth understanding of it, promoting the continuous exploration of new knowledge (Katila & Ahuja, 2002; Levinthal & March, 1993). Previous studies have shown that those companies with strong exploitation are likely to have better exploration (Cao, Gedajlovic, & Zhang, 2009; Katila & Ahuja, 2002; Stettner & Lavie, 2014); furthermore, these contradictions between exploratory innovation and exploitative innovation can be resolved through time separation, space separation, and parallel structures (Jansen et al., 2006; Lubatkin, Simsek, Ling, & Veiga, 2006). Overall, the relationship between exploratory innovation and exploitative innovation is synergic.

2.4.2 Methods for Achieving Ambidextrous Innovation

Ambidextrous innovation is a strategy for enterprises to engage in exploratory innovation and exploitative innovation simultaneously (He & Wong, 2004). How can companies achieve ambidextrous innovation? Scholars have mainly explored the methods of ambidextrous innovation from the organizational perspective and the

extra-organizational perspective (Duncan, 1976; Lavie & Rosenkopf, 2006).

From the organizational perspective, previous studies have solved the contradiction between exploratory innovation and exploitative innovation by separating them through spatial separation, structural analysis, and temporal separation, for example (Jansen et al., 2006; Lubatkin et al., 2006). Spatial separation divides the organizational structure into an organic structure and a mechanical structure and puts them into different business units. The organic structure is suitable for exploratory innovation due to its flexible organizational structure, loose process, and open culture, while the mechanical structure is suitable for exploitative innovation due to its centralized organization structure, compact process, and conservative culture (Lawrence & Lorsch, 1967); therefore, spatial separation resolves the contradiction between exploration and exploitation (Duncan, 1976). A parallel structure involves setting up a formal structure and a secondary structure within the organization, the formal structure being used to implement exploitative innovations to maintain the efficiency of the organization and the secondary structure being used to implement exploratory innovation to maintain the development potential (Raisch & Birkinshaw, 2008). Time separation requires companies to engage in exploratory or exploitative innovations at different times (Gupta et al., 2006), and it emphasizes that enterprises can switch freely between exploratory innovation and exploitative innovation for longer periods according to their needs (Burgelman, 1983; Wu & Wu, 2016). However, organizational ambidexterity requires the support of context ambidexterity and leadership ambidexterity (Rogan & Mors, 2014). Context ambidexterity builds an organizational scenario that can affect employee behaviour, business processes, and beliefs to encourage employees to allocate time, energy, and resources between exploratory innovation and exploitative innovation according to task needs (Gibson & Birkinshaw, 2004). Leadership ambidexterity requires corporate executives to be able to coordinate departmental activities and allocate resources rationally to solve conflicts between exploratory innovation and exploitative innovation (Lubatkin et al., 2006; Rogan & Mors, 2014; Smith & Tushman, 2005).

From the extra-organizational perspective, some scholars have suggested that companies can obtain sufficient resources through enterprise alliances or enterprise networks to alleviate the contradiction between exploratory innovation and

exploitative innovation by overcoming the resource limitations (Chuluun et al., 2017). Previous studies have shown that companies located within an enterprise network can obtain more resources needed for ambidextrous innovation (Lavie & Rosenkopf, 2006; Simsek, 2009).

Overall, organizational ambidexterity focuses on separating contradictions while extra-organizational ambidexterity emphasizes solving contradictions by providing more resources. The methods for achieving ambidextrous innovation are summarized and marked in Figure 2.11.

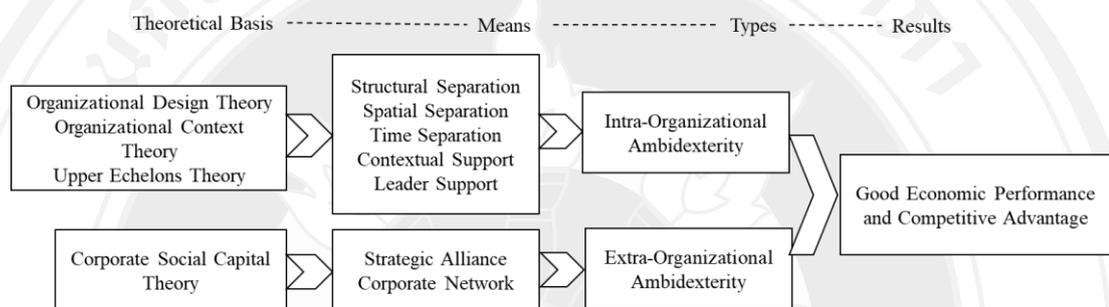


Figure 2.11 The Research System of Ambidextrous Innovation

2.4.3 The Dimensions of Ambidextrous Innovation

Most scholars have defined ambidextrous innovation as a strategy for companies to pursue both innovative and exploitative innovation, which helps companies to achieve sustainable development by improving their environmental adaptability (Cao et al., 2009; Jansen et al., 2006; Lin & Chen, 2015; Yang, Zhou, & Zhang, 2015).

He and Wong (2004) distinguished the interactive modes of exploratory innovation and exploitative innovation: balancing exploration and exploitation and combining exploration and exploitation. Balancing exploration and exploitation involved allocating resources to exploratory innovation and exploitative innovation in an optimal ratio and ensuring short-term profits and long-term capability. This study uses “|exploratory innovation – exploitative innovation|” to measure ambidextrous balance. Meanwhile, combining exploration and exploitation is a strategy for enterprises to implement high-level exploratory innovation and utilization innovation

simultaneously, and the study uses “exploratory innovation * exploitative innovation” to measure it. Based on the study by He and Wong (2004); Jansen et al (2006) used “exploratory innovation / exploitative innovation” to measure the balance dimension and “exploratory innovation * exploitative innovation” to measure the combination dimension, and Lubatkin et al (2006) used $|\text{exploratory innovation} - \text{exploitative innovation}|$ to measure the balance dimension and “exploratory innovation + exploitative innovation” to measure the combination dimension, which can reduce information loss compared with the product method. The balance dimension has also been measured using “ $|\text{exploratory innovation} - \text{exploitative innovation}|$ ” and the combination dimension has been measured using “exploratory innovation * exploitative innovation” (Cao et al., 2009). Some scholars used “ $1 - |\text{exploratory innovation} - \text{exploitative innovation}| / |\text{exploratory innovation} + \text{exploitative innovation}|$ ” to measure the balance dimension and “ $1 / 2 * (\text{exploratory innovation} + \text{exploitative innovation})$ ” to measure the combination dimension (Wang, Chen, & Yang, 2012).

Overall, previous studies have shown that, although there are differences in measurement methods for ambidextrous innovation, the dimension of ambidextrous innovation is the same. This study divides ambidextrous innovation into the ambidextrous balance dimension and the ambidextrous combination dimension based on the previous literature. Ambidextrous balance is the balanced effect of exploratory innovation and exploitative innovation within the enterprise (Benner & Tushman, 2003; March, 1991), and we use “ $5 |\text{exploratory innovation} - \text{exploitative innovation}|$ ” to measure ambidextrous balance (Cao et al., 2009; He & Wong, 2004; Lubatkin et al., 2006). Ambidextrous combination is the synergic effect of exploratory innovation and exploitative innovation (Cao et al., 2009; Gibson & Birkinshaw, 2004; He & Wong, 2004; Jansen et al., 2006; Rogan & Mors, 2014), and we use “exploratory innovation * exploitative innovation” to measure ambidextrous combination (Lubatkin et al., 2006).

2.4.4 Enterprise Networks and Ambidextrous Innovation

We propose that tie strength may positively affect ambidextrous innovation. Previous studies have shown that those companies located in a strong-tie network

have better ambidextrous innovation performance (Lavie & Rosenkopf, 2006; Rothaermel & Alexandre, 2009). This is because those enterprises need to build a trusted organizational environment through strong ties to support ambidextrous innovation (Jansen, Simsek, & Cao, 2012). Empirical research has shown that a trusting environment formed by continuous communication can not only help companies to allocate resources rationally between exploratory innovation and exploitative innovation (Gibson & Birkinshaw, 2004) but can also enable companies to obtain the resources needed for ambidextrous innovation at a lower cost by reducing the transaction costs (Granovetter, 1985). Besides, some key and invisible resources that can solve the problems encountered in the process of ambidextrous innovation are only transferred in a strong-tie network; therefore, companies need to maintain strong ties with other companies within the network to increase the success rate of ambidextrous innovation (Inkpen & Tsang, 2005). Given the evidence mentioned above, we posit that:

H3a: Tie strength has a positive effect on ambidextrous balance.

H3b: Tie strength has a positive effect on ambidextrous combination.

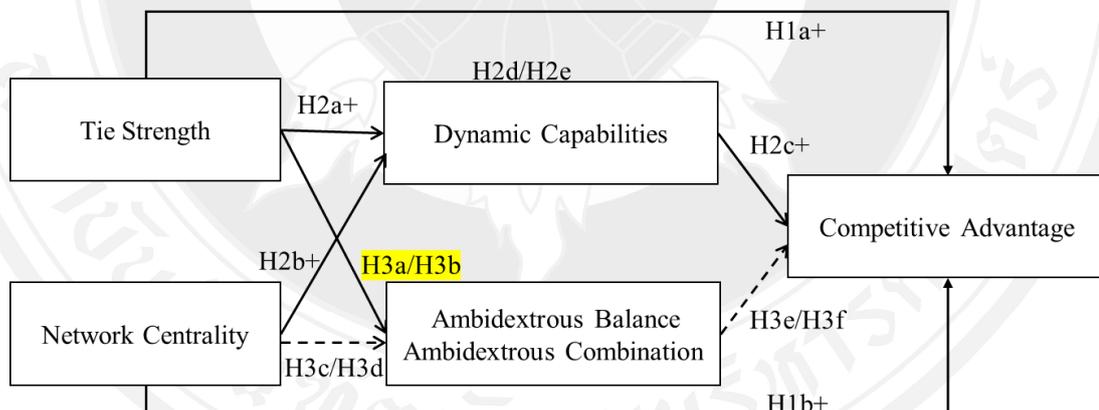


Figure 2.12 The Theoretical Hypotheses Concerning Tie Strength and Ambidextrous Innovation

We also propose that network centrality may positively affect ambidextrous innovation. Previous studies have shown that companies occupying the centre of the network can easily obtain more resources to support ambidextrous innovation (Burt,

2004; Phelps, 2010). It is possible that enterprises at the centre of the network can obtain more heterogeneous information from other enterprises because they have more access to information (Lin, Mcdonough, Lin, & Lin, 2013; Lin, 2008), and empirical research has shown that companies at the centre of the network have stronger willingness to innovate and higher innovation performance (Dolfsma & Van Der Eijk, 2017). Network centrality also helps companies to obtain resources at a lower cost and enables companies to balance or combine exploratory innovation and exploitative innovation at a lower cost (Tan, Zhang, & Wang, 2015); moreover, enterprises at the centre of the network have easier access to more resources than those at the edge of the network, indicating that enterprises located in the central position of a network have sufficient resources to try different innovations (Burt & Burzynska, 2017; Freeman, 1991; Stuck, Broekel, & Revilla Diez, 2016). Furthermore, enterprises at the centre of the network can use their reputation and status to obtain the support and help from other companies to solve their problems and reduce the risk of failure (Björk, Karlsson, & Magnusson, 2014; Wong & Boh, 2014), and empirical research has shown that companies at the centre of the network are more likely to obtain success in ambidextrous innovation (Chuluun et al., 2017). Given the evidence mentioned above, we posit that:

H3c: Network centrality has a positive effect on ambidextrous balance.

H3d: Network centrality has a positive effect on ambidextrous combination.

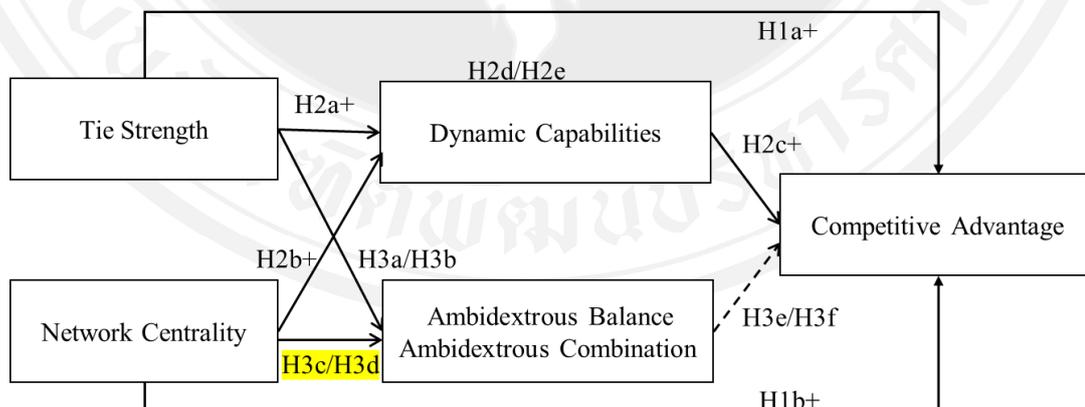


Figure 2.13 The Theoretical Hypotheses between Network Centrality and Ambidextrous Innovation

2.4.5 Ambidextrous Innovation and Competitive Advantages

In a dynamic environment, companies need to use ambidextrous innovation to improve corporate performance and adapt to environmental changes (Enkel, Heil, Hengstler, & Wirth, 2017; Mueller, Rosenbusch, & Bausch, 2013). Enterprises not only use exploitative innovation to survive in the existing market but also use exploratory innovation to adapt to the future market (Kollmann & Stöckmann, 2014); therefore, ambidextrous innovation is an important corporate strategy to achieve sustainable development in a dynamic environment (Junni, Sarala, Taras, & Tarba, 2013; Rothaermel & Alexandre, 2009).

We propose that ambidextrous balance may positively affect competitive advantages. Previous studies have shown that ambidextrous imbalance will reduce corporate performance (He & Wong, 2004), and companies that can balance exploration and exploitation have a higher corporate performance than ones that can only engage in exploration or exploitation (Tan & Liu, 2014; Tushman & O'reilly, 1996). This is because companies that focus on exploration may fall into the trap of continuous exploration failure, incurring huge costs (Leonard-Barton, 1992), while companies that focus on exploitation may fall into the trap of insufficient capacity, making it difficult for them to adapt to new markets (Volberda & Lewin, 2003). Therefore, enterprises need to balance exploratory innovation and exploitative innovation to achieve sustainable development (Gibson & Birkinshaw, 2004; Junni et al., 2013; Morgan & Berthon, 2008). Given the evidence mentioned above, we posit that:

H3e: Ambidextrous balance has a positive effect on competitive advantages.

We propose that ambidextrous combination may positively affect competitive advantages. Previous studies have shown that those companies that can engage in ambidextrous combination have better corporate performance (Cao et al., 2009; He & Wong, 2004), and it is possible that the leverage effect of exploratory innovation and exploitation brings a higher level of technological innovation and market innovation to enterprises, which can produce a competitive advantage (Gupta et al., 2006; He et al., 2019; Karamanos, 2016). Besides, the new knowledge and new technologies generated by exploratory innovation provide the basis for exploitative innovation, and the reuse of existing knowledge and technology enables enterprises to gain a deep

understanding of their technical shortcomings, which forces them to explore new knowledge and new technologies; therefore, those companies with strong exploratory innovation may have good performance in exploitative innovation (Rothaermel & Alexandre, 2009). Given the evidence mentioned above, we posit that:

H3f: Ambidextrous combination has a positive effect on competitive advantages.

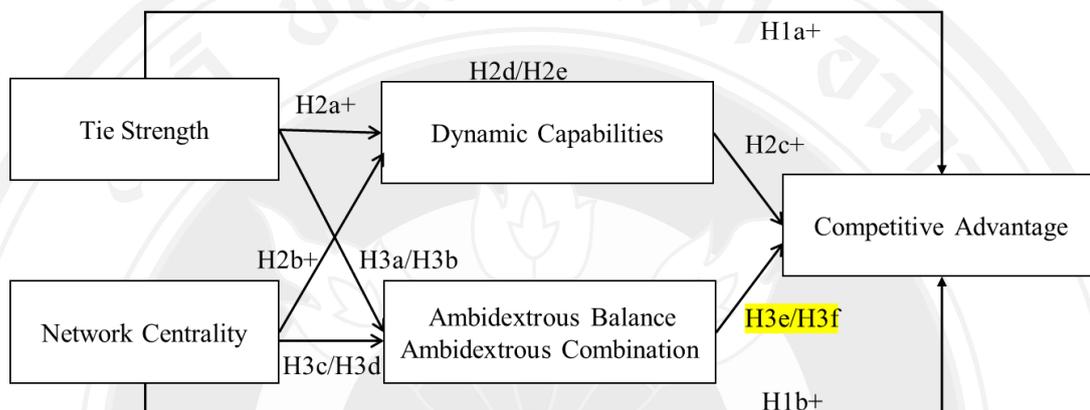


Figure 2.14 The Theoretical Hypotheses Concerning Ambidextrous Innovation and Competitive Advantages

2.4.6 The Mediating Effect of Ambidextrous Innovation

We propose that enterprise networks have an indirect effect on competitive advantages through ambidextrous innovation. Previous studies have shown that enterprises find it difficult to implement ambidextrous innovation due to resource constraints (March, 1991), and strong-tie networks and central network positions can provide sufficient resources for enterprises to support ambidextrous innovation and help them to gain or maintain a competitive advantage (Burt, 2009; Grant, 1996). Moreover, the trust mechanism generated by strong-tie networks provides environmental support for enterprises to engage in ambidextrous innovation; therefore, companies in a strong-tie network are more likely to gain competitive advantages through ambidextrous innovation (Chen et al., 2016; Granovetter, 1985). On the other side, the fragmented social capital generated by an enterprise network cannot directly produce a competitive advantage without resource usage (Hart, 1995);

therefore, those companies that can obtain sufficient resources require ambidextrous innovation to improve the application effect of corporate social capital (Nieves & Osorio, 2013). Given the evidence mentioned above, we posit that:

H3g: The relationship between tie strength and competitive advantages is mediated by ambidextrous balance.

H3h: The relationship between tie strength and competitive advantages is mediated by ambidextrous combination.

H3i: The relationship between network centrality and competitive advantages is mediated by ambidextrous balance.

H3j: The relationship between network centrality and competitive advantages is mediated by ambidextrous combination.

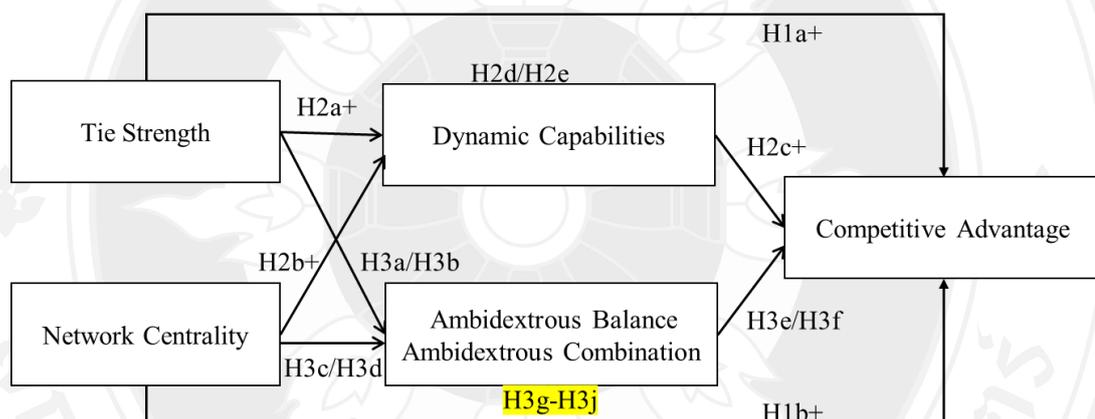


Figure 2.15 The Theoretical Hypotheses among Enterprise Networks, Ambidextrous Innovation, and Competitive Advantages

2.5 Dynamic Capabilities and Ambidextrous Innovation

We propose that dynamic capabilities may positively affect ambidextrous innovation. Dynamic capabilities are the core driving force of innovation (Lee-Kelley & Sankey, 2008; Roaldsen, 2014). Ambidextrous innovation is a production of environmental change, and previous studies have shown that companies with strong sensing capability usually pay more attention to ambidextrous innovation because, once the existing knowledge and technology cannot cope with the new market, enterprises with better sensing capability can identify these problems quickly and

explore new knowledge and technology to suit the new market rapidly (Ellonen, Wikström, & Jantunen, 2009; Mikalef, Boura, Lekakos, & Krogstie, 2019; Protogerou, Caloghirou, & Lioukas, 2011). Moreover, knowledge resources are the foundation of innovation, and absorptive capacity not only creates a unique knowledge system for ambidextrous innovation by absorbing external knowledge resources (Hashim, Bock, & Cooper, 2015) but also enables enterprises to combine their existing knowledge and new knowledge to develop new ideas that can solve practical problems (Zahra & George, 2002). Therefore, enterprises with strong absorptive capacity have sufficient resources to engage in ambidextrous innovation and find it easy to achieve ambidextrous innovation. Previous studies have also shown that internalizing new knowledge in business processes can enable companies to avoid path dependence, which can help them to switch freely between exploratory innovation and exploitative innovation (Huang, Chen, Zhang, & Ye, 2018). Besides, integration capability improves the efficiency of resource use by reallocating scattered resources, so companies with strong integration capability can alleviate the competition for resources between exploration and exploitation (Eisenhardt & Martin, 2000; Ellonen et al., 2009). Overall, ambidextrous innovation is positively associated with dynamic capabilities (Mikalef et al., 2019; Wang et al., 2019). Given the evidence mentioned above, we posit that:

H4a: Dynamic capabilities have a positive effect on ambidextrous balance.

H4b: Dynamic capabilities have a positive effect on ambidextrous combination.

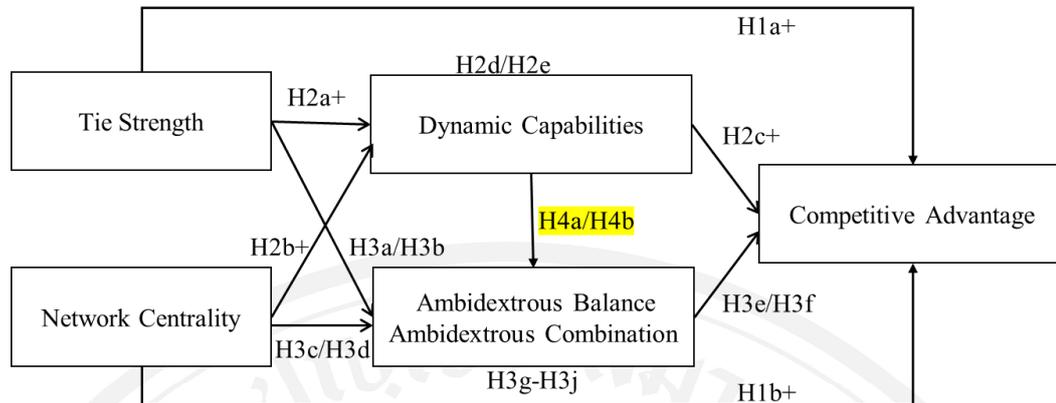


Figure 2.16 The Theoretical Hypotheses Regarding Dynamic Capabilities and Ambidextrous Innovation

2.6 The Mediating Effect of the Interaction of Dynamic Capabilities and Ambidextrous Innovation

This study proposes that enterprise networks may indirectly affect competitive advantages through dynamic capabilities and ambidextrous innovation. The previous literature has shown that the homogeneous information resources generated by strong-tie networks may not benefit corporate innovation (Inkpen & Tsang, 2005). If an enterprise can combine these homogeneous resources into systematic resources, which enable this homogeneous information to serve the enterprise innovation, then they affect competitive advantages through innovation. Moreover, keeping close contact with other companies or occupying a favourable network position does not mean that companies can obtain more and higher-quality social capital (Inkpen, 1998). Only those companies with strong dynamic capabilities can absorb these social resources and internalize them in the business process, and the social resources can produce advantages; therefore, dynamic capabilities play a vital role in maximizing the value of social capital and enabling it to serve ambidextrous innovation. Given this evidence, we posit that:

H4c: The relationship between tie strength and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous balance.

H4d: The relationship between tie strength and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous combination.

H4e: The relationship between network centrality and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous balance.

H4f: The relationship between network centrality and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous combination.

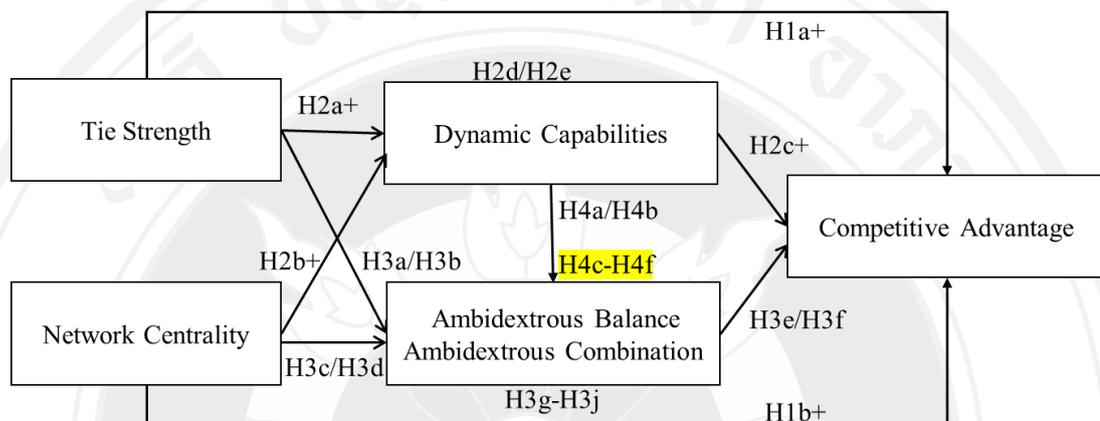


Figure 2.17 The Theoretical Relationships among Enterprise Networks, Dynamic Capabilities, Ambidextrous Innovation, and Competitive Advantages

CHAPTER 3

METHODOLOGY

This chapter consists of five parts: section 3.1 introduces the sample selection process; section 3.2 focuses on the data collection process; section 3.3 describes the process of questionnaire development; section 3.4 introduces the scale of constructs; and section 3.5 mainly introduces the method of data analysis.

3.1 Sample Selection Procedure

This study focuses on the high-tech enterprises in Beijing Zhongguancun and Shenzhen National High-Tech Zones. According to the National High-Tech Zone Innovation Capability Evaluation Report (2018), 11,283 HNTes were concentrated in Beijing and Shenzhen by the end of 2017, accounting for 64% of those in 11 national high-tech zones in municipalities and special economic zones, making it an easy location to collect data. Besides, the business environment facing enterprises changes faster than in other places; thus, the enterprises located in Beijing and Shenzhen may have a greater desire to obtain resources through their enterprise network to resist environmental changes or through ambidextrous innovation to increase their adaptability.

Both random sampling and convenience sampling were adopted by this study. Random sampling is a technique for selecting samples from the population at random and with equal probability, and the samples obtained using random sampling are more representative than those obtained through non-probability sampling (Acharya, Schnabl, & Suarez, 2013). However, its low questionnaire response rate requires us to consider alternatives; therefore, we also applied convenience sampling to ensure that we could obtain enough samples based on random sampling. Previous studies have shown that convenience sampling can allow researchers to obtain a large number of copies in a limited time (Etikan, Musa, & Alkassim, 2016).

Therefore, considering the difficulty of collecting data from high-tech companies, this study used random sampling and convenience sampling to ensure that we could obtain enough samples.

3.2 Data Collection Procedure

We used a questionnaire survey to collect data through online channels such as WeChat, QQ, and e-mail, which have become popular in China. The online approach allowed us to collect data in a wider range and helped us to save costs during the COVID-19 pandemic; therefore, most questionnaires were distributed and returned online during the period December 2019 to March 2020. The process of questionnaire collection was as follows. First, 500 questionnaires were sent to the business executives of high-tech enterprises that were selected through random sampling after receiving permission by phone. Considering that business executives may forget to respond to the questionnaire due to their busy working life, our assistants gave them a reminder by phone every two weeks. Second, we invited friends to distribute 1,000 questionnaires in the chambers of commerce in Beijing and Shenzhen, and 500 RMB electronic red envelopes were distributed to increase the response rate to every chamber of commerce. Previous studies have shown that cash incentives can increase the response rate of electronic questionnaires (Ou, Hsu, & Ou, 2015). Third, we asked the staff of the high-tech zone management committee to help distribute 500 questionnaires to ensure that we could collect enough data.

3.3 Questionnaire Development

All the constructs in this study were measured using existing scales. Existing scales are more trustworthy because they have been repeatedly tested, modified, and used by scholars; moreover, using existing scales saves time compared with developing new scales, which enables the researcher to focus on the core part of the paper instead of wasting time repeating the scale development process (Bulmer & Buchanan-Oliver, 2006).

Most of the scales were developed in English, except for the scale for absorptive capacity, which was developed in Chinese; therefore, these scales needed to be translated. First, we invited two experts who are proficient in Chinese and English to help us translate all the English scales into Chinese scales, making them fit our research context; moreover, we performed reverse translation to ensure the accuracy and meaning of the translation results (Banville, Desrosiers, & Genet-Volet, 2000). We also conducted a pilot test, which is a necessary part of the process of questionnaire development because it can help to eliminate unreasonable, ambiguous, and particularly complex items (De Vaus, 2013; Wu, 2009). Previous studies have shown that the sample size for the pilot test should be greater than 10% of the total theoretical sampling (Bollen & Long, 1993), and this study used Yamane (1967) formula to determine the theoretical sample size. The formula is as follows:

$$n = \frac{N}{1 + NE^2}$$

n : theoretical sampling; N : population size; and E : maximum acceptable margin of error (5%) (Yamane, 1967).

By the end of 2017, there were 11,283 high-tech enterprises in Beijing Zhongguancun and Shenzhen High-Tech Zones; therefore, the N equals 11,283, the theoretical sample size is 391, and the sample size for the pre-test is approximately 40.

This study used 42 samples to conduct the pre-test, and the results are presented in Table 3.1. From the research results, it could be seen that the Cronbach's alpha of the constructs ranged from 0.735 to 0.937 and all of them exceeded 0.7, indicating that the reliability of the questionnaire was acceptable (Nunnally, 1994).

Table 3.1 Pre-test Results Using 42 Valid Questionnaires

Variables	Items	Cronbach's α	Variables	Items	Cronbach's α
Competitive Advantage	8	0.937	Absorptive Capability	5	0.75
Tie Strength	5	0.901	Integration and Reconstruction	6	0.879
Network Centrality	5	0.885	Exploratory Innovation	4	0.884
Sensing Capability	4	0.735	Exploitative Innovation	4	0.888

3.4 Variable Measurements

All the scales were measured on a five-point Likert scale that ranged from one (strongly disagree) to five (strongly agree). Compared with other measurement methods, Likert scales can measure some multi-dimensional complex concepts or attitudes that are difficult to measure with other scientific methods, such as tie strength, sensing capability, and absorptive capacity; moreover, they are convenient for testers and responders due to its structured form. Besides, Likert scales have better reliability than other measurement methods under the same conditions (Gliem & Gliem, 2016). Therefore, this study used a Likert scale to measure the items. All the items of the variables are presented below.

3.4.1 Dependent Variable: Competitive Advantage

Competitive advantage was measured using a scale proposed by Chen, Lai, and Wen (2006), which has been employed in the previous literature (Chen, 2011; Chen, Lai, & Wen, 2006; Chiou, Chan, Lettice, & Chung, 2011; Liao, 2016; Saeidi et al., 2019). The items of the scale were as followed:

CA1: Our company has a low-cost advantage compared with our competitors.

CA2: Our company has better-quality products or services than our competitors.

CA3: Our company has more R&D capabilities and innovation than our competitors.

CA4: Our company has better managerial capability than our competitors.

CA5: Our company has a better image than our competitors.

CA6: The market growth of our company exceeds that of our competitors.

CA7: Our company has a higher profit level than our competitors.

CA8: Our company is the first mover in important fields and occupies an important position.

3.4.2 Dependent Variable: Enterprise Network

Tie strength and network centrality were the two dimensions of the enterprise network variable.

Tie Strength. Tie strength was measured using a scale that originated from Granovetter (1977) and was developed by Hansen (1999). We made minor adjustments to the original scale, making it more suitable for China's research scenarios. The revised items are as follows:

TS1: Our company maintains frequent contact with other organizations.

TS2: Our company and other organizations have mutual trust and common interests.

TS3: There are many opportunities for communication and cooperation between our company and other organizations.

TS4: Our company maintains close contact with other organizations.

TS5: Our company has established strategic alliances with other organizations.

Network Centrality. Network centrality was measured using a scale proposed by Freeman (1977); Powell et al. (1996); and developed by Tsai (2001). The previous literature has also used this scale (Li, Veliyath, & Tan, 2013; Zhang et al., 2016). The items of the scale were as follows:

NC1: Most local companies know our company's name.

NC2: Other local companies have no difficulty in exchanging knowledge and technology with our company.

NC3: Other companies usually exchange knowledge and technology through our company.

NC4: Other local companies often obtain technical or business knowledge from us when they need technical advice or support.

NC5: Other local companies often provide our company with technical or business knowledge when we need technical advice or support.

3.4.3 Mediator: Dynamic Capabilities

The dynamic capabilities consist of three parts, specifically sensing capability, absorptive capability, and integration and reconstruction capabilities. The items for these constructs are presented in the following.

Sensing Capability. The scale of sensing capability was developed by Pavlou and EI Sawy (2001), and the previous literature has also cited this scale (Wilden, Gudergan, Nielsen, & Lings, 2013). However, according to these definitions, the fourth item was suitable for interpreting absorptive capability instead of sensing capability, so this study retained it and performed reverse coding to check the validity of the questionnaire. The revised items are as follows:

SC1: Our company frequently scans the environment to identify new business opportunities.

SC2: Our company often reviews our product development efforts to ensure that they are in line with what our customers want.

SC3: Our company uses established processes to identify target market segments/changing customer needs.

SC4: Our company cannot use new ideas for product improvement and product creation.

Absorptive Capability. Absorptive capability was measured using a scale consisting of five items (Cui, Yu, & Cui, 2008). The second item in the scale reflects the characteristics of sensing capability instead of absorptive capability; we retained it and performed reverse coding on it to check the validity of the questionnaire. The revised items are as follows:

AC1: Our company can often quickly acquire new knowledge.

AC2: Our company cannot perceive the changes that external new knowledge may bring to our company.

AC3: Our company can easily connect existing knowledge with new insights.

AC4: Our company can quickly use new knowledge to develop new products or new services.

AC5: Our company can quickly use new knowledge to revise the rules and regulations of the company.

Integration and Reconstruction Capabilities. Reconstruction capability that responds to big environmental changes was measured using a scale proposed by Protogerou et al. (2011), These scales have been adopted by other scholars (Mikalef et al., 2019; Wilden et al., 2013). Besides, integration capability that is used to cope with small environmental changes was measured using a scale proposed by Gong (2011). According to the needs, we merged some items to make the expression more complete, for instance: merged IG1 and IG3 into IR4 to emphasize the collaboration of resources; merged IG2 and IG4 into IR5 to indicate the collaboration between various departments; and deleted the duplicate items (IG6). The revised items are as follows:

IR1: Our company can successfully introduce new or substantial changes to achieve our targets and objectives.

IR2: Our company can successfully adjust our business processes in response to shifts in our business priorities.

IR3: Our company can successfully reconfigure our business processes to come up with new productive assets.

IR4: Our company can successfully and quickly assign resources to meet task requirements.

IR5: Our company can successfully coordinate departmental relationships to meet task requirements.

IR6: Internal and external communication are important to our company.

3.4.4 Mediator: Ambidextrous Innovation

Ambidextrous innovation includes ambidextrous balance and ambidextrous combination. Ambidextrous balance was measured using “5 – |exploratory innovation – exploitative innovation|” proposed by He and Wong (2004); ambidextrous combination was measured using “exploratory innovation + exploitative innovation” (Li & Liu, 2014). To measure ambidextrous balance and ambidextrous combination, we needed to measure exploratory innovation and exploitative innovation. Exploratory innovation and exploitative innovation were measured on a scale that consists of eight items, with four items measuring exploratory innovation and another four items measuring exploitative innovation, as proposed by He and Wong (2004). This scale has also been employed in other literature (Cao et al., 2009; He & Wong, 2004; Parida, Lahti, & Wincent, 2016). The items of the scale were as follows:

ERI1: Our company always tries to introduce new products.

ERI2: Our company always tries to expand our product range.

ERI3: Our company always tries to open up new markets.

ERI4: Our company always tries to enter new technological fields.

EII1: Our company always tries to improve the quality of existing products/services.

EII2: Our company always tries to reduce production costs.

EII3: Our company always tries to improve product flexibility and applicability.

EII4: Our company continues to improve the service level of existing customers.

3.4.5 Control Variables

Control variables may affect the dependent variable but cannot relate to the research hypothesis (Carlson & Wu, 2012). To understand better the relationship between constructs, enterprise characteristics such as industry type, enterprise nature, enterprise size, and enterprise age are often selected as control variables. Based on the previous literature, this study chose industry type, enterprise size, and enterprise age as control variables. These control variables will be discussed below.

Industry Types. Previous studies have shown that the position in the network has an important impact on resource acquisition (Bourdieu, 1986); for instance, companies located in the central position of a network can obtain more resources than enterprises located at the edge of the network (Burt, 2004). Generally speaking, manufacturing enterprises are located in the central position of supply chains, which enables them to attain more resources to support their dynamic capabilities, ambidextrous combination, or competitive advantage, while service enterprises are located in the downstream of the supply chain, which makes it difficult for them to obtain information resources from upstream companies, such as raw material suppliers and manufacturers (Mentzer et al., 2001). Therefore, the industry type might influence the effect of corporate social capital on competitive advantages. We divided enterprises into high-tech manufacturing enterprises and high-tech service enterprises as industry types. High-tech manufacturing enterprises include pharmaceutical manufacturing, aerospace equipment manufacturing, electronic communication equipment manufacturing, computer and office equipment manufacturing, medical device manufacturing, and information and chemical products, while high-tech service enterprises include information services, e-commerce services, inspection and testing services, professional technical services, R&D and design services, the transformation of scientific and technological achievements, intellectual property and related legal services, and environmental testing and governance services.

Enterprise Size. Enterprise size is positively associated with the resources or capacity, and the previous literature has shown that large companies can obtain more social resources from enterprise networks compared with small companies because resources and capabilities are slowly accumulated during the growth of enterprises. Therefore, large companies usually have enough time to accumulate resources and

capabilities (Zollo & Winter, 2002). Moreover, personal resources affect the social resources that can be obtained, so large companies can obtain the required social capital more easily than small companies (Lin, Yang, & Demirkan, 2007). The argument presented above can also be explained by the Matthew effect, which claims that stronger becomes stronger and weaker becomes weaker. Therefore, the enterprise size may affect the effect of enterprise networks on competitive advantages. In this study, we set five options concerning the number of employees: fewer than 100, 101~300, 300~500, 300~1000, and more than 1000 employees.

Enterprise Age. Enterprise age positively affects the accumulation of resources and capabilities because long-established companies have more time to accumulate resources and develop their capabilities; therefore, they also have more capabilities and a strong ability to obtain more social resources and then gain competitive advantages (Bantel, 1998). Meanwhile, newer companies may be troubled because they lack the time to accumulate resources. Therefore, enterprises of different ages have different resource capabilities and capabilities that will affect the acquisition of social capital. In this study, we set five options based on enterprise age, specifically companies aged less than 3, 3~5, 5~8, 8~10, and more than 10 years.

3.5 Estimation Method

3.5.1 Validity and Reliability

This study used exploratory factor analysis (Robert-Baum & Wally), reliability analysis, and confirmatory factor analysis (CFA) to test the validity and reliability of measurement scales with SPSS.22 software and AMOS.23 software.

Validity is used to measure the sufficiency of constructs, and it is an essential part of the research process (Schwab, 1980). This study considers content validity, structural validity, and discriminant validity. Content validity was ensured by three experts (Vogt, 2007). Structural validity was tested by EFA (Emmons, 1984); the Kaiser–Meyer–Olkin (KMO) value exceeded 0.7 and Bartlett’s test was significant, indicating that the data are suitable for factor analysis (Kaiser, 1974). In addition, the maximum-likelihood method was used to extract factors. The total variance exceeded 60% and the commonalities exceeded 0.5, indicating that the factors can be used to

represent all the items (Costello & Osborne, 2005; Hair, Ringle, & Sarstedt, 2011). Discriminant validity was measured by the average variance extracted (AVE). The AVE exceeded 0.5 and the square root of the AVE was higher than its correlation with other constructs, indicating that discriminant validity existed between constructs (Fornell & Larcker, 1981).

Reliability is used to measure the consistency of scales (Nunnally, 1994; Sekaran & Bougie, 2010). Cronbach's alpha, corrected item-total correlation (CTIT), and composite reliability were all used to test the reliability of the scales. Cronbach's alpha was larger than 0.7, indicating that all the items used to measure one construct had a close mutual correlation (Gravetter & Forzano, 2018; Nunnally, 1994). If the corrected item-total correlation (CTIT) of items was lower than 0.5, it would be deleted to improve the Cronbach's alpha of its construct (Francis & White, 2002). Besides, composite reliability exceeded an alpha of 0.7, which indicates that the internal consistency of the scales was acceptable (Hair et al., 2011).

3.5.2 Mediating Effect

The mediator (M) is located between the independent variables (X) and the dependent variables (Y), and it is the internal reason why X affects Y (Noble, Farah, & Mccandliss, 2006). The relationship of X, M, and Y is shown in Figure 3.1. When X can indirectly affect Y through M, M plays a mediating role between X and Y. The mediating effect of M was measured using a bootstrap test (Mackinnon, Fairchild, & Fritz, 2007). The test process of mediating effects is as follows. First, both the regression coefficient of the independent variable on the mediator (a) and the regression coefficient of the mediator on the dependent variable (b) were significant, indicating that the mediator might mediate the independent and dependent variables. If a or b is insignificant, the mediating effect needs to be measured using the bootstrap test. If the estimated value of the indirect effect includes zero between the lower band and the upper band of the bias-corrected 95% and the 95th percentile, indicating that a mediating effect does not exist; otherwise, a mediating effect exists. Second, we use the direct effect of the independent variable on the dependent variable to check the types of mediation; if the direct effect is significant, the mediator plays a partial mediation role; if the direct effect is insignificant, the mediator plays a full mediation

role (Baron & Kenny, 1986).

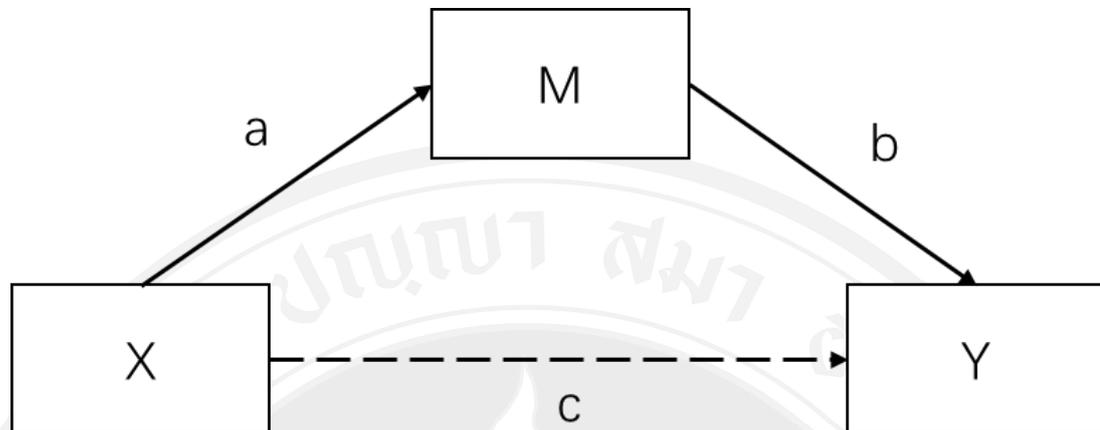


Figure 3.1 The Process of Testing the Mediator Effect

3.5.3 Conceptual Framework and Hypothesis Test

We use a structural equation model (SEM) to test the conceptual model and hypotheses that were proposed by this study because it can estimate both direct and indirect effects simultaneously (Kelloway, 1998); besides, it is suitable for theoretical exploration (Haenlein & Kaplan, 2004) and it has no strict requirements for the independence of observations and estimation error that are inevitable in social science research (Haenlein & Kaplan, 2004; Lee, 1990). Before we use the structural equation model to estimate the hypotheses, we first need to measure the fitness of the model, which is always estimated using the chi-square value, adjusted goodness of fit index (AGFI), root mean square residual (RMR), root mean square error of approximation (RMSEA), normed chi-square (CMIN/DF), and comparative fit index (CFI). When the SEM model has a smaller chi-square value, it indicates that the model fits the observed data well. Values of RMR and RMSEA smaller than 0.05, CFI larger than 0.9, and CMIN/DF between 1 and 3 indicate that the model fits the observed data well (Bentler, 1990; Hoyle, 1995; Maccallum, Browne, & Sugawara, 1996; Mciver & Carmines, 1981); therefore, the fitness of the model is acceptable.

CHAPTER 4

RESULTS

There are ten sections in this chapter. Section 4.1 describes the demographic information of the questionnaires; section 4.2 carries out validity analysis and EFA analysis; section 4.3 conducts a CFA analysis; section 4.4 carries out multivariate normal distribution analysis; section 4.5 tests the hypotheses in the SEM-ERI-EII model, which includes exploratory innovation and exploitative innovation; section 4.6 tests the hypotheses in the SEM-BD model, which contains ambidextrous balance; section 4.7 tests the hypotheses in the SEM-CD model, which includes ambidextrous combination; section 4.8 compares the results of the different models and concludes the results of the hypotheses; and section 4.9 conducts multi-group analysis on industry type, enterprise size, and enterprise age.

4.1 Demographic Information

We distributed a total of 3700 electronic questionnaires, of which 2500 were distributed through WeChat, 1000 were distributed through chambers of commerce, and 200 were distributed through friends. During the period from 13 December 2019 to 13 February 2020, 384 valid samples were collected, producing a response rate of 10.4% after deleting 48 invalid samples.

To make the demographic data effective in this research, we have descriptive statistics on six demographic factors, specifically gender, region, nature of the enterprise, industry category, age of the enterprise, and size of the enterprise. The frequency and percentage of the demographic characteristics mentioned above are presented in Table 4.1. Regarding gender, 199 respondents were male, accounting for 51.8%, and 185 were female, accounting for 48.2%. Concerning regions, the majority of respondents came from Beijing (n=299, 77.9%) and 22.1% were from Shenzhen. In term of enterprises' nature, state-owned enterprises/state-owned holding companies

accounted for 18%, foreign companies 25%, private companies 69.8%, and other companies 5.7%, most of them being private companies, which is consistent with the actual situation. According to industry type, 102 were manufacturing enterprises and 282 were service companies. For the enterprise age, enterprises aged less than 3 years accounted for 24%, enterprises aged 3 to 5 years accounted for 17.2%, enterprises aged 5 to 8 years accounted for 19.3%, enterprises aged 8 to 10 years accounted for 10.7%, and enterprises with more than 10 years accounted for 28.9%, which indicated that half of the enterprises entering the high-tech zones have successfully passed the start-up period. Regarding the enterprise scale, most of the companies had fewer than 100 employees, accounting for 49%, companies with 101–300 employees accounted for 21.1%, companies with 301–500 employees accounted for 8.1%, followed by companies with 501~1000 employees, which accounted for 3.9%, and enterprises with more than 1000 employees, which accounted for 18%, respectively.

Table 4.1 Demographic Information of High-Tech Enterprises

Variables	Categories	Frequency	Percentage
Gender	Male	199	51.80%
	Female	185	48.20%
	Total	384	100%
Region	Beijing	299	77.90%
	Shenzhen	85	22.10%
	Total	384	100%
Enterprises' Nature	State-owned enterprises or state holding enterprises	69	18%
	Foreign enterprises	25	6.50%
	Private enterprises	268	69.80%
	Others	22	5.70%
	Total	384	100%
Industry	Manufacturing industry	102	26.60%
	Service industry	282	73.40%
	Total	384	100%
Enterprise	Below 3	92	24%

Variables	Categories	Frequency	Percentage
Age	3~5	66	17.20%
	5~8	74	19.30%
	8~10	41	10.70%
	Above 10	111	28.90%
	Total	384	100%
Enterprise Scale	Below 100	188	49%
	101~300	81	21.10%
	301~500	31	8.10%
	501~1000	15	3.90%
	Above 1000	69	18%
	Total	384	100%

4.2 Validity Test and Reliability Test

4.2.1 Validity Test

Structural validity is a particularly important tool for checking how well the constraints were measured (Schwab, 1980). In this study, structural validity was estimated using exploratory factor analysis (Robert-Baum & Wally), which helps researchers to find structures or correlation patterns from the data (Vogt, 2007). The results of the EFA showed that the KMO value was 0.94, which exceeded 0.7, and passed Bartlett's spherical significance test ($p < 0.001$), which indicated that the questionnaire data are suitable for factor analysis (Kaiser, 1974). It can be seen from Table 4.2 that the variances of competitive advantage, integration and reconstruction capability, network centrality, tie strength, absorptive capability, sensing capability, exploratory innovation, and exploitative innovation were 11.272%, 10.149%, 8.998%, 8.441%, 8.338%, 6.867%, 6.772%, and 6.455%, respectively; the total variance of the 8 factors extracted was 67.212%, which exceeds 60%, indicating that the 8 factors extracted had good representation (Hair et al., 2011). Moreover, all the items were retained because their commonalities and the varimax solution value were greater than 0.5 (Costello & Osborne, 2005); therefore, the scale used in this study had good structural validity.

Table 4.2 The Results of EFA

Variables	Items	Communalities	CA	IR	NC	RI	AC	SC	ERI	EII
Competitive Advantage (CA)	CA1	0.65	0.687	-	-	-	-	-	-	-
	CA2	0.678	0.671	-	-	-	-	-	-	-
	CA3	0.643	0.662	-	-	-	-	-	-	-
	CA4	0.65	0.644	-	-	-	-	-	-	-
	CA5	0.682	0.702	-	-	-	-	-	-	-
	CA6	0.615	0.616	-	-	-	-	-	-	-
	CA7	0.639	0.655	-	-	-	-	-	-	-
	CA8	0.658	0.609	-	-	-	-	-	-	-
Tie Strength (TS)	TS1	0.63	-	-	-	0.744	-	-	-	-

Variables	Items	Communalities	CA	IR	NC	RI	AC	SC	ERI	EII
	TS2	0.591	-	-	-	0.719	-	-	-	-
	TS3	0.594	-	-	-	0.71	-	-	-	-
	TS4	0.651	-	-	-	0.766	-	-	-	-
	TS5	0.772	-	-	-	0.828	-	-	-	-
Network Centrality (NC)	NC1	0.673	-	-	0.772	-	-	-	-	-
	NC2	0.688	-	-	0.772	-	-	-	-	-
	NC3	0.677	-	-	0.772	-	-	-	-	-
	NC4	0.702	-	-	0.76	-	-	-	-	-
	NC5	0.688	-	-	0.79	-	-	-	-	-
Sensing Capability (SC)	SC1	0.75	-	-	-	-	0.813	-	-	-

Variables	Items	Communalities	CA	IR	NC	RI	AC	SC	ERI	EII
	SC2	0.701	-	-	-	-	-	0.753	-	-
	SC3	0.749	-	-	-	-	-	0.745	-	-
	SC4	0.715	-	-	-	-	-	0.716	-	-
Absorptive Capability (AC)	AC1	0.67	-	-	-	-	0.738	-	-	-
	AC2	0.615	-	-	-	-	0.669	-	-	-
	AC3	0.7	-	-	-	-	0.748	-	-	-
	AC4	0.712	-	-	-	-	0.784	-	-	-
	AC5	0.702	-	-	-	-	0.786	-	-	-
Integration and Reconstruction (IR)	IR1	0.7	-	0.789	-	-	-	-	-	-
	IR2	0.655	-	0.743	-	-	-	-	-	-

Variables	Items	Communalities	CA	IR	NC	RI	AC	SC	ERI	EII
	IR3	0.622	-	0.726	-	-	-	-	-	-
	IR4	0.661	-	0.72	-	-	-	-	-	-
	IR5	0.706	-	0.776	-	-	-	-	-	-
	IR6	0.678	-	0.76	-	-	-	-	-	-
Exploratory Innovation (ERI)	ERI1	0.684	-	-	-	-	-	-	0.744	-
	ERI2	0.598	-	-	-	-	-	-	0.712	-
	ERI3	0.647	-	-	-	-	-	-	0.705	-
	ERI4	0.685	-	-	-	-	-	-	0.761	-
Exploitative Innovation (EII)	EII1	0.696	-	-	-	-	-	-	-	0.708
	EII2	0.619	-	-	-	-	-	-	-	0.729

Variables	Items	Communalities	CA	IR	NC	RI	AC	SC	ERI	EII
	EII3	0.691	-	-	-	-	-	-	-	0.741
	EII4	0.72	-	-	-	-	-	-	-	0.725
Maximum Likelihood Estimation	Eigenvalue	4.622	4.161	3.689	3.448	3.418	2.816	2.756	2.647	-
	Factor Variance (%)	11.272	10.149	8.998	8.411	8.338	6.867	6.722	6.455	-
	Cumulative Variance (%)	11.272	21.421	30.419	38.83	47.167	54.035	60.757	67.212	-

4.2.2 Reliability Test

Reliability is measured by Cronbach's alpha coefficient and Corrected Item-Total Correlation (CITC) (Gravetter & Forzano, 2018). As shown in Table 4.3, the Cronbach's alphas of competitive advantage, tie strength, network centrality, sensing capability, absorptive capability, integration and reconstruction capabilities, exploratory innovation, and exploitative innovation were 0.921, 0.856, 0.883, 0.87, 0.868, 0.895, 0.812, and 0.828, respectively; all of them exceeded 0.7, which indicated that the constructs had good reliability (Fornell & Larcker, 1981). Moreover, the values of CITC exceeded 0.5, which indicated that all the items should be preserved; otherwise, the reliability of the scale would decline (Francis & White, 2002).

Table 4.3 Cronbach's Alpha

Factors	Items	Corrected Item– Total Correlation	Cronbach's Alpha if Item	Cronbach's Alpha
Competitive Advantage (CA)	CA1	0.721	0.912	0.921
	CA2	0.755	0.909	-
	CA3	0.722	0.912	-
	CA4	0.749	0.91	-
	CA5	0.746	0.91	-
	CA6	0.711	0.913	-
	CA7	0.739	0.911	-
	CA8	0.744	0.91	-
Tie Strength (TS)	TS1	0.657	0.83	0.856
	TS2	0.627	0.839	-
	TS3	0.627	0.838	-
	TS4	0.673	0.826	-
	TS5	0.783	0.8	-
Network Centrality	NC1	0.714	0.86	0.883

Factors	Items	Corrected Item– Total Correlation	Cronbach’s Alpha if Item	Cronbach’s Alpha
(NC)	NC2	0.725	0.857	-
	NC3	0.713	0.86	-
	NC4	0.731	0.856	-
	NC5	0.716	0.859	-
Sensing Capability (SC)	SC1	0.725	0.834	0.87
	SC2	0.696	0.844	-
	SC3	0.755	0.82	-
	SC4	0.725	0.835	-
Absorptive Capability (AC)	AC1	0.689	0.841	0.868
	AC2	0.629	0.857	-
	AC3	0.725	0.833	-
	AC4	0.71	0.836	-
	AC5	0.715	0.835	-
Integration and Reconstruction (IR)	IR1	0.74	0.874	0.895
	IR2	0.693	0.881	-
	IR3	0.681	0.883	-
	IR4	0.71	0.878	-
	IR5	0.75	0.872	-
	IR6	0.736	0.874	-
Exploratory Innovation (ERI)	ERI1	0.67	0.746	0.812
	ERI2	0.576	0.792	-
	ERI3	0.612	0.773	-
	ERI4	0.668	0.747	-
Exploitative Innovation (EII)	EII1	0.685	0.769	0.828
	EII2	0.601	0.807	-

Factors	Items	Corrected Item– Total Correlation	Cronbach’s Alpha if Item	Cronbach’s Alpha
	EII3	0.627	0.796	-
	EII4	0.708	0.759	-

4.3 Validity Check and Reliability Check

We used confirmatory factor analysis (CFA) to check the composite reliability, convergent validity, and discriminant validity, which can help researchers to find patterns of correlation among data and explain the items (Vogt, 2007). Moreover, it is necessary to test and modify the fitness of the CFA model, which depends on indexes such as the chi-square value, adjusted goodness-of-fit index (AGFI), root mean square residual (Armstrong & Overton), root mean square error of approximation (RMSEA), CMIN/DF, and comparative fit index (CFI). The revised CFA model is shown in Figure 4.1.

The results of the CFA were $\chi^2(df)=882.289$ ($df=758$), $p = 0.00$; AGFI=0.891; CFI=0.989; RMR=0.041; RMSEA=0.021; CMIN/DF=1.164; and CFI=0.985. These indexes indicated that the fitness of the revised CFA model was acceptable except for χ^2 (Wu, 2009). However, χ^2 is easily affected by the estimated parameters and sample size; thus, it is not the only indicator used to judge the level of model fit (West, Finch, & Curran, 1995). Therefore, the revised CFA model could be used to check the internal reliability and validity of constructs.



Figure 4.1 Standardized Estimates in the Adjusted CFA Model

Table 4.4 The Results of CR and AVE

Constructs	Items	Factor Loading	Reliability Coefficient	Measurement Error	CR	AVE	SQRT (AVE)
Competitive Advantage (CA)	CA1	0.753	0.567	0.433	0.921	0.594	0.771
	CA2	0.79	0.624	0.376	-	-	-
	CA3	0.758	0.575	0.425	-	-	-
	CA4	0.784	0.615	0.385	-	-	-
	CA5	0.775	0.601	0.399	-	-	-
	CA6	0.749	0.561	0.439	-	-	-
	CA7	0.768	0.59	0.41	-	-	-
	CA8	0.79	0.624	0.376	-	-	-
Tie Strength (TS)	TS1	0.729	0.531	0.469	0.86	0.555	0.745
	TS2	0.678	0.46	0.54	-	-	-
	TS3	0.682	0.465	0.535	-	-	-
	TS4	0.748	0.56	0.44	-	-	-
	TS5	0.872	0.76	0.24	-	-	-
Network Centrality (NC)	NC1	0.767	0.588	0.412	0.883	0.603	0.777
	NC2	0.78	0.608	0.392	-	-	-
	NC3	0.767	0.588	0.412	-	-	-
	NC4	0.8	0.64	0.36	-	-	-
	NC5	0.767	0.588	0.412	-	-	-
Dynamic Capabilities (DC)	SC	0.784	0.615	0.385	0.807	0.582	0.763
	AC	0.747	0.558	0.442	-	-	-

Constructs	Items	Factor Loading	Reliability Coefficient	Measurement Error	CR	AVE	SQRT (AVE)
	IR	0.758	0.575	0.425	-	-	-
Sensing Capability (SC)	SC1	0.775	0.601	0.399	0.871	0.628	0.792
	SC2	0.751	0.564	0.436	-	-	-
	SC3	0.839	0.704	0.296	-	-	-
	SC4	0.803	0.645	0.355	-	-	-
Absorptive Capability (AC)	AC1	0.748	0.56	0.44	0.87	0.572	0.756
	AC2	0.686	0.471	0.529	-	-	-
	AC3	0.803	0.645	0.355	-	-	-
	AC4	0.769	0.591	0.409	-	-	-
	AC5	0.772	0.596	0.404	-	-	-
Integration and Reconstruction (IR)	IR1	0.787	0.619	0.381	0.896	0.59	0.768
	IR2	0.735	0.54	0.46	-	-	-
	IR3	0.731	0.534	0.466	-	-	-
	IR4	0.764	0.584	0.416	-	-	-
	IR5	0.802	0.643	0.357	-	-	-
	IR6	0.787	0.619	0.381	-	-	-
Exploratory Innovation (ERI)	ERI1	0.779	0.607	0.393	0.815	0.525	0.725
	ERI2	0.648	0.42	0.58	-	-	-
	ERI3	0.705	0.497	0.503	-	-	-
	ERI4	0.758	0.575	0.425	-	-	-
Exploitative	EII1	0.789	0.623	0.377	0.83	0.55	0.742

Constructs	Items	Factor Loading	Reliability Coefficient	Measurement Error	CR	AVE	SQRT (AVE)
Innovation (EII)	EII2	0.665	0.442	0.558	-	-	-
	EII3	0.693	0.48	0.52	-	-	-
	EII4	0.815	0.664	0.336	-	-	-

The results of the CFA model are presented in Table 4.4. Table 4.4 shows that the range of CR was from 0.807 to 0.921 and it exceeded 0.7, which indicated that the constructs had good consistency (Diamantopoulos, Siguaw, & Siguaw, 2000); besides, the factor loadings of the items ranged from 0.653 to 0.872; though some of them were below the minimum value of 0.7, they exceeded 0.6, so the reliability of the scale is still acceptable (Hair et al., 2011).

Convergent validity was used to check whether the items in the same constructs correspond well to one another (Hair et al., 2011), and we applied the average variance extracted (AVE) to measure the convergent validity. The results showed that the range of AVE was from 0.525 to 0.603 and it exceeded 0.5 (Gregory, 2004); therefore, the convergent validity of the constructs was satisfactory.

Discriminant validity mainly measures whether a construct is different from other constructs. It was estimated using the square root of the AVE (Fornell & Larcker, 1981). The results showed that the range of the square root of the AVE was from 0.725 to 0.777 and all of them were greater than any associated correlations. Therefore, each construct could not overlap with other constructs.

Besides, the range of correlation coefficients between constructs was from 0.226 to 0.615 and all of them were significant and did not exceed 0.75, which indicated that there was no multicollinearity problem among the constructs and reflected that each construct was different from the other constructs (Cooper & Schindler, 2006). It also indicated that the latent variables have discriminant validity. The results of the corrections are presented in Table 4.5.

Table 4.5 Correlations and Covariances

Constructs	Correlations	Bias-Corrected 95% CI		Covariances	S.E.	C.R.	P
		Lower	Upper				
TS<-->NC	0.429	0.269	0.598	0.222	0.035	6.327	***
TS<-->ERI	0.265	0.128	0.409	0.137	0.033	4.161	***
TS<-->EII	0.319	0.175	0.486	0.172	0.035	4.947	***
TS<-->CA	0.555	0.424	0.679	0.308	0.041	7.597	***
TS<-->DC	0.44	0.316	0.575	0.181	0.031	5.865	***
NC<-->ERI	0.358	0.197	0.534	0.198	0.036	5.434	***
NC<-->EII	0.43	0.253	0.597	0.247	0.039	6.36	***
NC<-->CA	0.612	0.489	0.729	0.362	0.044	8.204	***
NC<-->DC	0.377	0.218	0.541	0.166	0.031	5.294	***
CA<-->DC	0.662	0.518	0.805	0.312	0.041	7.685	***
ERI<-->EII	0.558	0.386	0.743	0.321	0.043	7.483	***
ERI<-->CA	0.699	0.578	0.813	0.414	0.047	8.729	***
ERI<-->DC	0.376	0.18	0.583	0.166	0.032	5.157	***
EII<-->CA	0.708	0.587	0.82	0.436	0.049	8.886	***
EII<-->DC	0.474	0.277	0.671	0.217	0.035	6.197	***

Note: *** is $p < 0.001$; TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

4.4 Multivariate Normal Distribution Test

The multivariate normal distribution test is necessary for the maximum likelihood method, which is widely used to estimate the structural equation model (SEM) (Schermelel-Engel, Moosbrugger, & Müller, 2003). When all the items follow a multivariate normal distribution, it indicates that the chi-square could reasonably be used to test the fitness of SEM (Bollen, 1989). The multivariate normal distribution test is estimated by comparing Mardia's coefficient and the product of item numbers (n) and $(n+2)$ (Mardia, 1970). The result of the normality test is presented in Table 4.6. It shows that the value of Mardia's coefficient was 14.1, which was less than the product of item numbers (n) and $(n+2)$. Therefore, the maximum likelihood method can be used to estimate the fitness of SEM.

Table 4.6 Normality of Observed Variables

Variable	Items	Skew.	C.R.	Kurtosis	C.R.
Competitive Advantage (CA)	CA8	-0.356	-2.85	-0.49	-1.96
	CA7	-0.337	-2.694	-0.159	-0.635
	CA6	-0.212	-1.697	-0.129	-0.517
	CA5	-0.544	-4.355	-0.15	-0.6
	CA4	-0.428	-3.425	-0.356	-1.424
	CA3	-0.46	-3.677	-0.277	-1.106
	CA2	-0.58	-4.642	-0.166	-0.663
	CA1	-0.277	-2.215	-0.502	-2.01
Exploitative Innovation (EII)	EII4	-0.691	-5.527	0.181	0.723
	EII3	-0.354	-2.835	-0.387	-1.547
	EII2	-0.448	-3.584	-0.207	-0.829

Variable	Items	Skew.	C.R.	Kurtosis	C.R.
	EII1	-0.589	-4.714	-0.077	-0.308
Exploratory Innovation (ERI)	ERI4	-0.379	-3.035	-0.295	-1.18
	ERI3	-0.092	-0.736	-0.632	-2.529
	ERI2	-0.375	-2.999	-0.481	-1.923
	ERI1	-0.308	-2.464	-0.452	-1.809
Network Centrality (NC)	NC5	-0.331	-2.644	-0.171	-0.685
	NC4	-0.314	-2.515	-0.326	-1.305
	NC3	-0.271	-2.169	-0.458	-1.834
	NC2	-0.404	-3.235	-0.188	-0.752
	NC1	-0.399	-3.191	-0.173	-0.692
Tie Strength (TS)	TS5	-0.529	-4.232	0.247	0.988
	TS4	-0.201	-1.604	-0.296	-1.185
	TS3	-0.389	-3.111	-0.088	-0.352
	TS2	-0.464	-3.712	-0.143	-0.571
	TS1	-0.527	-4.213	0.115	0.462
Integration and Reconstruction (IR)	IR6	-0.42	-3.362	-0.298	-1.191
	IR5	-0.457	-3.653	-0.394	-1.576
	IR4	-0.375	-3.003	-0.425	-1.698
	IR3	-0.289	-2.313	-0.546	-2.184
	IR2	-0.238	-1.904	-0.551	-2.203
	IR1	-0.566	-4.531	-0.008	-0.031

Variable	Items	Skew.	C.R.	Kurtosis	C.R.
Absorptive Capability (AC)	AC5	-0.339	-2.711	-0.274	-1.094
	AC4	-0.351	-2.808	-0.384	-1.536
	AC3	-0.198	-1.585	-0.455	-1.819
	AC2	-0.043	-0.348	-0.994	-3.974
	AC1	-0.388	-3.104	-0.398	-1.593
Sensing Capability (SC)	SC4	-0.096	-0.77	-0.853	-3.41
	SC3	-0.25	-2.001	-0.62	-2.479
	SC2	-0.268	-2.143	-0.241	-0.962
	SC1	-0.344	-2.75	-0.253	-1.014
	Multivariate	-	-	85.45	14.1

4.5 The SEM Model Including Exploratory Innovation and Exploitative Innovation

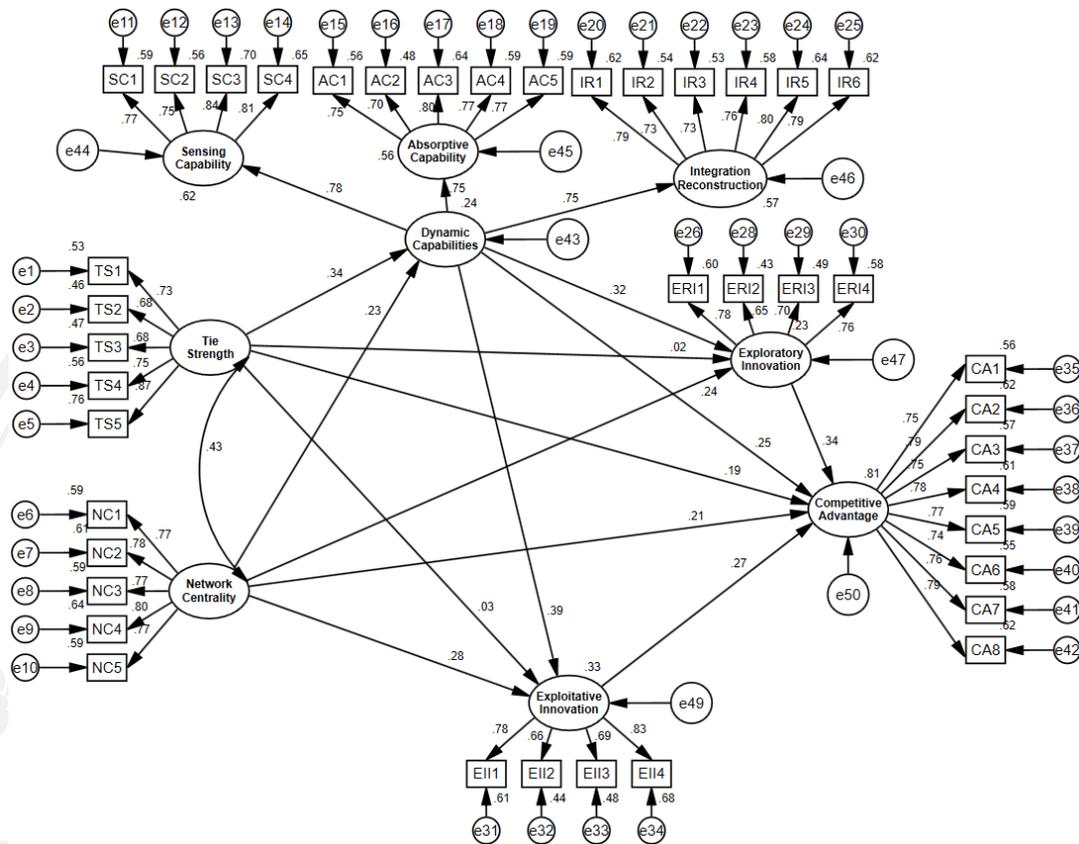


Figure 4.2 Standardized Estimates of the SEM-ERI-EII Model

AMOS.23 software was used to test the research hypotheses and evaluate the SEM-ERI-EII model, which includes six constructs: competitive advantage, tie strength, network centrality, dynamic capabilities (sense, absorption, and integration), exploratory innovation, and exploitative innovation. The results, AGFI=0.893, RMR=0.047, RMSEA=0.026, CMIN/DF=1.264, and CFI=0.976, of these indicators suggested that the fitness of the SEM-ERI-EII model was accepted and could be used to test the hypotheses. The standardized estimation results of the SEM-ERI-EII model are shown in Figure 4.2.

4.5.1 The Results of the Hypothesis Testing in the SEM–ERI–EII Model

The standardized path coefficients and unstandardized path coefficients of the six latent variables are presented in Table 4.7.

Table 4.7 The Regression Weights in the SEM–ERI–EII Model

Path	Standardized Regression Weights	Unstandardized Regression Weights	S.E.	C.R.	P	Results
RI<--->NC	0.429 (correlations)	0.222 (covariances)	0.035	6.328	***	-
CA<---TS	0.187	0.211	0.047	4.493	***	Supported
CA<---NC	0.205	0.217	0.045	4.771	***	Supported
DC<---TS	0.344	0.291	0.059	4.884	***	Supported
DC<---NC	0.233	0.184	0.053	3.473	***	Supported
CA<---DC	0.253	0.337	0.072	4.674	***	Supported
ERI<---TS	0.017	0.018	0.073	0.251	0.802	-
ERI<---NC	0.239	0.238	0.066	3.591	***	-
EII<---TS	0.03	0.033	0.071	0.471	0.637	-
EII<---NC	0.277	0.285	0.065	4.373	***	-
CA---ERI	0.344	0.364	0.048	7.605	***	-
CA<---EII	0.269	0.276	0.047	5.809	***	-
ERI<---DC	0.322	0.405	0.095	4.254	***	-
EII<---DC	0.393	0.511	0.097	5.297	***	-

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

As shown in Table 4.7, the standard regression weight between tie strength and competitive advantages was 0.187 and the standard regression weight between network centrality and competitive advantages was 0.205, both of which were significant at the 0.05 confidence level, indicating that competitive advantages are positively associated with tie strength and network centrality. Therefore, H1a and H1b were supported by the SEM-ERI-EII model.

The standard regression weight between tie strength and dynamic capabilities was 0.344, the standard regression weight between network centrality and dynamic capabilities was 0.233, and the standard regression weight between dynamic capabilities and competitive advantages was 0.253; all of these were significant at the 0.05 confidence level, indicating that dynamic capabilities are positively associated with tie strength and network centrality. Therefore, hypotheses 2a/2b/2c were supported by the SEM-ERI-EII model. Moreover, we estimated the mediating effect of dynamic capabilities using the coefficient product method (Mackinnon, Lockwood, Hoffman, West, & Sheets, 2002). The mediating effects of dynamic capabilities were 0.087 in the RI-DC-CA path and 0.059 in the NC-DC-CA path, but a bootstrap test was still required to check whether the mediating effects were significant. The results of the bootstrap test are presented in section 4.6.3.

The standard regression weight between tie strength and exploratory innovation was 0.017 and the standard regression weight between tie strength and exploitative innovation was 0.03, both of which were not significant at the 0.05 confidence level; therefore, the tie strength did not positively affect exploratory innovation and exploitative innovation. However, the standard regression weight between network centrality and exploratory innovation was 0.239, the standard regression weight between network centrality and exploitative innovation was 0.277, the standard regression weight between exploratory innovation and competitive advantage was 0.344, and the standard regression weight between exploitative innovation and competitive advantage was 0.269, all of which were significant. Therefore, network centrality positively affects exploratory innovation and exploitative innovation, which are the resources of competitive advantages. Moreover, we used the coefficient product method to estimate the mediating effects (Mackinnon et al., 2002); the mediating effect of exploratory innovation was 0.082 in the NC-

ERI–CA path and the mediating effect of exploitative innovation was 0.074 in the NC–EII–CA path.

Besides, the standard regression weight between dynamic capabilities and exploratory innovation was 0.322 and the standard regression weight between dynamic capabilities and exploratory innovation was 0.393, which were significant; therefore, dynamic capabilities positively affect exploratory innovation and exploratory innovation. Furthermore, the mediating effect of the interaction of dynamic capabilities and exploratory innovation was 0.038 in the TS–DC–ERI–CA path and 0.026 in the NC–DC–ERI–CA path; the mediating effect of the interaction of dynamic capabilities and exploitative innovation was 0.036 in the TS–DC–ERI–CA path and 0.025 in the NC–DC–ERI–CA path. However, we need to check whether these mediating effects are significant using the bootstrap test.

Overall, to understand the relationships among the latent variables, we present all the path coefficients in Figure 4.3.

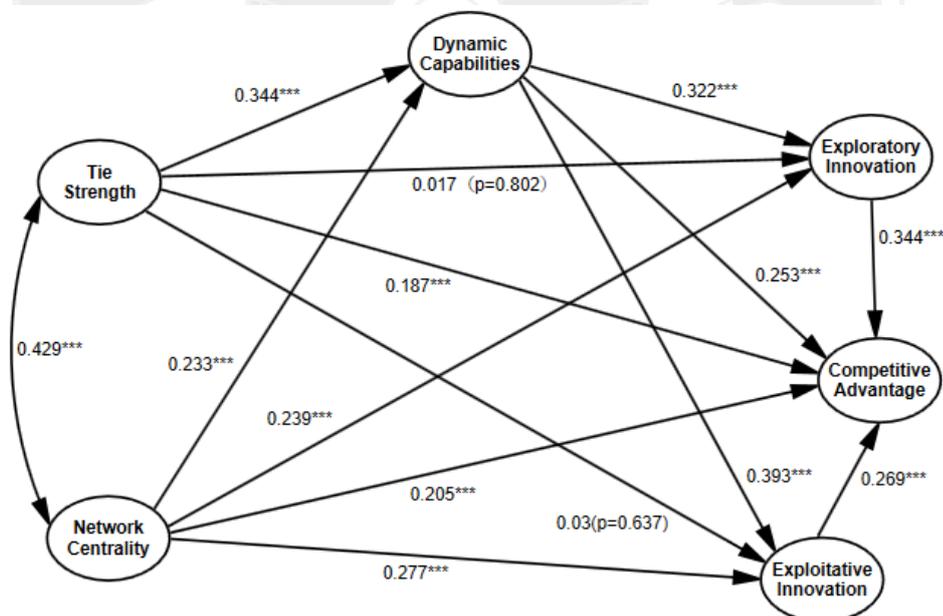


Figure 4.3 The Path Coefficients in the SEM–ERI–EII Model

4.5.2 The Results of the Hypothesis Check in the SEM–ERI–EII Model

We used the bootstrap test to confirm whether the mediating effect is significant (Mackinnon, Lockwood, & Williams, 2004). The bootstrapping technique is a method to estimate the total effect, direct effect, and indirect effect using multiple subsamples drawn randomly from existing data. If the confidence interval between 2.5% and 97.5% does not include 0, it indicates that the mediating effect is significant; otherwise, the mediation effect is not significant (Preacher, Rucker, & Hayes, 2007). Furthermore, we judge the type of mediation effect in the light of the direct effect; if the direct effect is significant, the mediator plays a partial mediation role; if the direct effect is not significant, the mediator plays a full mediation role (Baron & Kenny, 1986). The results of the bootstrap test are shown in Table 4.8.

Table 4.8 The Bootstrap Test Results of the SEM–ERI–EII Model

Path	Standardized Estimate	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
Total Effect						
TS–CA	0.363	0.249	0.448	0.255	0.453	-
NC–CA	0.472	0.339	0.595	0.343	0.597	-
TS–ERI	0.128	0.018	0.247	0.014	0.244	-
NC–ERI	0.314	0.154	0.481	0.151	0.478	-
TS–EII	0.166	0.029	0.313	0.025	0.307	-
NC–EII	0.369	0.182	0.542	0.195	0.554	-
TS–DC–CA	0.087	0.027	0.168	0.028	0.171	Supported
NC–DC–CA	0.059	0.017	0.177	0.013	0.14	Supported
TS–ERI–CA	0.006	-0.053	0.066	-0.059	0.064	-
NC–ERI–CA	0.082	0.015	0.191	0.007	0.173	-

Path	Standardized Estimate	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
TS-EII-CA	0.008	-0.039	0.078	-0.047	0.069	-
Indirect Effect						
NC-EII-CA	0.074	0.013	0.172	0.011	0.162	-
TS-DC-ERI	0.111	0.019	0.282	0.016	0.268	-
NC-DC-ERI	0.075	0.012	0.252	0.007	0.217	-
TS-DC-EII	0.135	0.047	0.312	0.043	0.295	-
NC-DC-EII	0.092	0.026	0.288	0.02	0.239	-
TS-DC-ERI-CA	0.038	0.008	0.111	0.004	0.097	-
NC-DC-ERI-CA	0.026	0.005	0.1	0.002	0.078	-
TS-DC-EII-CA	0.036	0.013	0.096	0.008	0.077	-
NC-DC-EII-CA	0.025	0.007	0.084	0.003	0.061	-
Direct Effect						
TS-CA	0.187	0.063	0.292	0.066	0.293	-
NC-CA	0.205	0.041	0.345	0.042	0.346	-
TS-ERI	0.017	-0.161	0.176	-0.176	0.17	-
NC-ERI	0.239	0.036	0.429	0.034	0.427	-
TS-EII	0.03	-0.165	0.216	-0.183	0.21	-
NC-EII	0.277	0.044	0.465	0.053	0.483	-

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

As shown in Table 4.8, the indirect effect of dynamic capabilities was 0.087 in the RI–DC–CA path and 0.059 in the NC–DC–CA path, neither of which included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and percentile 95% CI, indicating that the relationship of the enterprise network and competitive advantages is mediated by dynamic capabilities; furthermore, the direct effect of the enterprise network on competitive advantages was significant, indicating that dynamic capabilities have a partial mediation effect between enterprise networks and competitive advantages. Therefore, H2a and H2b were supported.

The indirect effect of exploratory innovation was 0.006 in the RI–ERI–CA path and included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, which suggested that the mediating effect of exploratory innovation was insignificant in the RI–ERI–CA path. Similarly, the mediating effect of exploitative innovation was 0.008 and insignificant. Therefore, the relationship of tie strength and competitive advantages is not mediated by exploratory innovation and exploitative innovation.

The indirect effect of exploratory innovation was 0.082 and the mediating effect of exploitative innovation was 0.074 in the NC–ERI–CA path, both of which did not include 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, indicating that exploratory innovation and exploitative innovation mediate between network centrality and competitive advantages; furthermore, the direct effect of network centrality on competitive advantages was significant, indicating that the relationship between network centrality and competitive advantages is partially mediated by exploratory innovation and exploitative innovation.

The indirect effects of the interaction of dynamic capabilities and exploratory innovation were 0.038 in the RI–DC–ERI–CA path and 0.026 in the NC–DC–ERI–CA path, and they did not include 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, indicating that the interactions of dynamic capabilities and exploratory innovation have multiple mediating effects between enterprise networks and competitive advantages. Furthermore, the direct effect of tie strength on exploratory innovation was insignificant, indicating that the relationship of tie strength and competitive advantage is fully mediated by the interactions of

dynamic capabilities and exploratory innovation. The direct effect of network centrality on exploratory innovation was significant, indicating that the relationship of network centrality and competitive advantages is partially mediated by the interactions of dynamic capabilities and exploratory innovation. Similarly, the indirect effect of the interactions of dynamic capabilities and exploitative innovation was 0.036 and played a full mediation role between tie strength and competitive advantages. The relationship of network centrality and competitive advantages was partially mediated by the indirect effect of the interactions of dynamic capabilities and exploitative innovation of 0.025 and played a partial mediation role between tie strength and competitive advantages.

In summary, the mediating effects of dynamic capabilities, exploratory innovation, and exploitative innovation were all tested. Dynamic capabilities made the effect of enterprise networks on competitive advantages rise by 0.146, and exploratory innovation enabled the effect of enterprise networks on competitive advantages to increase by 0.146. Exploitative innovation promoted the effect of enterprise networks on competitive advantages to improve by 0.135, which indicated that enterprises need to continue to introduce exploratory innovation or exploitative innovation to improve the utilization efficiency of social capital. However, section 4.5 only explored the effects of exploratory innovation or exploitative innovation. In the next section, we explore the effect of ambidextrous innovation, that is, the effects of ambidextrous balance and ambidextrous combination.

4.6 The SEM Model Including Ambidextrous Balance

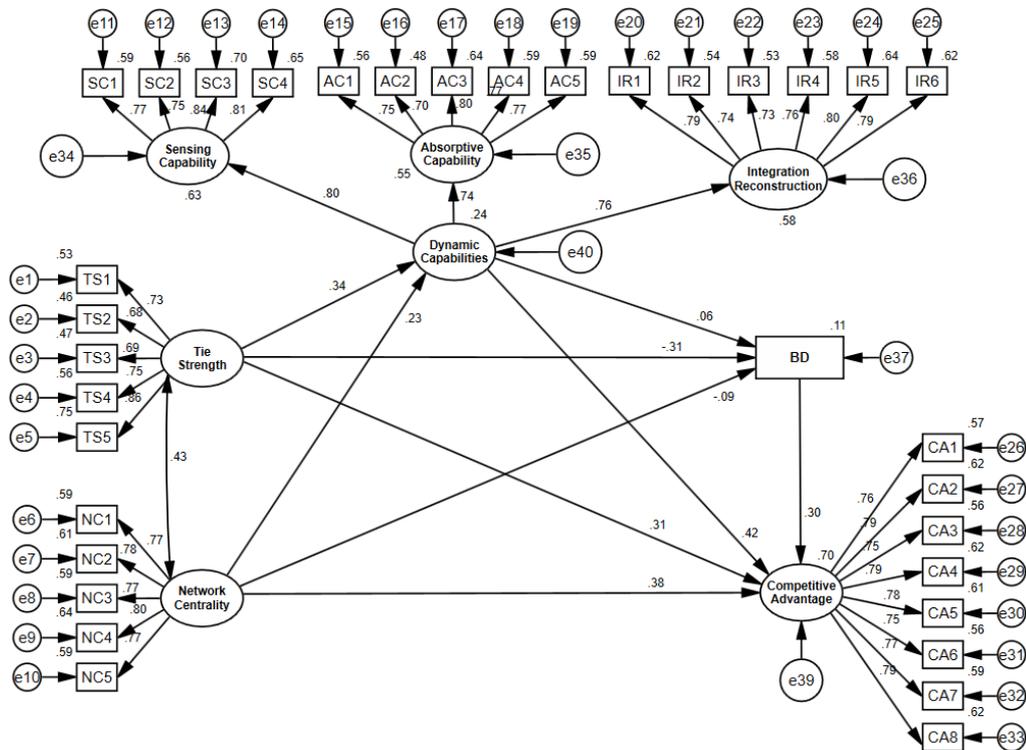


Figure 4.4 Standardized Regression Weights in the SEM-BD Model

Note: BD = Ambidextrous Balance

This section focuses on ambidextrous balance, which is a strategy to achieve sustainable development by allocating limited resources to exploratory innovation and exploitative innovation in a balanced way or using an optimal ratio (Li et al., 2010). We proposed the model that includes ambidextrous balance and named it as SEM-BD, which included five constructs, specifically competitive advantage, tie strength, network centrality, dynamic capabilities, and ambidextrous balance, and was measured through “5 – |exploratory innovation – exploitative innovation|”. The results were AGFI=0.9, RMR=0.041, RMSEA=0.023, CMIN/DF=1.206, and CFI=0.985, suggesting that the fitness of the SEM-BD model was accepted, and it could be used to test the hypotheses. The standardized estimation results of the SEM-BD model are shown in Figure 4.4.

4.6.1 The Results of the Hypothesis Testing in the SEM–BD Model

The standardized regression coefficients and non-standardized regression coefficients of SEM–BD are presented in Table 4.9.

Table 4.9 Hypothesis Testing and Regression Weights

Path	Standardized Regression Weights	Unstandardized Regression Weights	S.E.	C.R.	P	Result
TS<--->NC	0.43 (correlations)	0.222 (covariances)	0.035	6.336	***	-
CA<---TS	0.306	0.352	0.06	5.875	***	Supported
CA<---NC	0.381	0.411	0.054	7.672	***	Supported
DC<---TS	0.343	0.293	0.06	4.882	***	Supported
DC<---NC	0.234	0.187	0.054	3.494	***	Supported
CA<---DC	0.417	0.562	0.079	7.089	***	Supported
BD<---TS	-0.312	0.321	0.068	-4.747	***	Rejected
BD<---NC	-0.087	0.084	0.059	-1.427	0.153	Rejected
CA<---BD	0.302	0.339	0.044	7.626	***	Supported
BD<---DC	0.059	0.07	0.08	0.874	0.382	Rejected

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; BD = ambidextrous balance; CA = competitive advantage

Table 4.9 shows that the standard regression weight between tie strength and competitive advantages was 0.306 and the standard regression weight between network centrality and competitive advantages was 0.381, both of which were significant at the 0.05 confidence level, indicating that competitive advantages are positively associated with tie strength and network centrality. Therefore, hypothesis 1 was supported in the SEM–BD model.

The standard regression weight between tie strength and dynamic capabilities was 0.343, the standard regression weight between network centrality and dynamic capabilities was 0.234, and the standard regression weight between dynamic capabilities and competitive advantages was 0.417. All of these were significant at the 0.05 confidence level, indicating that dynamic capabilities that are a source of competitive advantage are positively associated with tie strength and network centrality. Therefore, hypotheses 2a/2b/2c were supported by the SEM–BD model. However, the standard regression weight between tie strength and ambidextrous balance was -0.312 and significant and the standard regression weight between network centrality and ambidextrous balance was -0.087 and insignificant, indicating that enterprise networks do not always promote enterprises to achieve ambidextrous balance. Therefore, H3a and H3c were rejected. Besides, the effect of dynamic capabilities on ambidextrous balance was 0.059 ($p=0.382$) and insignificant; therefore, H4a was rejected by the SEM–BD model.

Overall, six path hypotheses were supported among the nine path hypotheses and three path hypotheses were rejected. To understand the relationships among the latent variables in the SEM–BD model, we present all the path coefficients in Figure 4.5.

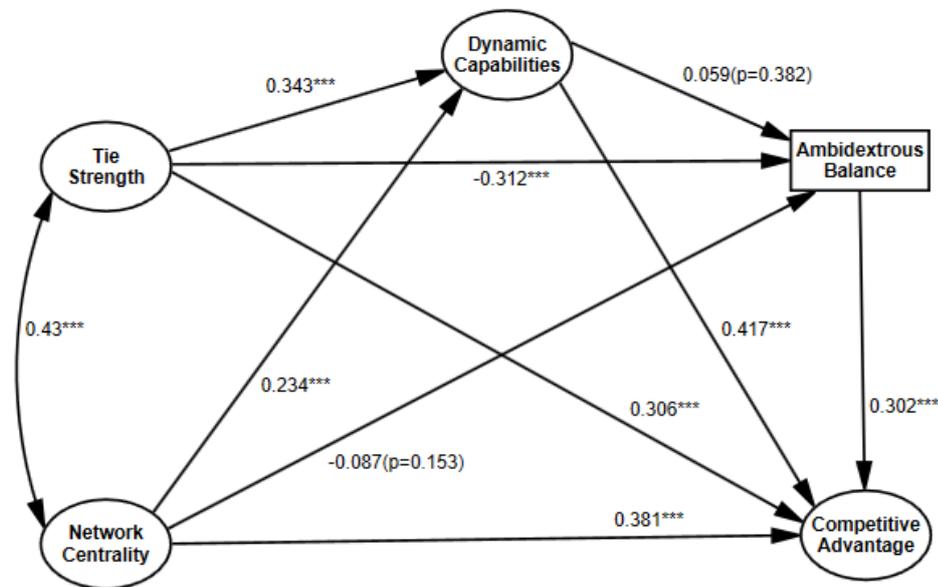


Figure 4.5 Standardized Regression Weights in the SEM-BD Model

We also found a mediating effect in Figure 4.5. For instance, the mediating effect of dynamic capabilities was 0.143 in the TS-DC-CA path and 0.098 in the NC-DC-CA path; the mediating effect of ambidextrous balance was -0.094 in the TS-BD-CA path and -0.026 in the NC-BD-CA path; and the mediating effect of $DC \times BD$ was 0.006 in the TS-DC-BD-CA path and 0.004 in the NC-DC-BD-CA path. However, whether the mediating effect was significant still required a bootstrap test to check.

4.6.2 The Results of the Hypothesis Check in the SEM-BD Model

The bootstrap test results of the SEM-BD model are presented in Table 4.10.

Table 4.10 The Results of the Total Effect, Direct Effect, and Indirect Effect in the Bootstrap Test

Path	Standardized Value	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
Total Effect						
TS-CA	0.36	0.249	0.446	0.258	0.452	Supported
NC-CA	0.456	0.323	0.579	0.328	0.584	Supported
TS-BD	-0.292	0.209	0.373	0.209	0.374	-
NC-BD	-0.073	-0.092	0.18	-0.071	0.192	-
Indirect Effect						
TS-DC- CA	0.143	0.086	0.228	0.084	0.225	Supported
NC-DC- CA	0.098	0.039	0.213	0.032	0.192	Supported
TS-BD- CA	-0.094	-0.159	-0.05	-0.153	-0.048	Rejected
NC-BD- CA	-0.026	-0.076	0.018	-0.077	0.017	Rejected
TS-DC- BD-CA	0.006	-0.016	0.032	-0.016	0.031	Rejected
NC-DC- BD-CA	0.004	-0.009	0.024	-0.013	0.022	Rejected
TS-DC- BD	0.02	-0.102	0.05	-0.102	0.05	Rejected
NC-DC- BD	0.014	-0.081	0.031	-0.073	0.038	Rejected
Direct Effect						
TS-CA	0.306	0.17	0.445	0.165	0.442	Supported

Path	Standardized Value	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
NC–CA	0.381	0.229	0.511	0.233	0.515	Supported
TS–BD	-0.312	0.195	0.424	0.196	0.425	-
NC–BD	-0.087	-0.076	0.207	-0.063	0.214	-

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; BD = ambidextrous balance; CA = competitive advantage

From Table 4.10, it can be seen that the indirect effect of dynamic capabilities was 0.143 in the TS–DC–CA path and 0.098 in the NC–DC–CA path; both of these did not include 0 between the lower bound and the upper bound of the bias-corrected 95% CI and percentile 95% CI, indicating that the relationship between enterprise networks and competitive advantages is mediated by dynamic capabilities; furthermore, the direct effect of enterprise networks on competitive advantages was significant, indicating that dynamic capabilities have a partial mediation effect between enterprise networks and competitive advantages. Therefore, hypothesis 2 was supported by the SEM-BD model.

The indirect effect of ambidextrous balance was -0.094 in the TS–BD–CA path and -0.026 in the NC–BD–CA path, both of which included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and percentile 95% CI, indicating that the relationship between enterprise networks and competitive advantages is not mediated by ambidextrous balance. Therefore, H31 and H33 were rejected by the SEM-BD model.

The indirect effect of the interaction of dynamic capabilities and ambidextrous balance was -0.006 in the TS–DC–ERI–CA path and -0.004 in the NC–DC–ERI–CA path, both of which included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and percentile 95% CI, indicating that the interactions of dynamic capabilities and ambidextrous balance do not mediate the relationship between enterprise networks and competitive advantages. Therefore, hypotheses 4c/4e

were rejected by the SEM-BD model.

In summary, this section mainly tested the relevant hypotheses related to ambidextrous balance. Our results showed that the mediating effects of dynamic capabilities improved the impact of tie strength on competitive advantages from 0.306 to 0.36 and enabled the impact of network centrality on competitive advantages to rise from 0.381 to 0.456. However, our results rejected the mediating effects of ambidextrous balance, which indicated that ambidextrous balance cannot help companies to improve the efficiency of their use of social capital.

4.6.3 Robustness Test of Ambidextrous Balance

We believe that the results related to ambidextrous balance are robust. Ambidextrous balance is the difference between exploratory innovation and exploitative innovation, which might lead to a concern about the potentially complex statistics involved; therefore, we need to test the robustness of the results related to ambidextrous balance. This study conducted an independent sample test to alleviate the inaccuracies caused by statistical data (Cao et al., 2009). The detailed steps are as follows: first, according to the median, we divided all the independent variables related to ambidextrous balance into two groups, a low-level and a high-level group; second, we used an independent sample T-test to compare the averages of the low-level group and the high-level group; third, we checked the significance of the T value. If the T value is significant, it indicates that the low group has a significantly low mean for the dependent variables and the high group has a significantly high mean for the dependent variables; otherwise, there is no significant difference in the mean between the low group and the high group. The robustness test results related to ambidextrous balance are presented in Table 4.11.

Table 4.11 Independent Samples Test on Ambidextrous Balance

Independent	Dependent	Groups	Levene's Test for Equality of Variances		T-Test for Equality of Means		
			F	Sig.	T	df	Sig. (2-tailed)
Tie strength	Ambidextrous Balance	Equal variances	50.984	.000	-2.775	382	.006
		Unequal variances	-	-	-4.629	324.676	.000
Network centrality	Ambidextrous balance	Equal variances	8.191	.004	-.157	382	.875
		Unequal variances	-	-	-.202	379.045	.840
Dynamic capability	Ambidextrous balance	Equal variances	14.545	0.000	0.678	382.000	0.498
		Unequal variances	-	-	0.670	317.306	0.503
Ambidextrous balance	Competitive advantage	Equal variances	7.770	0.006	0.270	382.000	0.787
		Unequal variances	-	-	0.202	25.728	0.842

From Table 4.11, it could be seen that the T value of tie strength on ambidextrous balance was -4.629 and significant, indicating that the low group of tie strength had a significant mean for ambidextrous balance; therefore, H3a still held. However, the T values of network centrality/dynamic capabilities on ambidextrous balance were -0.202 and 0.670, both of which were insignificant, indicating that the differences in the ambidextrous balance mean were insignificant between the low network centrality/dynamic capabilities group and the high network centrality/dynamic capabilities group; therefore, H3c and H4a are robust. What surprised us was the T value (0.202, $p=0.842$) of ambidextrous balance on competitive advantages, suggesting that the difference in competitive advantages was insignificant between the high ambidextrous balance group and the low ambidextrous balance group, which was contrary to our results in Table 4.9. Overall, except for ambidextrous balance, the results were robust.

4.7 The SEM Model Including Ambidextrous Combination

This section focuses on estimating the hypotheses related to ambidextrous combination, which is a strategy to achieve sustainable development by carrying out high-level exploratory innovation and exploitative innovation simultaneously (Rogan & Mors, 2014). To test hypotheses related to ambidextrous combination, we proposed the SEM-CD model that included the constructs of competitive advantage, tie strength, network centrality, dynamic capabilities, and ambidextrous combination and was measured using $|\text{exploratory innovation} + \text{exploitative innovation}|$ (Cao et al., 2009). The results were $AGFI=0.903$, $RMR=0.042$, $RMSEA=0.023$, $CMIN/DF=1.197$, and $CFI=0.986$, and these indicators suggested that the fitness of the SEM-CD model was acceptable and that it could be used to test the hypotheses, except for the chi-square ($616.576, p=0.001$). The standardized estimation results of the SEM-CD model are shown in Figure 4.6:

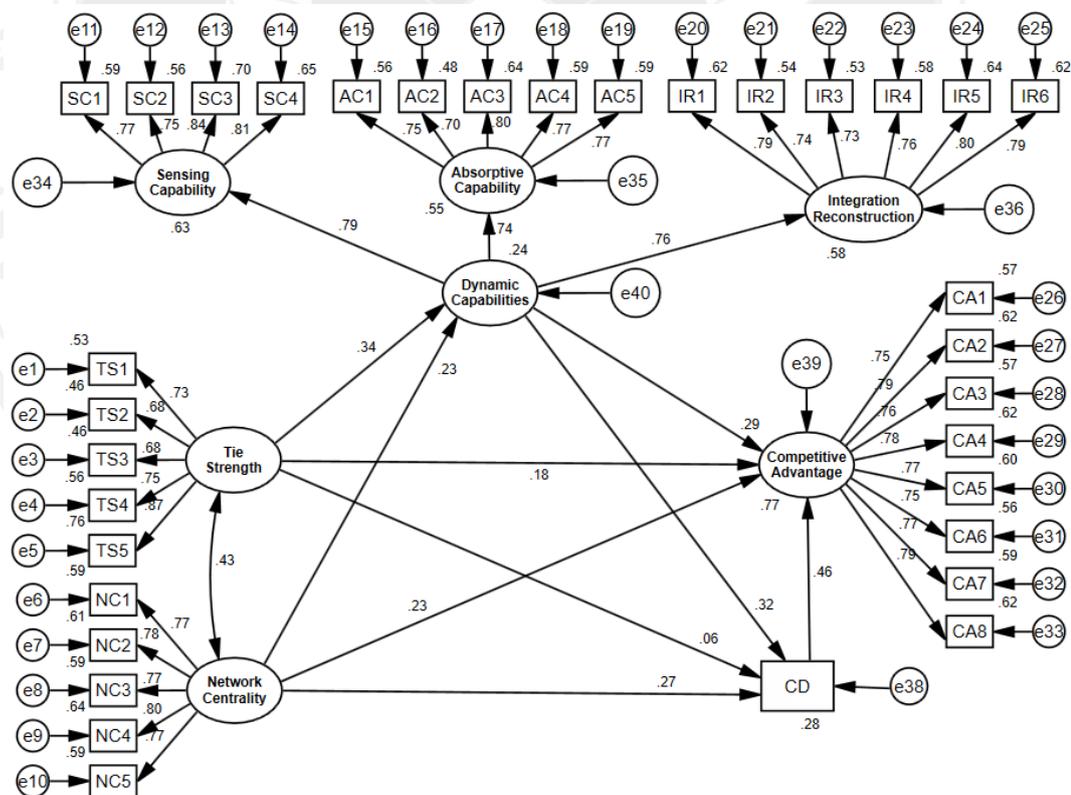


Figure 4.6 The Standardized Regression Weights in the SEM-CD Model

Note: CD = Ambidextrous Combination

4.7.1 Hypothesis Testing of the SEM–CD Model

Table 4.12 Hypothesis Testing and Regression Weights

Path	Standardized Regression Weights	Unstandardized Regression Weights	S.E.	C.R.	P	Result
TS<--->NC	0.429 (correlations)	0.222 (covariances)	0.035	6.327	***	-
CA<---TS	0.181	0.207	0.047	4.385	***	Supported
CA<---NC	0.231	0.247	0.045	5.534	***	Supported
DC<---TS	0.341	0.291	0.06	4.868	***	Supported
DC<---NC	0.235	0.188	0.053	3.51	***	Supported
CA<---DC	0.29	0.389	0.067	5.776	***	Supported
CD<---TS	0.064	0.125	0.115	1.089	0.276	Rejected
CD<---NC	0.273	0.498	0.104	4.774	***	Supported
CA<---CD	0.457	0.268	0.025	10.937	***	Supported
CD<---DC	0.317	0.725	0.149	4.868	***	Supported

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; CD = ambidextrous combination; CA = competitive advantage

The standardized regression coefficients and non-standardized regression coefficients of SEM–CD are presented in Table 4.12.

Table 4.12 shows that the standard regression weight between tie strength and competitive advantages were 0.181 and the standard regression weight between network centrality and competitive advantages was 0.231, both of which were significant at the 0.05 confidence level, indicating that competitive advantages are positively associated with tie strength and network centrality. Therefore, H1 (H1a/H1b) was supported by the SEM–CD model.

The standard regression weight between tie strength and dynamic capabilities was 0.341, the standard regression weight between network centrality and dynamic capabilities was 0.235, and the standard regression weight between dynamic capabilities and competitive advantages was 0.29; all of these were significant at the 0.05 confidence level, indicating that dynamic capabilities that are a source of competitive advantage are positively associated with tie strength and network centrality. Therefore, hypotheses 2a/2b/2c were supported by the SEM-CD model. Moreover, we estimated the mediating effect of dynamic capabilities using the coefficient product method (Mackinnon et al., 2002); the mediating effect of dynamic capabilities was 0.099 in the TS-DC-CA path and 0.068 in the NC-DC-CA path, but a bootstrap test was still required to check whether the mediating effect was significant.

The standard regression weight between tie strength and ambidextrous combination was 0.064 and insignificant, indicating that ambidextrous combination is not positively associated with tie strength, which was contrary to our research hypothesis; therefore, H3b was rejected. However, the standard regression weight between network centrality and ambidextrous combination was 0.273 and the standard regression weight between ambidextrous combination and competitive advantages was 0.457, both of which were significant, indicating that network centrality is positively associated with ambidextrous combination and that ambidextrous combination positively affects competitive advantages. These were consistent with our research hypotheses; therefore, hypotheses 3d/3f were supported by the SEM-CD model. Moreover, we estimated the mediating effect of ambidextrous combination using the coefficient product method (Mackinnon et al., 2002). The mediating effect of ambidextrous combination was 0.125 in the NC-CD-CA path, while the mediating effect of ambidextrous combination in the TS-CD-CA path needed to be estimated using the bootstrap test.

The standard regression weight between dynamic capabilities and ambidextrous combination was 0.317 and significant, indicating that ambidextrous combination is positively associated with dynamic capabilities, which was consistent with our research hypothesis. Therefore, H4b was supported. Furthermore, we estimated that the mediating effect of the interaction of dynamic capabilities and ambidextrous combination was 0.049 in the TS–DC–CD–CA path and 0.034 in the NC–DC–CD–CA path using the coefficient product method (Mackinnon et al., 2002), but multiple mediating effects needed to be checked using the bootstrap test. Overall, to understand the relationships among the latent variables in the SEM–CD model, we present all the path coefficients in Figure 4.7.

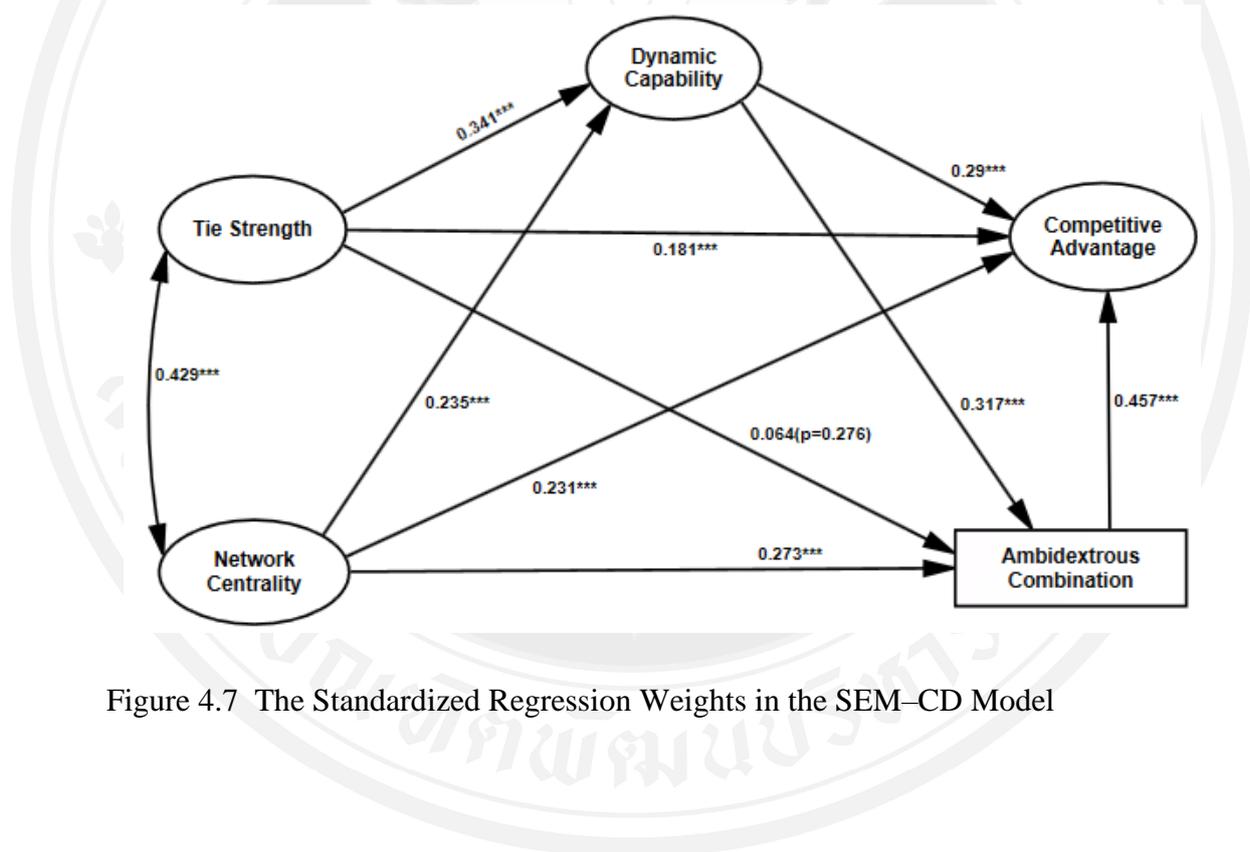


Figure 4.7 The Standardized Regression Weights in the SEM–CD Model

4.7.2 The Hypothesis Check of the SEM-CD Model

The bootstrap test results of the SEM-CD model are presented in Table 4.13.

Table 4.13 The Results of the Bootstrap Test

Path	Standardize d Value	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
Total Effect						
TS-CA	0.359	0.248	0.444	0.255	0.45	Supported
NC-CA	0.458	0.324	0.579	0.33	0.584	Supported
TS-CD	0.172	0.063	0.282	0.061	0.28	-
NC-CD	0.347	0.202	0.483	0.21	0.491	-
Indirect Effect						
TS-DC-CA	0.099	0.045	0.168	0.045	0.165	Supported
NC-DC-CA	0.068	0.026	0.154	-0.02	0.137	Supported
TS-CD-CA	0.029	-0.033	0.103	-0.037	0.098	Rejected
NC-CD-CA	0.125	0.044	0.219	0.044	0.219	Supported
TS-DC-CD	0.108	0.038	0.21	0.036	0.204	-
NC-DC-CD	0.075	0.02	0.188	0.015	0.169	-
TS-DC-CD- CA	0.049	0.019	0.099	0.017	0.092	Supported
NC-DC-CD- CA	0.034	0.01	0.089	0.007	0.077	Supported
Direct Effect						
TS-CA	0.181	0.071	0.281	0.075	0.283	Supported

Path	Standardize d Value	Bias-Corrected 95% CI		Percentile 95% CI		Results
		Lower	Upper	Lower	Upper	
NC-CA	0.231	0.085	0.359	0.085	0.362	Supported
TS-CD	0.064	-0.073	0.21	-0.084	0.203	-
NC-CD	0.273	0.101	0.427	0.106	0.432	-

Note: RI = tie strength; NC = network centrality; DC = dynamic capabilities; CD = ambidextrous combination; CA = competitive advantage

Table 4.13 shows that the indirect effect of dynamic capabilities was 0.099 in the TS-DC-CA path and 0.068 in the NC-DC-CA path; neither of them included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, indicating that the effect of the enterprise network on competitive advantages was mediated by dynamic capabilities; furthermore, the direct effect of the enterprise network on competitive advantages was significant, indicating that dynamic capabilities exert a partial mediation effect between enterprise networks and competitive advantages. Therefore, H2a and H2b were supported by the SEM-CD model.

The indirect effect of ambidextrous combination was 0.029 in the TS-CD-CA path and included 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, indicating that the effect of enterprise networks on competitive advantages is not mediated by ambidextrous combination; therefore, H3c was rejected by the SEM-CD model. However, the indirect effect of ambidextrous combination was 0.125 in the NC-CD-CA path and did not include 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, suggesting that the relationship between network centrality and competitive advantages is not mediated by ambidextrous combination; therefore, H3d was supported by the SEM-CD model.

The indirect effect of the interaction of dynamic capabilities and ambidextrous combination (dynamic capabilities \times ambidextrous combination) was 0.049 in the TS–DC–CD–CA path and 0.034 in the NC–DC–CD–CA path, both of which did not include 0 between the lower bound and the upper bound of the bias-corrected 95% CI and the 95% CI, indicating that the interactions of dynamic capabilities and ambidextrous combination mediate the relationship between enterprise networks and competitive advantages. Therefore, H4d and H4f were supported by the SEM–CD model. Furthermore, the direct effect of tie strength on ambidextrous combination was insignificant, which indicated that the interaction of dynamic capabilities and ambidextrous combination played a role of full mediation in the TS–DC–CD–CA path, while the direct effect of network centrality on ambidextrous combination was significant, which indicated that the interaction of dynamic capabilities and ambidextrous combination played a role of partial mediation in the NC–DC–CD–CA path.

In summary, this section mainly tested the hypotheses related to ambidextrous combinations, and our results supported the mediating effects of dynamic capabilities. Dynamic capabilities caused the impact of tie strength on competitive advantages to increase from 0.181 to 0.280 and enabled the impact of network centrality on competitive advantages to rise from 0.231 to 0.299. Our results also supported the mediating effects of ambidextrous combination: ambidextrous combination made the impact of tie strength on competitive advantages increase by 0.049 and enabled the impact of network centrality on competitive advantages to rise by 0.159. These findings indicated that dynamic capabilities play a vital role in the process of companies using corporate social capital to achieve ambidextrous combination; therefore, enterprises need to develop dynamic capabilities when they engage in ambidextrous combination.

4.7.3 The Robustness Test of Ambidextrous Combination

Like ambidextrous balance, ambidextrous combination is a combination variable of exploratory innovation and utilization innovation; therefore, we also conducted an independent T-test to ensure the robustness of the results. The results of the independent T-test are presented in Table 4.14.

From Table 4.14, it could be seen that the T values were -14.148 ($p=0.000$), -14.506 ($p=0.000$), -11.165 ($p=0.000$), and -12.306 ($p=0.000$), indicating that the high tie strength/ network centrality/dynamic capability groups had significantly greater means of ambidextrous combination and the high ambidextrous combination group had a significantly greater mean of competitive advantages, which is consistent with our results in Table 4.12. Therefore, the results related to ambidextrous combination were robust.

Table 4.14 Independent Samples Test of Ambidextrous Combination

Independent	Dependent	Groups	Levine's Test for Equality of Variances		T-Test for Equality of Means		
			F	Sig.	T	df	Sig. (2-tailed)
Tie strength	Ambidextrous combination	Equal variances	30.538	.000	-10.455	382	.000
		Different variances	-	-	-14.148	326.016	.000
Network centrality	Ambidextrous combination	Equal variances	18.423	.000	-12.414	382	.000
		Different variances	-	-	-14.506	324.300	.000
Dynamic capability	Ambidextrous combination	Equal variances	.006	.938	-11.165	382	.000
		Different variances	-	-	-11.152	378.207	.000
Ambidextrous combination	Competitive advantage	Equal variances	3.418	.065	-12.306	382	.000
		Different variances	-	-	-10.701	97.799	.000

4.7.4 The Comparison of Different Structural Equation Models

Ambidextrous innovation is a combined variable of exploratory innovation and exploitative innovation, such as ambidextrous balance and ambidextrous combination, which cannot coexist in the same company because the assumptions of ambidextrous balance and ambidextrous combination are completely different. In other words, it is impossible for a company to assume limited and sufficient resources at the same time; therefore, companies that engage in ambidextrous balance (ambidextrous combination) cannot engage in ambidextrous combination (ambidextrous balance). This study proposes three SEM models to test the relationships among enterprise networks, dynamic capabilities, exploratory and exploitative innovation/ambidextrous balance/ambidextrous combination, and competitive advantages. The results of the squared multiple correlation comparison are presented in Table 4.15.

Table 4.15 The Comparison of Squared Multiple Correlation

SEM–ERI–EII Model		SEM–BD Model		SEM–CD Model	
Constructs	Estimate	Constructs	Estimate	Constructs	Estimate
Dynamic capabilities	0.241	Dynamic capabilities	0.241	Dynamic capabilities	0.24
Exploratory innovation	0.333	Ambidextrous balance	0.112	Ambidextrous combination	0.278
Exploitative innovation	0.228				
Competitive advantages	0.807	Competitive advantages	0.704	Competitive advantages	0.774

The squared multiple correlations were used to measure the proportion of a construct's variance that could be explained by other constructs in the model. The table presented above indicates that the proportion of competitive advantages' variance explained by enterprise networks, dynamic capabilities, exploratory innovation and exploitative innovation/ambidextrous balance/ambidextrous

combination were 0.807, 0.704, and 0.774, respectively, and the lower squared multiple correlations of competitive advantages explained by ambidextrous balance/ambidextrous combination indicated that engaging in ambidextrous balance or ambidextrous combination requires more costs and resources to overcome the contradiction between exploration and exploitation. The proportions of dynamic capabilities' variances explained by the three SEM models were all 0.24, suggesting that the squared multiple correlations of dynamic capabilities were no different in the three SEM models. Besides, the proportion of exploratory innovation's variance explained was 0.228, the proportion of exploratory innovation's variance explained was 0.333, the proportion of ambidextrous balance's variance explained was 0.112, and the proportion of ambidextrous combination's variance explained was 0.278; among them, the percentage of ambidextrous balance explained by tie strength, network centrality, and dynamic capabilities was only 0.112, indicating that we needed to continue to look for other factors that explain ambidextrous balance.

4.8 Multigroup Analysis

Both multigroup confirmatory factor analysis and multigroup path analysis were applied to test the path differences simultaneously. Before performing multigroup path analysis, multigroup confirmatory factor analysis was required to check the differences in the measured items. Because the constructs are composed of measured items, differences in the measured items may affect the relationships between constructs. If the regression weights of the measured items are not significantly different, the influence of the measured items on path analysis is not considered; if the regression weight of the measured items is significantly different at the 0.05 confidence level, the difference in these measured items could be considered in the multigroup path analysis (Ho, 2006). In the study, the critical ratio was used to determine whether the regression weights of the measured items and the path coefficients between the constructs were significantly different. When the values of the critical ratios exceeded ± 1.96 , they indicated that significant differences existed in the measured items or path coefficients between different groups; otherwise, there was no difference (Arbuckle & Wothke, 1999). Next, the multigroup analysis was

conducted on the industry type, the company scale, and the company age, respectively.

4.8.1 The Multigroup Analysis of Industry Type

4.8.1.1 The Multigroup Confirmatory Factor Analysis of Industry Type

The process of multigroup analysis of industry type was followed. First, we divided high-tech enterprises into manufacturing companies and service companies as industry types; second, we labelled the standard regression weight of manufacturing companies with mv1–mv35 and the standard regression weight of service companies with sv1–sv35, and the details are presented in Table 4.16; third, the standard regression weight of manufacturing companies was equal to the standard regression weight of service companies, indicating that there were no differences between manufacturing companies and service companies. The results of the multiple analyses are presented in Table 4.16 and Table 4.17.

Table 4.16 The Nested Model Comparison Assuming the Group Variant to Be Corrected

Model	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
Group Variant	1522	1843.2	0	0.024	2243.2	-	-	-	-
Group Invariant	1557	1884.2	0	0.023	2214.2	-	-	-	-
Differences	35	41.024	0.223	-	-	0.004	0.005	0.000	0.000

Note: Group invariant means that the regression weights of manufacturing equal those of service companies; group variant means that the regression weights of manufacturing are unequal to the regression weights of service companies

From Table 4.16, it could be seen that the chi-square value of the group variant model was 1843.15 (df=1522) compared with 1884.173 (df=1557) in the group invariant model, and the difference in the chi-square values was 41.024 and insignificant at the 0.05 confidence level, indicating that the fitness of the group variant model and that of the group invariant model were not significantly different. However, the RMSEA (0.023) and AIC (2214.173) of the group invariant model were slightly smaller than the RMSEA (0.024) and AIC (2243.15) of the group variant model, indicating that the group invariant model was more concise and had better fitness than the group variant model. The difference between the measured items is shown in Table 4.17.

Table 4.17 The Differences in Standardized Regression Weights between Manufacturing and Service Companies in CFA

Manufacturing	Services	Path	Manufacturing		Services		Critical Ration
			Estimate	P	Estimate	P	
1	1	CA1<---CA	0.748	***	0.752	***	-
mv7	sv7	CA2<---CA	0.796	***	0.778	***	0.24
mv6	sv6	CA3<---CA	0.811	***	0.737	***	0.59
mv5	sv5	CA4<---CA	0.788	***	0.776	***	0.77
mv4	sv4	CA5<---CA	0.794	***	0.767	***	0.57
mv3	sv3	CA6<---CA	0.758	***	0.762	***	0.76
mv2	sv2	CA7<---CA	0.755	***	0.786	***	0.42
mv1	sv1	CA8<---CA	0.764	***	0.802	***	0.31
1	1	TS1<---TS	0.738	***	0.726	***	-
mv21	sv21	TS2<---TS	0.732	***	0.669	***	-1.05
mv20	sv20	TS3<---TS	0.716	***	0.669	***	-0.03

Manufacturing	Services	Path	Manufacturing		Services		Critical Ration
			Estimate	P	Estimate	P	
mv19	sv19	TS4<---TS	0.774	***	0.732	***	0.36
mv18	sv18	TS5<---TS	0.881	***	0.868	***	0.85
1	1	NC1<---NC	0.779	***	0.768	***	-
mv17	sv17	NC2<---NC	0.749	***	0.793	***	1.56
mv16	sv16	NC3<---NC	0.777	***	0.769	***	1.62
mv15	sv15	NC4<---NC	0.812	***	0.793	***	-0.19
mv14	sv14	NC5<---NC	0.783	***	0.753	***	1.86
1	1	SC<---DC	0.775	***	0.793	***	-
mv22	sv22	AC<---DC	0.771	***	0.747	***	-0.51
mv23	sv23	IR<---DC	0.753	***	0.762	***	-1.246
1	1	SC1<---SC	0.752	***	0.776	***	-
mv24	sv24	SC2<---SC	0.742	***	0.751	***	-1.255
mv25	sv25	SC3<---SC	0.824	***	0.844	***	-1.777
mv26	sv26	SC4<---SC	0.854	***	0.796	***	-1.404
1	1	AC1<---AC	0.685	***	0.784	***	-
mv27	sv27	AC2<---AC	0.67	***	0.706	***	-0.309
mv28	sv28	AC3<---AC	0.758	***	0.813	***	-0.77
mv29	sv29	AC4<---AC	0.759	***	0.772	***	-0.22
mv30	sv30	AC5<---AC	0.746	***	0.779	***	-0.97
1	1	IR1<---IR	0.805	***	0.783	***	-

Manufacturing	Services	Path	Manufacturing		Services		Critical Ration
			Estimate	P	Estimate	P	
mv31	sv31	IR2<---IR	0.742	***	0.734	***	0.422
mv32	sv32	IR3<---IR	0.698	***	0.743	***	1.231
mv33	sv33	IR4<---IR	0.804	***	0.756	***	-0.38
mv34	sv34	IR5<---IR	0.794	***	0.803	***	1.288
mv35	sv35	IR6<---IR	0.782	***	0.787	***	1.767
1	1	ERI1<---ERI	0.747	***	0.802	***	-
mv13	sv13	ERI2<---ERI	0.629	***	0.66	***	-0.61
mv12	sv12	ERI3<---ERI	0.675	***	0.718	***	-1.95
mv11	sv11	ERI4<---ERI	0.781	***	0.752	***	2.74
1	1	EII1<---EII	0.778	***	0.79	***	-
mv10	sv10	EII2<---EII	0.71	***	0.647	***	-0.98
mv9	sv9	EII3<---EII	0.697	***	0.689	***	-0.53
mv8	sv8	EII4<---EII	0.823	***	0.816	***	-1.38

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; IR = integration and reconstruction capability; AC = absorptive capability; SC = sensing capability; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

As shown in the table above, the standard regression weights of the measured items of manufacturing enterprises ranged from 0.629 to 0.881 and were significant and the standard regression weights of the measured items of service enterprises ranged from 0.647 to 0.868 and were significant, indicating that the standard regression weights of the measured items of manufacturing enterprises were

different from those of service enterprises. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The result of the pairwise parameter comparisons showed that the critical ration of ERI4 for industry difference was 2.74 and exceeded the critical value (1.96), which indicated that the measured item (ERI4) of manufacturing companies was significantly different from that of service companies. Therefore, the difference of ERI4 needed to be considered in the path analysis.

4.8.1.2 Multigroup Path Analysis of Industry Type

The labels of the path coefficient for manufacturing companies and service companies are presented in Table 4.18.

Table 4.18 Parameter Settings of Multigroup Path Analysis of Industry Category in the Different Models

SEM-ERI-EII			SEM-BD			SEM-CD		
Path	Manufacturing	Services	Path	Manufacturing	Services	Path	Manufacturing	Services
CA<---	m3	s3	CA<---	m3	s3	CA<--	m2	s2
TS			TS			-TS		
CA<---	m7	s7	CA<---	m6	s6	CA<--	m5	s5
NC			NC			-NC		
DC<---	m1	s1	DC<---	m1	s1	DC<--	m1	s1
TS			TS			-TS		
DC<---	m5	s5	DC<---	m4	s4	DC<--	m4	s4
NC			NC			-NC		
CA<---	m10	s10	CA<---	m8	s8	CA<--	m7	s7
DC			DC			-DC		
ERI<---	m2	s2	BD<---	m2	s2	CD<--	m3	s3
TS			TS			-TS		
ERI<---	m6	s6	BD<---	m5	s5	CD<--	m6	s6
NC			NC			-NC		
CA<---	m12	s12	CA<---	m9	s9	CA<--	m9	s9
ERI			BD			-CD		
EII<---	m4	s4	BD<---	m7	s7	CD<--	m8	s8
TS			DC			-DC		

SEM-ERI-EII			SEM-BD			SEM-CD		
Path	Manufacturing	Services	Path	Manufacturing	Services	Path	Manufacturing	Services
EII<---	m8	s8	-	-	-	-	-	-
NC								
CA<---	m13	s13	-	-	-	-	-	-
EII								
ERI<---	m9	s9	-	-	-	-	-	-
DC								
EII<---	m11	s11	-	-	-	-	-	-
DC								
Group Variant	mv (1-10,12-35) = sv (1-10,12-35)		Group Variant	mv (1-7,14-35) = sv (1-7,14-35)		Group Variant	mv (1-7,14-35) = sv (1-7,14-35)	
Group Invariant	mv (1-10,12-35) = sv (1-10,12-35) and m (1-13) = s (1-13)		Group Invariant	mv (1-7,14-35) = sv (1-7,14-35) and m (1-9) = s (1-9)		Group Invariant	mv (1-7,14-35) = sv (1-7,14-35) and m (1-9) = s (1-9)	

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; BD = ambidextrous balance; CD = ambidextrous combination; CA = competitive advantage

In the SEM-ERI-EII model, we set the group variant with mv (1-10,12-35) of manufacturing companies equal to sv (1-10,12-35) of service companies and set the group invariant with mv (1-10,12-35) equal to sv (1-10,12-35) and m (1-13) unequal to s (1-13). Similarly, in the SEM-BD model, we set the group variant with mv (1-7,14-35) equal to sv (1-7,14-35), the group invariant to mv (1-7,14-35) equal to sv (1-7,14-35), and m (1-9) equal to s (1-9); in the SEM-CD model, we set the group variant with mv (1-7,14-35) equal to sv (1-7,14-35), the group invariant with mv (1-7,14-35) equal to sv (1-7,17-35), and m (1-9) equal to s (1-9). The results are shown in Table 4.19:

Table 4.19 The Nested Model Comparison Assuming the Group Variant to Be Corrected

Model	Group	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
SEM-ERI-EII	Group variant	1558	1918.7	0	0.025	2246.7	-	-	-	-
	Group invariant	1569	2001.5	0	0.027	2307.5	-	-	-	-
	Differences	11	82.807	0	-	-	0.008	0.009	0.007	0.008
SEM-BD	Group variant	1059	1268.5	0	0.023	1530.5	-	-	-	-
	Group invariant	1068	1347.8	0	0.026	1591.8	-	-	-	-
	Differences	9	79.333	0	-	-	0.009	0.011	0.008	0.01
SEM-CD	Group variant	1059	1264.6	0	0.023	1526.6	-	-	-	-
	Group invariant	1068	1344	0	0.026	1588	-	-	-	-
	Differences	9	79.474	0.833	-	-	0.009	0.01	0.008	0.01

Note: Group invariant means that the regression weights of manufacturing equal the regression weights of services; group variant means that the regression weights of manufacturing are unequal to the regression weights of services

The table presented above shows that, in the SEM-ERI-EII model, the chi-square value of the group variant model was 1918.702 (df=1558) compared with the chi-square value of 2001.509 (df=1558) in the group invariant model, and the difference in the chi-square values was 82.807 and significant at the 0.05 confidence level, indicating that the fitness of the group variant model was significantly better than that of the group invariant model. Besides, the RMSEA (0.025) and AIC (2246.7) of the group variant model were slightly smaller than the RMSEA (0.027) and AIC (2307.5) of the group invariant model, showing that the group variant model was more concise and had better fitness than the group invariant model.

In the SEM–BD model, the chi-square value of the group variant model was 1268.467 (df=1059) compared with the chi-square value (1347.8, df=1068) of the group invariant model, and the difference in the chi-square values was 79.333 and significant at the 0.05 confidence level, which indicated that the fitness of the group variant model was significantly better than that of the group invariant model. Besides, the RMSEA (0.023) and AIC (1530.5) of the group variant model were slightly smaller than the RMSEA (0.026) and AIC (1591.8) of the group invariant model, highlighting that the group variant model was more concise and owned better fitness than the group invariant model.

In the SEM–CD model, the chi-square value of the group variant model was 1264.6 (df=1059) compared with the chi-square value of 1344 (df=1068) of the group invariant model, and the difference in the chi-square values was 79.474 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were not significantly different. However, the RMSEA (0.023) and AIC (1526.6) of the group variant model were slightly smaller than the RMSEA (0.026) and AIC (1588) of the group invariant model, indicating that the group variant model was more concise and had better fitness than the group invariant model.

In short, the group variant model was better than the group invariant model. The differences between the manufacturing enterprises and the service enterprises in different models are shown in Table 4.20, Table 4.21, and Table 4.22.

Table 4.20 The Differences in Standardized Regression Weights between Manufacturing and Service Companies in the SEM–ERI–EII Model

Manufacturing No.	Service Num.	Path	Manufacturing		Services		Critical Ration
			Estimate	P	Estimate	P	
m3	s3	CA<---TS	0.392	***	0.106	0.038	-4.19
m7	s7	CA<---NC	0.565	***	0.138	0.006	-5.5
m1	s1	DC<---TS	0.337	0.006	0.339	***	0.242
m5	s5	DC<---NC	0.159	0.187	0.259	0.001	0.796
m10	s10	CA<---DC	0.258	***	0.29	***	0.021
m2	s2	ERI<---TS	0.036	0.747	0.034	0.677	0.052
m6	s6	ERI<---NC	0.52	***	0.11	0.169	-2.536
m12	s12	CA<---ERI	0.049	0.329	0.398	***	3.94
m4	s4	EII<---TS	0.09	0.412	0.023	0.771	-0.492
m8	s8	EII<---NC	0.466	***	0.17	0.026	-2.313
m13	s13	CA<---EII	0.132	0.013	0.272	***	1.76
m9	s9	ERI<---DC	0.146	0.227	0.396	***	1.998
m11	s11	EII<---DC	0.25	0.037	0.474	***	1.336

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

From the table presented above, in the SEM–ERI–EII model, the path coefficients of the manufacturing enterprise constructs ranged from 0.09 to 0.565 and were significant and the path coefficients of the service enterprise constructs ranged from 0.023 to 0.474, indicating that the path coefficients of manufacturing enterprises were different from those of service enterprises. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons are also shown in Table 4.21. It can be seen that the critical ration of tie strength on competitive advantages was -4.19, the critical ration of network centrality on competitive advantages was -5.5, the critical ration of network centrality on exploratory innovation was -2.536, the critical ration of exploratory innovation on competitive advantages was 3.939, the critical ration of network centrality on exploitative innovation was -2.313, and the critical ration of dynamic capabilities on exploratory innovation was 1.998, all of which exceeded the critical value (+-1.96), indicating that these path coefficients were significantly different between manufacturing companies and service companies. In detail, the effect of enterprise networks on competitive advantages and the effect of network centrality on exploratory innovation or exploitative innovation were greater for manufacturing enterprises; however, the effect of exploratory innovation on competitive advantages and the effect of dynamic capabilities on exploratory innovation were greater for service enterprises.

Table 4.21 The Differences in Standardized Regression Weights between Manufacturing and Service Companies in the SEM–BD Model

Manufacturing Num.	Service Num.	Path	Manufacturing		Service		Critical Ratio
			Estimate	P	Estimate	P	
m3	s3	CA<---TS	0.474	***	0.256	***	-2.792
m6	s6	CA<---NC	0.692	***	0.248	***	-6.128
m1	s1	DC<---TS	0.342	0.005	0.336	***	0.214
m4	s4	DC<---NC	0.158	0.192	0.258	0.001	0.81
m8	s8	CA<---DC	0.287	***	0.497	***	2.196
m2	s2	BD<---TS	0.265	0.022	0.344	***	0.673
m5	s5	BD<---NC	0.16	0.14	0.051	0.496	-0.827
m9	s9	CA<---BD	-0.259	***	-0.332	***	-1.05
m7	s7	BD<---DC	-0.026	0.835	-0.07	0.378	-0.28

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; BD = ambidextrous balance; CA = competitive advantage

From the table presented above, in the SEM–BD model, the path coefficients of the manufacturing enterprise constructs ranged from -0.259 to 0.692 and the path coefficients of the service enterprise constructs ranged from -0.332 to 0.497, indicating that the path coefficients of manufacturing enterprises were different from those of service enterprises. However, whether these differences were significant should be checked using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ration of tie strength on competitive advantages was -2.792, the critical ration of network centrality on competitive advantages was -6.128, and the critical ration of dynamic capabilities on competitive advantages was 2.196. All of these exceeded the critical value (+-1.96), which indicates that the effect of the tie strength/network centrality on competitive advantages was greater for manufacturing enterprises; however, the effect of dynamic capabilities on competitive advantages was greater for service enterprises, which indicated that service enterprises are more likely to develop their dynamic capabilities.

Table 4.22 The Differences in Standardized Regression Weights between Manufacturing and Service Companies in the SEM-CD Model

Manufacturing Num.	Service Num.	Path	Manufacturing		Services		Critical Ration
			Estimate	P	Estimate	P	
m2	s2	CA<---TS	0.394	***	0.105	0.04	-4.145
m5	s5	CA<---NC	0.577	***	0.148	0.003	-5.767
m1	s1	DC<---TS	0.336	0.006	0.335	***	0.244
m4	s4	DC<---NC	0.161	0.181	0.258	0.001	0.796
m7	s7	CA<---DC	0.264	***	0.333	***	0.507
m3	s3	CD<---TS	0.087	0.358	0.073	0.316	-0.054
m6	s6	CD<---NC	0.525	***	0.162	0.021	-2.992
m9	s9	CA<---CD	0.139	0.007	0.511	***	4.865
m8	s8	CD<---DC	0.223	0.03	0.366	***	1.12

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; CD = ambidextrous combination; CA = competitive advantage

The table presented above shows that, in the SEM–CD model, the path coefficients of the manufacturing enterprise constructs ranged from 0.087 to 0.577 and the path coefficients of the service enterprise constructs ranged from 0.073 to 0.511, indicating that the path coefficients of manufacturing enterprises were different from those of service enterprises in the SEM–CD model. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ratio of tie strength on competitive advantages was -4.145, the critical ratio of network centrality on competitive advantages was -5.767, the critical ratio of network centrality on ambidextrous combination was -2.992, and the critical ratio of ambidextrous combination on competitive advantages was 4.865, all of which exceeded the critical range (+-1.96). This indicated that the effect of tie strength/network centrality on competitive advantages and the effect of network centrality on ambidextrous combination were greater for manufacturing enterprises; however, the effect of ambidextrous combination on competitive advantages was greater for service enterprises.

4.8.2 Multigroup Analysis of Company Size

4.8.2.1 Multigroup Confirmatory Factor Analysis of Company Size

The process of multigroup analysis was followed for company size. First, we divided high-tech enterprises into companies with fewer than 300 employees and companies with more than 300 employees. Second, we labelled the standard regression weight of companies with fewer than 300 employees using mv1–mv35 and the standard regression weight of companies with more than 300 employees using sv1–sv35; the details are presented in Table 4.22. Third, the standard regression weight of companies with fewer than 300 employees were equal to the standard regression weight of companies with more than 300 employees, indicating that the standard regression weight of measured items had no significant differences between big companies and small companies; otherwise, there were no differences between companies with different sizes. The results are presented in Table 4.23 and Table 4.24.

Table 4.23 The Nested Model Comparison Assuming Group Variance to Be Corrected

Model	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
Group Variant	1522	1820.6	0	0.023	2220.6	-	-	-	-
Group Invariant	1557	1863.2	0	0.023	2193.2	-	-	-	-
Differences	35	42.635	0.176	-	-	0.004	0.005	0	0

Note: Group invariant means that the regression weights of enterprises with fewer than 300 employees equal the regression weights of enterprises with more than 300 employees; group variant means that the regression weights of enterprises including fewer than 300 employees are unequal to the regression weights of enterprises including more than 300 employees

From Table 4.23, it is apparent that the chi-square value of the group variant model was 1820.6 (df=1522) compared with the chi-square value of 1863.2 (df=1557) of the group invariant model. The difference in the chi-square values was 42.635 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were not significantly different. However, the RMSEA (0.023) and AIC (2220.6) of the group invariant model were slightly smaller than the RMSEA (0.023) and AIC (2193.2) of the group variant model, indicating that the group invariant model was more concise. The difference between the measured items is shown in Table 4.24.

As shown in Table 4.24, the standard regression weights of the measured items of companies with fewer than 300 employees ranged from 0.619 to 0.857 and were significant and the standard regression weights of the measured items of companies with more than 300 employees ranged from 0.572 to 0.906 and were significant, indicating that the standard regression weights of the measured items of companies with fewer than 300 employees were different from those of companies

with more than 300 employees. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

Table 4.24 Standardized Regression Weights between Companies with Fewer than 300 Employees and Companies with More than 300 Employees in CFA

Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ration
			Estimate	P	Estimate	P	
1	1	CA1<---CA	0.746	***	0.773	***	-
mv7	sv7	CA2<---CA	0.8	***	0.761	***	-1.32
mv6	sv6	CA3<---CA	0.791	***	0.67	***	-1.41
mv5	sv5	CA4<---CA	0.798	***	0.737	***	-1.16
mv4	sv4	CA5<---CA	0.786	***	0.751	***	-0.62
mv3	sv3	CA6<---CA	0.771	***	0.679	***	1.52
mv2	sv2	CA7<---CA	0.764	***	0.785	***	0.15
mv1	sv1	CA8<---CA	0.78	***	0.806	***	0.12
1	1	TS1<---TS	0.786	***	0.572	***	-
mv21	sv21	TS2<---TS	0.68	***	0.678	***	1.84
mv20	sv20	TS3<---TS	0.684	***	0.658	***	1.83
mv19	sv19	TS4<---TS	0.719	***	0.819	***	2.58
mv18	sv18	TS5<---TS	0.857	***	0.906	***	2.4
1	1	NC1<---NC	0.753	***	0.791	***	-
mv17	sv17	NC2<---NC	0.745	***	0.852	***	-0.63
mv16	sv16	NC3<---NC	0.763	***	0.766	***	-0.66

Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ratio
			Estimate	P	Estimate	P	
mv15	sv15	NC4<---NC	0.784	***	0.851	***	-0.44
mv14	sv14	NC5<---NC	0.751	***	0.8	***	-0.48
1	1	SC<---DC	0.788	***	0.767	***	-
mv22	sv22	AC<---DC	0.775	***	0.711	***	-0.476
mv23	sv23	IR<---DC	0.758	***	0.759	***	-1.49
1	1	SC1<---SC	0.765	***	0.781	***	-
mv24	sv24	SC2<---SC	0.736	***	0.786	***	-0.039
mv25	sv25	SC3<---SC	0.835	***	0.841	***	-0.518
mv26	sv26	SC4<---SC	0.822	***	0.785	***	-0.884
1	1	AC1<---AC	0.76	***	0.727	***	-
mv27	sv27	AC2<---AC	0.7	***	0.698	***	0.099
mv28	sv28	AC3<---AC	0.803	***	0.8	***	0.471
mv29	sv29	AC4<---AC	0.769	***	0.774	***	0.406
mv30	sv30	AC5<---AC	0.753	***	0.807	***	0.248
1	1	IR1<---IR	0.82	***	0.707	***	-
mv31	sv31	IR2<---IR	0.745	***	0.72	***	1.823
mv32	sv32	IR3<---IR	0.746	***	0.69	***	0.999
mv33	sv33	IR4<---IR	0.729	***	0.844	***	2.874
mv34	sv34	IR5<---IR	0.813	***	0.774	***	1.568
mv35	sv35	IR6<---IR	0.794	***	0.757	***	1.48

	Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ration
				Estimate	P	Estimate	P	
1	1		ERI1<---ERI	0.806	***	0.698	***	-
mv13	sv13		ERI2<---ERI	0.619	***	0.749	***	1.27
mv12	sv12		ERI3<---ERI	0.688	***	0.748	***	1.16
mv11	sv11		ERI4<---ERI	0.729	***	0.839	***	1.64
1	1		EII1<---EII	0.765	***	0.832	***	-
mv10	sv10		EII2<---EII	0.62	***	0.753	***	0.94
mv9	sv9		EII3<---EII	0.706	***	0.681	***	-0.68
mv8	sv8		EII4<---EII	0.793	***	0.859	***	-1.43

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; IR = integration and reconstruction capability; AC = absorptive capability; SC = sensing capability; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

The results of the pairwise parameter comparisons are also shown in Table 4.24. It could be seen that the critical ratios of TS4, TS5, and TS4 were 2.58, 2.4, and 2.874 between companies with different sizes, respectively, all of them exceeding the critical value (1.96), which indicated that TS4, TS5, and IR4 were significantly different between companies with fewer than 300 employees and companies with more than 300 employees. Therefore, the difference in TS4, TS5, and IR4 needed to be considered in the path analysis.

4.8.2.2 Multigroup Path Analysis of Company Scale

The labels of the path coefficients for companies with fewer than 300 employees and companies with more than 300 employees are presented in Table 4.25.

Table 4.25 Parameter Settings of the Multigroup Path Analysis of the Company Scale Category in the Different Models

Path	SEM-ERI-EII		SEM-BD			SEM-CD		
	Manufacturing	Service	Path	Manufacturing	Service	Path	Manufacturing	Services
CA<---	m3	s3	CA<---	m3	s3	CA<--	m2	s2
TS			TS			-TS		
CA<---	m7	s7	CA<---	m6	s6	CA<--	m5	s5
NC			NC			-NC		
DC<---	m1	s1	DC<---	m1	s1	DC<--	m1	s1
TS			TS			-TS		
DC<---	m5	s5	DC<---	m4	s4	DC<--	m4	s4
NC			NC			-NC		
CA<---	m10	s10	CA<---	m8	s8	CA<--	m7	s7
DC			DC			-DC		
ERI<---	m2	s2	BD<---	m2	s2	CD<--	m3	s3
TS			TS			-TS		
ERI<---	m6	s6	BD<---	m5	s5	CD<--	m6	s6
NC			NC			-NC		
CA<---	m12	s12	CA<---	m9	s9	CA<--	m9	s9
ERI			BD			-CD		
EII<---	m4	s4	BD<---	m7	s7	CD<--	m8	s8
TS			DC			-DC		
EII<---	m8	s8	-	-		-	-	
NC								
CA<---	m13	s13	-	-		-	-	
EII								
ERI<---	m9	s9	-	-		-	-	
DC								
EII<---	m11	s11	-	-		-	-	
DC								
Group	mv (1-17,20-32,34-35)		Group	mv (1-7,14-17,20-32,34-35)		Group	mv (1-7,14-17,20-32,34-35)	
Variant	= sv (1-17,20-32,34-35)		Variant	= sv (1-7,14-17,20-32,34-35)		Variant	= sv (1-7,14-17,20-32,34-35)	
Group	mv (1-17,20-32,34-35)		Group	mv (1-7,14-17,20-32,34-35)		Group	mv (1-7,14-17,20-32,34-35)	
Invariant	= sv (1-17,20-32,34-35)		Invariant	= sv (1-7,14-17,20-32,34-35)		Invariant	= sv (1-7,14-17,20-32,34-35)	

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; BD = ambidextrous balance; CD = ambidextrous combination; CA = competitive advantage

From Table 4.25, in the SEM-ERI-EII model, we set the group variant with mv (1-17,20-32,34-35) equal to sv (1-17,20-32,34-35), while we set the group invariant with mv (1-17,20-32,34-35) equal to sv (1-17,20-32,34-35) and m (1-13) equal to s (1-13). Similarly, in the SEM-BD model and the SEM-CD model, we set the group variant with mv (1-7,14-17,20-32,34-35) equal to sv (1-7,14-17,20-32,34-35), while we set the group invariant with mv (1-7,14-17,20-32,34-35) equal to sv (1-7,14-17,20-32,34-35) and m (1-9) was equal to s (1-9). The fitness of the different models is shown in Table 4.26.

Table 4.26 The Nested Model Comparison Assuming the Group Variant to Be Corrected

Model	Group	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
SEM-ERI-EII	variant	1556	1886.9	0	0.024	2218.9	-	-	-	-
	invariant	1567	1902	0	0.024	2212	-	-	-	-
	Differences	11	15.153	0.176	-	-	0.001	0.002	0.000	0.000
SEM-BD	variant	1056	1230.2	0	0.021	1498.2	-	-	-	-
	invariant	1065	1239.5	0	0.021	1489.5	-	-	-	-
	Differences	9	9.323	0.408	-	-	0.001	0.001	0.000	0.000
SEM-CD	variant	1056	1235.8	0	0.021	1503.8	-	-	-	-
	invariant	1065	1247.7	0	0.021	1497.7	-	-	-	-
	Differences	9	11.875	0.220	-	-	0.001	0.002	0.000	0.000

From Table 4.26, it could be seen that, in the SEM-ERI-EII model, the chi-square value of the group variant model was 1886.9 (df=1556) compared with the chi-square value of 1902 (df=1557) in the group invariant model. The difference was 15.153 and insignificant at the 0.05 confidence level, which indicated that there was no significant difference between the fitness of the group variant model and that of the

group invariant model. Besides, the RMSEA (0.024) and AIC (2218.9) of the group variant model were slightly larger than the RMSEA (0.024) and AIC (2212) of the group invariant model, indicating that the group invariant model was more concise.

In the SEM–BD model, the chi-square value in the group variant model was 1230.2 (df=1056) compared with the chi-square value of 1239.5 (df=1065) in the group invariant model. The difference was 9.323 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model had no significant difference. Besides, the AIC (1498.2) of the group variant model was slightly smaller than the AIC (1489.5) of the group invariant model, indicating that the group invariant model was more concise than the group variant model.

In the SEM–CD model, the chi-square value in the group variant model was 1235.8 (df=1056) compared with the chi-square value of 1247.7 (df=1065) in the group invariant model, and the difference in the chi-square values was 11.875 and insignificant at the 0.05 confidence level. This indicated that the fitness of the group variant model and that of the group invariant model had no significant difference. Besides, the AIC (1503.8) of the group variant model was equal to or slightly larger than the AIC (1497.7) of the group invariant model, indicating that the group invariant model was more concise than the group variant model.

In short, the group invariant model was better than the group invariant model regarding the company scale. The differences between the companies with fewer than 300 employees and those with more than 300 employees in the different models are shown in Table 4.27, Table 4.28, and Table 4.29.

Table 4.27 The Difference in Standardized Regression Weights between Companies with Fewer than 300 Employees and Companies with More than 300 Employees in the SEM–ERI–EII Model

Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ration
			Estimat e	P	Estimat e	P	
m3	s3	CA<---TS	0.178	0.001	0.201	0.006	0.285
m7	s7	CA<---NC	0.178	0.002	0.27	***	0.227
m1	s1	DC<---TS	0.368	***	0.348	0.002	0.177
m5	s5	DC<---NC	0.168	0.065	0.339	0.002	0.88
m10	s10	CA<---DC	0.233	0.002	0.295	***	0.29
m2	s2	ERI<---TS	-0.04	0.659	0.079	0.499	0.806
m6	s6	ERI<---NC	0.268	0.002	0.267	0.021	-0.215
m12	s12	CA<---ERI	0.402	***	0.235	***	-2.753
m4	s4	EII<---TS	-0.053	0.52	0.139	0.216	1.393
m8	s8	EII<---NC	0.323	***	0.318	0.005	-0.059
m13	s13	CA<---EII	0.199	0.003	0.41	***	1.22
m9	s9	ERI<---DC	0.431	***	0.039	0.78	-2.2
m11	s11	EII<---DC	0.572	***	0.003	0.981	-3.1

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

From the table presented above, it is apparent that, in the SEM–ERI–EII model, the path coefficients of companies with fewer than 300 employees ranged from -0.053 to 0.431 and the path coefficients of companies with more than 300 employees ranged from 0.003 to 0.41, indicating that the path coefficients differed between enterprises of different sizes. However, whether these differences were significant should be checked using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ration of network centrality on exploratory innovation was -2.753, the critical ration of dynamic capabilities on exploratory innovation was -2.2, and the critical ration of dynamic capabilities on exploitative innovation was -3.1; all of these exceeded the critical value (+-1.96), which indicated that the path coefficients were significantly different between companies with fewer than 300 employees and companies with more than 300 employees. In detail, the effect of network centrality on exploratory innovation and the effect of dynamic capabilities on exploratory innovation/exploitative innovation were greater for companies with fewer than 300 employees. Besides, there was no significant difference between the other path coefficients in the SEM–ERI–EII model.

Table 4.28 The Differences in Standardized Regression Weights between Companies with Fewer than 300 Employees and Companies with More than 300 Employees in the SEM–BD Model

Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ration
			Estimate	P	Estimate	P	
m3	s3	CA<---TS	0.266	***	0.365	***	1.029
m6	s6	CA<---NC	0.363	***	0.472	***	-0.137
m1	s1	DC<---TS	0.363	***	0.349	0.002	0.207
m4	s4	DC<---NC	0.171	0.058	0.338	0.002	0.829
m8	s8	CA<---DC	0.439	***	0.364	***	-0.96
m2	s2	BD<---TS	0.36	***	0.251	0.018	-0.226
m5	s5	BD<---NC	0.079	0.342	0.072	0.485	-0.1
m9	s9	CA<---BD	-0.265	***	-0.381	***	-0.57
m7	s7	BD<---DC	-0.177	0.027	0.179	0.154	2.315

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; BD = ambidextrous balance; CA = competitive advantage

From Table 4.28, it could be seen that, in the SEM–BD model, the path coefficients of companies with fewer than 300 employees ranged from -0.265 to 0.439 and the path coefficients of companies with more than 300 employees ranged from -0.381 to 0.472, indicating that the path coefficients of companies with fewer than 300 employees were different from those of companies with more than 300 employees. However, whether these differences were significant required checking using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ration of dynamic capabilities on ambidextrous balance was 2.315 and exceeded 1.96, which indicated that the effect of dynamic capabilities on ambidextrous balance was greater for companies with more than 300 employees. Besides, there was no significant difference between other path coefficients in the SEM–BD model.

Table 4.29 The Differences in Standardized Regression Weights between Companies with Fewer than 300 Employees and Companies with More than 300 Employees in the SEM–CD Model

Fewer than 300	More than 300	Path	Fewer than 300		More than 300		Critical Ration
			Estimate	P	Estimate	P	
m2	s2	CA<---TS	0.172	0.002	0.193	0.007	0.306
m5	s5	CA<---NC	0.206	***	0.3	***	0.226
m1	s1	DC<---TS	0.36	***	0.348	0.002	0.206
m4	s4	DC<---NC	0.173	0.055	0.339	0.002	0.821
m7	s7	CA<---DC	0.277	***	0.297	***	-0.036
m3	s3	CD<---TS	-0.001	0.985	0.149	0.159	1.242
m6	s6	CD<---NC	0.301	***	0.291	0.005	-0.262
m9	s9	CA<---CD	0.451	***	0.492	***	-0.794
m8	s8	CD<---DC	0.464	***	0.005	0.969	-2.81

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; CD = ambidextrous combination; CA = competitive advantage

The table presented above shows that, in the SEM–CD model, the path coefficients of companies with fewer than 300 employees ranged from -0.001 to 0.464 and the path coefficients of companies with more than 300 employees ranged from 0.005 to 0.492, indicating that the path coefficients of companies with fewer than 300 employees were different from those of companies with more than 300 employees. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ration of dynamic capabilities on ambidextrous combination was -2.81 and exceeded 1.96, which indicated that the effect of dynamic capabilities on ambidextrous combination was greater for companies with fewer than 300 employees. Besides, there was no significant difference between other path coefficients in the SEM–CD model.

4.8.3 The Multigroup Analysis of Enterprise Age

4.8.3.1 The Multigroup Confirmatory Factor Analysis of Enterprise Age

The process of multigroup analysis of enterprise age was as follows. First, we divided high-tech enterprises into companies less than 5 years old and companies more than 5 years old. Second, we labelled the standard regression weight of companies less than 5 years old using mv1–mv35 and the standard regression weight of companies more than 5 years old using sv1–sv35; the details are presented in Table 4.29. Third, the standard regression weight of companies less than 5 years old was equal to the standard regression weight of companies more than 5 years old, indicating that the standard regression weight of the measured items was no different between companies less than 5 years old and companies more than 5 years old; otherwise, differences was insignificant. The different models' fitness is presented in Table 4.30 and Table 4.31.

Table 4.30 The Nested Model Comparison Assuming the Group Variance to Be Corrected

Model	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
Group Variant	1522	1885.5	0	0.025	2285.5	-	-	-	-
Group Invariant	1557	1923.5	0	0.025	2253.5	-	-	-	-
Differences	35	37.929	0.337	-	-	0.004	0.004	-0.001	-0.001

Note: Group invariant means that the regression weights of companies less than 5 years old equal the regression weights of companies more than 5 years old; group variant means that the regression weights of companies less than 5 years old are unequal to the regression weights of companies more than 5 years old

From Table 4.30, it is apparent that the chi-square value in the group variant model was 1885.5 (df=1522) compared with the chi-square value of 1923.5 (df=1557) in the group invariant model. The difference was 37.929 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were not significantly different. However, the AIC (2285.5) of the group invariant model was slightly larger than the AIC (2153.5) of the group variant model, indicating that the group invariant model was more concise. The difference between the measured items is shown in Table 4.31.

Table 4.31 Standardized Regression Weights between Companies Less than 5 Years Old and Companies More than 5 Years Old in the CFA Model

Less than 5 Years	More than 5 Years	Path	Less than 5 Years		More than 5 Years		Critical Ratio
			Estimate	P	Estimate	P	
1	1	CA1<---CA	0.794	***	0.714	***	-
mv7	sv7	CA2<---CA	0.861	***	0.72	***	-0.87

Less than 5 Years	More than 5 Years	Path	Less than 5 Years		More than 5 Years		Critical Ratio
			Estimate	P	Estimate	P	
mv6	sv6	CA3<---CA	0.804	***	0.716	***	0.21
mv5	sv5	CA4<---CA	0.777	***	0.786	***	1.23
mv4	sv4	CA5<---CA	0.789	***	0.754	***	0.59
mv3	sv3	CA6<---CA	0.728	***	0.768	***	1.78
mv2	sv2	CA7<---CA	0.797	***	0.744	***	0.21
mv1	sv1	CA8<---CA	0.791	***	0.79	***	1.48
1	1	TS1<---TS	0.788	***	0.678	***	-
mv21	sv21	TS2<---TS	0.717	***	0.64	***	0.14
mv20	sv20	TS3<---TS	0.69	***	0.679	***	1.49
mv19	sv19	TS4<---TS	0.762	***	0.735	***	1.29
mv18	sv18	TS5<---TS	0.85	***	0.888	***	1.54
1	1	NC1<---NC	0.751	***	0.782	***	-
mv17	sv17	NC2<---NC	0.757	***	0.804	***	-0.02
mv16	sv16	NC3<---NC	0.751	***	0.778	***	0.47
mv15	sv15	NC4<---NC	0.845	***	0.761	***	-1.31
mv14	sv14	NC5<---NC	0.828	***	0.717	***	-1.15
1	1	SC<---DC	0.745	***	0.827	***	-
mv22	sv22	AC<---DC	0.742	***	0.746	***	0.485
mv23	sv23	IR<---DC	0.81	***	0.728	***	-0.803
1	1	SC1<---SC	0.739	***	0.788	***	-

Less than 5 Years	More than 5 Years	Path	Less than 5 Years		More than 5 Years		Critical Ration
			Estimate	P	Estimate	P	
mv24	sv24	SC2<---SC	0.729	***	0.767	***	-0.289
mv25	sv25	SC3<---SC	0.816	***	0.857	***	0.739
mv26	sv26	SC4<---SC	0.806	***	0.81	***	-0.179
1	1	AC1<---AC	0.735	***	0.758	***	-
mv27	sv27	AC2<---AC	0.68	***	0.701	***	-0.468
mv28	sv28	AC3<---AC	0.832	***	0.785	***	-0.273
mv29	sv29	AC4<---AC	0.767	***	0.77	***	-0.14
mv30	sv30	AC5<---AC	0.785	***	0.76	***	-0.673
1	1	IR1<---IR	0.742	***	0.811	***	-
mv31	sv31	IR2<---IR	0.754	***	0.732	***	-0.251
mv32	sv32	IR3<---IR	0.736	***	0.726	***	-0.555
mv33	sv33	IR4<---IR	0.716	***	0.789	***	0.569
mv34	sv34	IR5<---IR	0.856	***	0.766	***	-1.33
mv35	sv35	IR6<---IR	0.805	***	0.776	***	-0.98
1	1	ERI1<---ERI	0.791	***	0.762	***	-
mv13	sv13	ERI2<---ERI	0.685	***	0.626	***	0.69
mv12	sv12	ERI3<---ERI	0.66	***	0.744	***	1.64
mv11	sv11	ERI4<---ERI	0.766	***	0.751	***	0.82
1	1	EII1<---EII	0.807	***	0.776	***	-
mv10	sv10	EII2<---EII	0.665	***	0.67	***	0.49

Less than 5 Years	More than 5 Years	Path	Less than 5 Years		More than 5 Years		Critical Ration
			Estimate	P	Estimate	P	
mv9	sv9	EII3<---EII	0.78	***	0.63	***	-1.36
mv8	sv8	EII4<---EII	0.824	***	0.801	***	-0.32

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; IR = integration and reconstruction capability; AC = absorptive capability; SC = sensing capability; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

As is evident in Table 4.31, the standard regression weights of the measured items of companies less than 5 years old ranged from 0.66 to 0.861 and were significant and the standard regression weights of the measured items of companies more than 5 years old ranged from 0.626 to 0.888 and were significant, indicating that the standard regression weights of the measured items of companies with less than 5 years were different from those of companies with more than 5 years. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ratios of the measured items ranged from -1.15 to 1.64 and were within ± 1.96 , which indicated that all the standard regression weights of items were no different between companies less than 5 years old and companies more than 5 years old. Therefore, it was not necessary to consider the differences in the measured items in the path analysis.

4.8.3.2 The Multigroup Path Analysis of Enterprise Age

The labels of the path coefficients for companies less than 5 years old and companies more than 5 years old are presented in Table 4.32.

Table 4.32 The Parameter Settings of the Multigroup Path Analysis of Enterprise Age in Different Models

Path	SEM-ERI-EII		SEM-BD		SEM-CD			
	Manufacturing	Services	Path	Manufacturing	Services	Path	Manufacturing	Services
CA<---TS	m3	s3	CA<---TS	m3	s3	CA<---TS	m2	s2
CA<---NC	m7	s7	CA<---NC	m6	s6	CA<---NC	m5	s5
DC<---TS	m1	s1	DC<---TS	m1	s1	DC<---TS	m1	s1
DC<---NC	m5	s5	DC<---NC	m4	s4	DC<---NC	m4	s4
CA<---DC	m10	s10	CA<---DC	m8	s8	CA<---DC	m7	s7
ERI<---TS	m2	s2	BD<---TS	m2	s2	CD<---TS	m3	s3
ERI<---NC	m6	s6	BD<---NC	m5	s5	CD<---NC	m6	s6
CA<---ERI	m12	s12	CA<---BD	m9	s9	CA<---CD	m9	s9
EII<---TS	m4	s4	BD<---DC	m7	s7	CD<---DC	m8	s8
EII<---NC	m8	s8	-	-	-	-	-	-
CA<---EII	m13	s13	-	-	-	-	-	-
ERI<---DC	m9	s9	-	-	-	-	-	-
EII<---DC	m11	s11	-	-	-	-	-	-
Group Variant	mv (1-35) = sv (1-35)		Group Variant	mv (1-7,14-35) = sv (1-7,14-35)		Group Variant	mv (1-7,14-35) = sv (1-7,14-35)	
Group Invariant	mv (1-35) = sv (1-35) and m (1-13) = s (1-13)		Group Invariant	mv (1-7,14-35) = sv (1-7,14-35) and m (1-9) = s (1-9)		Group Invariant	mv (1-7,14-35) = sv (1-7,14-35) and m (1-9) = s (1-9)	

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; BD = ambidextrous balanced; CD = ambidextrous combination; CA = competitive advantage

From Table 4.32, in the SEM–ERI–EII model, we set the group variant with mv (1–35) equal to sv (1–35), the group invariant with mv (1–35) equal to sv (1–35), and m (1–13) equal to s (1–13). Similarly, in the SEM–BD model and the SEM–CD model, we set the group variant with mv (1–35) equal to sv (1–35), the group invariant with mv (1–35) equal to sv (1–35), and m (1–9) equal to s (1–9). The fitness of the group variant model and that of the group invariant model in the different models are shown in Table 4.33.

Table 4.33 The Nested Model Comparison Assuming the Group Variance to Be Corrected

Model	Group	DF	CMIN	P	RMSEA	AIC	NFI	IFI	RFI	TLI
SEM–ERI–EII	Group variant	1559	1970.8	0	0.026	2296.8	-	-	-	-
	Group invariant	1572	1986.5	0	0.026	2286.5	-	-	-	-
	Differences	13	15.737	0.264	-	-	0.002	0.002	0	0
SEM–BD	Group variant	1059	1297.7	0	0.024	1559.7	-	-	-	-
	Group invariant	1068	1302.7	0	0.024	1546.7	-	-	-	-
	Differences	9	5.016	0.833	-	-	0.001	0.001	-0.001	-0.001
SEM–CD	Group variant	1059	1306.4	0	0.025	1568.4	-	-	-	-
	Group invariant	1068	1312.3	0	0.024	1556.3	-	-	-	-
	Differences	9	5.877	0.752	-	-	0.001	0.001	-0.001	-0.001

Note: Group invariant means that the regression weights of companies less than 5 years old equal the regression weights of companies more than 5 years old; group variant means that the regression weights of companies less than 5 years old are unequal to the regression weights of companies more than 5 years old

From the table presented above, it could be seen that, in the SEM–ERI–EII model, the chi-square value of the group variant model was 1970.8 (df=1559) compared with the chi-square value of 1986.5 (df=1572) in the group invariant model. The difference in the chi-square values was 15.737 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were no different. Besides, the AIC (2296.8) of the group variant model was slightly larger than the AIC (2286.5) of the group invariant model, indicating that the group invariant model was more concise.

In the SEM–BD model, the chi-square value of the group variant model was 1297.7 (df=1059) compared with the chi-square value of 1302.7 (df=1068) in the group invariant model. The difference was 5.016 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were the same. Besides, the AIC (1559.7) of the group variant model was slightly smaller than the AIC (1546.7) of the group invariant model, indicating that the group invariant model was more concise than the group variant model.

In the SEM–CD model, the chi-square value of the group variant model was 1306.4 (df=1059) compared with the chi-square value of 1312.3 (df=1068) in the group invariant model. The difference in the chi-square values was 5.877 and insignificant at the 0.05 confidence level, which indicated that the fitness of the group variant model and that of the group invariant model were the same. Besides, the RMSEA (0.025) and AIC (1568.4) of the group variant model were slightly larger than the RMSEA (0.024) and AIC (1556.3) of the group invariant model, indicating that the group invariant model was more concise and had better fitness than the group variant model.

In short, the group invariant model with no differences between companies less than 5 years old and companies more than 5 years old was better than the group variant model. The differences between companies less than 5 years old and companies more than 5 years old in the different models are shown in Table 4.34, Table 4.35, and Table 4.36.

Table 4.34 The Differences in Regression Weights between Enterprises Less than 5 Years Old and Enterprises More than 5 Years Old in the SEM-ERI-EII Model

Less than 5 Years Old	More than 5 Years Old	Path	Less than 5 Years Old		More than 5 Years Old		C.R.
			Estimate	P	Estimate	P	
m3	s3	CA<---TS	0.226	***	0.155	0.002	-0.841
m7	s7	CA<---NC	0.171	0.011	0.222	***	0.39
m1	s1	DC<---TS	0.387	***	0.322	***	0
m5	s5	DC<---NC	0.136	0.191	0.289	***	1.294
m10	s10	CA<---DC	0.211	0.008	0.323	***	0.65
m2	s2	ERI<---TS	0.052	0.64	-0.008	0.928	-0.412
m6	s6	ERI<---NC	0.314	0.002	0.164	0.056	-1.104
m12	s12	CA<---ERI	0.434	***	0.263	***	-2.503
m4	s4	EII<---TS	0.105	0.291	-0.036	0.671	-1.07
m8	s8	EII<---NC	0.256	0.005	0.3	***	0.244
m13	s13	CA<---EII	0.197	0.007	0.319	***	1.23
m9	s9	ERI<---DC	0.177	0.109	0.439	***	1.65
m11	s11	EII<---DC	0.428	***	0.362	***	-0.8

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; CA = competitive advantage

Table 4.34 shows that, in the SEM–ERI–EII model, the path coefficients of companies less than 5 years old ranged from 0.052 to 0.434 and the path coefficients of companies more than 5 years old ranged from -0.036 to 0.439, indicating that the path coefficients of companies less than 5 years old were different from those of companies more than 5 years old. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that the critical ration of the path coefficient between exploratory innovation and competitive advantage was -2.503 and exceeded the critical range, which was from -1.96 to 1.96, indicating that the effect of exploratory innovation on competitive advantages was different between companies less than 5 years old and companies more than 5 years old. There was no significant difference between the other path coefficients in the SEM–ERI–EII model.

From Table 4.35, it could be seen that, in the SEM–BD model, the path coefficients of companies less than 5 years old ranged from -0.327 to 0.389 and the path coefficients of companies more than 5 years old ranged from -0.278 to 0.496, indicating that the path coefficients of companies less than 5 years old were different from those of companies more than 5 years old. However, whether these differences were significant should be checked using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

Table 4.35 The Differences in Regression Weights between Enterprises Less than 5 Years Old and Enterprises More than 5 Years Old in the SEM–BD Model

Less than 5 Years Old	More than 5 Years Old	Path	Less than 5 Years Old		More than 5 Years Old		C.R.
			Estimate	P	Estimate	P	
m3	s3	CA<---TS	0.374	***	0.246	***	-1.274
m6	s6	CA<---NC	0.371	***	0.386	***	-0.217
m1	s1	DC<---TS	0.389	***	0.318	***	-0.058
m4	s4	DC<---NC	0.134	0.195	0.291	***	1.33
m8	s8	CA<---DC	0.323	***	0.496	***	0.99
m2	s2	BD<---TS	0.3	0.004	0.324	***	0.36
m5	s5	BD<---NC	0.067	0.477	0.108	0.179	0.315
m9	s9	CA<---BD	-0.327	***	-0.278	***	0.923
m7	s7	BD<---DC	-0.038	0.711	-0.076	0.387	-0.24

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; BD = ambidextrous balance; CA = competitive advantage

The results of the pairwise parameter comparisons showed that all the critical ratios of the path coefficient ranged from -1.274 to 0.923 and were within the critical value (+/-1.96), which indicated that there was no difference between companies less than 5 years old and companies more than 5 years old in the SEM–BD model.

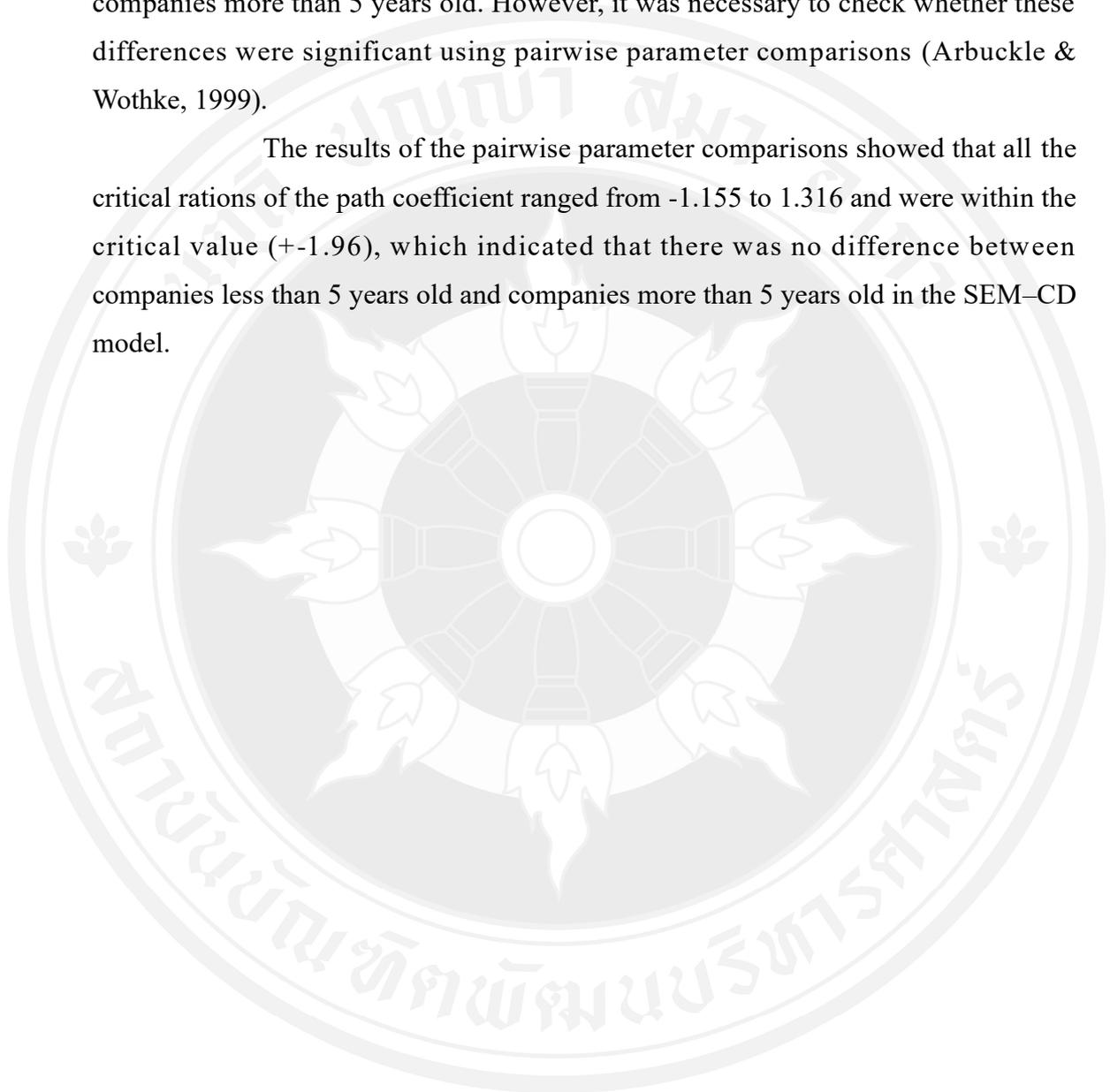
Table 4.36 The Differences in Regression Weights between Enterprises Less than 5 Years Old and Enterprises More than 5 Years Old in the SEM-CD Model

Less than 5 Years Old	More than 5 Years Old	Path	Less than 5 Years Old		More than 5 Years Old		C.R
			Estimate	P	Estimate	P	
m2	s2	CA<---TS	0.216	0.001	0.148	0.003	-0.824
m5	s5	CA<---NC	0.204	0.002	0.25	***	0.309
m1	s1	DC<---TS	0.385	***	0.318	***	-0.04
m4	s4	DC<---NC	0.137	0.186	0.292	***	1.316
m7	s7	CA<---DC	0.206	0.004	0.362	***	1.147
m3	s3	CD<---TS	0.125	0.182	0.013	0.86	-0.887
m6	s6	CD<---NC	0.298	***	0.247	0.001	-0.473
m9	s9	CA<---CD	0.486	***	0.436	***	-1.155
m8	s8	CD<---DC	0.267	0.005	0.358	***	0.487

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; CD = ambidextrous combination; CA = competitive advantage

Table 4.36 shows that, in the SEM–CD model, the path coefficients of companies less than 5 years old ranged from 0.137 to 0.486 and the path coefficients of companies more than 5 years old ranged from 0.013 to 0.436, indicating that the path coefficients of companies less than 5 years old were different from those of companies more than 5 years old. However, it was necessary to check whether these differences were significant using pairwise parameter comparisons (Arbuckle & Wothke, 1999).

The results of the pairwise parameter comparisons showed that all the critical ratios of the path coefficient ranged from -1.155 to 1.316 and were within the critical value (+-1.96), which indicated that there was no difference between companies less than 5 years old and companies more than 5 years old in the SEM–CD model.



CHAPTER 5

DISCUSSION AND CONCLUSION

This chapter consists of four parts: section 1 presents the main results; section 2 discusses the results; section 3 summarizes the contribution; and section 4 concludes with the limitations and suggestions for future research.

5.1 Main Results

In dynamic environments, enterprises that want to gain a competitive advantage not only need to integrate their internal resources but also need to obtain resources from other enterprises through enterprise networks. Nowadays, more and more enterprises are joining enterprise networks to break the resource constraint of enterprise boundaries and obtain more resources for strategic development or innovation. In this context, this study proposes a research framework to address the innovation dilemma of Chinese companies, enhance their environmental adaptability, and reveal the internal mechanism between enterprise networks and competitive advantages by examining the mediating effects of dynamic capabilities and ambidextrous innovation. The following questions were answered to achieve the research goals: how do enterprise networks affect the competitive advantages of Chinese companies, what role do dynamic capabilities and ambidextrous innovation play between enterprise networks and competitive advantages, and do path differences exist between different companies? As shown in Table 5.1, 14 of the 23 research hypotheses were supported and 9 were rejected. In detail, the mediating effects of dynamic capabilities and ambidextrous combination were supported by this study, but the mediating effect of ambidextrous balance was rejected.

Table 5.1 The Summary of the Hypotheses' Results

Questions	Numbers	Hypotheses	Results
H1	H1a	Tie strength has a positive effect on competitive advantages;	Supported
	H1b	Network centrality has a positive effect on competitive advantages;	Supported
H2	H2a	Tie strength has a positive effect on dynamic capabilities;	Supported
	H2b	Network centrality has a positive effect on dynamic capabilities;	Supported
	H2c	Dynamic capabilities have a positive effect on competitive advantages;	Supported
H2	H2d	The relationship between tie strength and competitive advantages is mediated by dynamic capabilities;	Supported
	H2e	The relationship between network centrality and competitive advantages is mediated by dynamic capabilities;	Supported
H3	H3a	Tie strength has a positive effect on ambidextrous balance;	Rejected
	H3b	Tie strength has a positive effect on ambidextrous combination;	Rejected
	H3c	Network centrality has a positive effect on ambidextrous balance;	Rejected
	H3d	Network centrality has a positive effect on ambidextrous combination;	Supported
	H3e	Ambidextrous balance has a positive effect on competitive advantages;	Supported
	H3f	Ambidextrous combination has a positive effect on competitive advantages;	Supported
	H3g	The relationship between tie strength and competitive advantages is mediated by ambidextrous balance;	Rejected
	H3h	The relationship between tie strength and competitive advantages is mediated by ambidextrous combination;	Rejected
	H3i	The relationship between network centrality and competitive advantages is mediated by ambidextrous balance;	Rejected
	H3j	The relationship between network centrality and competitive advantages is mediated by ambidextrous combination;	Supported
H4	H4a	Dynamic capabilities have a positive effect on ambidextrous	Rejected

Questions	Numbers	Hypotheses	Results
		balance;	
	H4b	Dynamic capabilities have a positive effect on ambidextrous combination;	Supported
	H4c	The relationship between tie strength and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous balance;	Rejected
	H4d	The relationship between tie strength and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous combination;	Supported
	H4e	The relationship between network centrality and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous balance;	Rejected
	H4f	The relationship between network centrality and competitive advantages is mediated by the interaction of dynamic capabilities and ambidextrous combination.	Supported

Furthermore, to understand better the differences between different enterprises, this study conducted a multi-group analysis of the industry category, enterprise size, and enterprise age. The results of the multi-group analysis are presented in Table 5.2.

Table 5.2 The Conclusion of the Multigroup Analysis on the Industry Category, Company Scale Category, and Age Category in Different Models

Category	Model	Manufacturing	Services	Path	Manufacturing		Services		C.R.
		Num.	Num.		Estimate	p	Estimate	p	
Industry Category	CFA	mv11	sv11	ERI4<---ERI	0.781	***	0.752	**	2.74
	SEM-ERI-EII	m3	s3	CA<--TS	0.392	***	0.106	0.0	-4.19
		m7	s7	CA<--NC	0.565	***	0.138	0.0	-5.5
		m6	s6	ERI<--	0.52	***	0.11	0.1	-2.536

Category	Model	Manufacturing	Services	Path	Manufacturing		Services		C.R.
		Num.	Num.		Estimate	p	Estimate	p	
				--NC				69	
		m12	s12	CA<--	0.049	0.32	0.398	**	3.94
				-ERI		9		*	
		m8	s8	EII<--	0.466	***	0.17	0.0	-2.313
				-NC				26	
		m9	s9	ERI<-	0.146	0.22	0.396	**	1.998
				--DC		7		*	
SEM-		m3	s3	CA<--	0.474	***	0.256	**	-2.792
BD				-TS				*	
		m6	s6	CA<--	0.692	***	0.248	**	-6.128
				-NC				*	
		m8	s8	CA<--	0.287	***	0.497	**	2.196
				-DC				*	
SEM-		m2	s2	CA<--	0.394	***	0.105	0.0	-4.145
CD				-TS				4	
		m5	s5	CA<--	0.577	***	0.148	0.0	-5.767
				-NC				03	
		m6	s6	CD<--	0.525	***	0.162	0.0	-2.992
				-NC				21	
		m9	s9	CA<--	0.139	0.00	0.511	**	4.865
				-CD		7		*	
Category	Model	<300	>300	Path	<300		>300		C.R.
		Num.	Num.		Estimate	p	Estimate	p	
Scale	CFA	mv19	sv19	RI4<--	0.719	***	0.819	**	2.58
				-TS				*	
		mv18	sv18	RI5<--	0.857	***	0.906	**	2.4
				-TS				*	
		mv33	sv33	IR4<--	0.729	***	0.844	**	2.874
				-IR				*	
	SEM-	m12	s12	CA<--	0.402	***	0.235	**	-2.753
	ERI-EII			-ERI				*	
		m9	s9	ERI<-	0.431	***	0.039	0.7	-2.2
				--DC				8	
		m11	s11	EII<--	0.572	***	0.003	0.9	-3.1
				-DC				81	

Category	Model	Manufacturing	Services	Path	Manufacturing		Services		C.R.
		Num.	Num.		Estimate	p	Estimate	p	
	SEM-	m7	s7	BD<--	-0.177	0.02	0.179	0.1	2.315
				-DC		7		54	
	SEM-	m8	s8	CD<--	0.464	***	0.005	0.9	-2.81
				-DC				69	
Category	Model	<5	>5	Path	<5		>5		C.R.
		Num.	Num.		Estimate	p	Estimate	p	
Age	SEM-	m12	s12	CA<--	0.434	***	0.263	**	-2.503
Category	ERI-EII			-ERI				*	

Note: TS = tie strength; NC = network centrality; DC = dynamic capabilities; ERI = exploratory innovation; EII = exploitative innovation; BD = ambidextrous balance; CD = ambidextrous combination; CA = competitive advantage

In Table 5.2, we use yellow to mark the results related to the research question and blue to mark the results that were not related to the research question, which could be considered in the future; the other parts are duplicates. As we can see from the yellow markings, regarding the industry category, the impacts of enterprise networks on the competitive advantage and ambidextrous combination of manufacturing companies were significantly greater than that of service companies; however, the effects of dynamic capabilities and ambidextrous combination on competitive advantages were greater than those of manufacturing companies; in term of company size, dynamic capabilities have a greater impact on ambidextrous combination for companies with fewer than 300 employees.

5.2 Discussion

5.2.1 A Discussion on the Effects of Enterprise Networks on Competitive Advantages

All the research results are discussed in this section. In terms of the first

question concerning whether enterprise networks help Chinese enterprises, which advocate a collectivist culture, to gain a competitive advantage, our results showed that both tie strength and network centrality have significant positive effects on competitive advantages, rejecting the notion that structural hole theory is not suitable for China as it advocates collectivism (Batjargal, 2007). These results are consistent with most previous studies (Lin & Chen, 2015; Sechi, Borri, De Lucia, & Celmins, 2011); therefore, Chinese companies with high technical expertise should maintain frequent contact with other enterprises and build a core position in the network to obtain important resources that can generate competitive advantages. The establishment of high-tech zones by the Chinese Government to incubate companies with international competitiveness also demonstrates the confidence of the Chinese Government in enterprise network theories, such as “weak ties” and “structural holes”.

In addition, the positive effects of enterprise networks on manufacturing’s competitive advantages were greater than those on service enterprises, the reason possibly being that manufacturing enterprises are located at the centre of networks and can easily connect with upstream and downstream enterprises; therefore, they have the advantages of information control and information utilization (Owen-Smith & Powell, 2004), which enable them easily to gain a competitive advantage. Furthermore, important resources and invisible knowledge are only transmitted in strong relationship networks (Hansen, 1999); thus, maintaining close relationships with upstream and downstream enterprises ensures that manufacturing enterprises obtain key resources (Mentzer et al., 2001), making it is easier for them to gain a competitive advantage through enterprise networks.

5.2.2 A Discussion on the Mediating Effects of Dynamic Capabilities

Concerning the second question regarding the role that dynamic capabilities play between enterprise networks and competitive advantages, the results showed that dynamic capabilities enact partial mediation between enterprise networks and competitive advantages, which indicates that, as an external capability, dynamic capabilities are an important driving factor for the conversion of resources into competitive advantages (Gulati et al., 2000; Prahalad & Hamel, 1990) and explains

why companies with the same external resources have different operating results (Gulati et al., 2000). Therefore, Chinese companies should build dynamic capabilities to make full use of corporate social capital, especially Chinese high-tech enterprises.

The results of the multigroup analysis also showed that dynamic capabilities had a stronger promoting effect on the competitive advantages of service companies than on those of manufacturing companies. It is possible that service companies need to pay more attention to differentiation to meet the personalized needs of customers, causing them to enhance their flexibility (Sampson & Froehle, 2006); therefore, service companies have a higher incentive to develop their dynamic capabilities.

5.2.3 A Discussion on the Mediating Effects of Ambidextrous Innovation

Regarding the third question concerning the role that the two dimensions of ambidextrous innovation play between enterprise networks and competitive advantages, our results supported the mediating effect of ambidextrous combination and rejected the mediating effect of ambidextrous balance because the trust mechanisms formed by strong relationship networks provide a supporting organizational environment for ambidextrous innovation (Gibson & Birkinshaw, 2004; Pavlou & El Sawy, 2011). However, the turbulent legal systems and institutional systems make it difficult for enterprises to generate trust ties (Shu, Page, Gao, & Jiang, 2012) and inhibit the sharing of key resources and core knowledge transfer (Li, Zhuang, Liu, & Zhang, 2017). Hence, high-tech enterprises in this context find it difficult to obtain sufficient resources from strong ties to engage in ambidextrous innovation. This provides evidence supporting the result that tie strength had no significant effect on ambidextrous balance and ambidextrous combination. Thus, only maintaining strong ties with difficulty guarantees that a company can obtain sufficient resources to implement ambidextrous innovation but occupying a dominant position is important for enterprises to engage in ambidextrous innovation.

Although network centrality brings more resources for enterprises to try different types of innovation (Burt & Burzynska, 2017; Stuck et al., 2016), it might increase the difficulty of resource allocation, leading to an ambidextrous imbalance. Moreover, there is no need for enterprise managers to carry out ambidextrous innovation to deal with environmental risks under the condition of sufficient resources, which enable enterprise managers to focus on exploitation or exploration instead of ambidextrous innovation; therefore, network centrality may be negatively associated with ambidextrous balance. What surprises us additionally is that the effect of ambidextrous innovation on competitive advantages is lower than for companies engaging in exploitation or exploration, which is contrary to the view of Jansen (2006) and March (1991), who claimed that balanced exploitation or exploration could help enterprises to gain competitive advantages by improving the utilization efficiency of corporate sustainability (Atuahene-Gima, 2005; Sok & O'cass, 2015). A possible reason is that excessive ambidextrous balance or ambidextrous combination requires a longer time and higher labour costs, which lead to lower corporate performance (Menguc & Auh, 2008); besides, if enterprises that are focused on exploration suddenly introduce exploitation, it might destroy the original organizational structure or disrupt the existing organizational culture, which would deepen the contradiction of the two innovations and prevent enterprises from gaining benefits (Adler, Goldoftas, & Levine, 1999; Menguc & Auh, 2008). It also might be the case that a lower level of ambidextrous innovation cannot produce a leverage effect, or the long-term effect of ambidextrous innovation has not yet appeared (Atuahene-Gima, 2005). These arguments provide theoretical support for the smaller effect of ambidextrous innovation on competitive advantages.

Furthermore, concerning the result that network centrality has a greater influence on the ambidextrous combination of manufacturing enterprises, this may be because the manufacturing industry occupies the core position in the supply chain (Mentzer et al., 2001), enabling manufacturing enterprises to obtain more resources for ambidextrous combination easily by communicating with upstream and downstream enterprises. Regarding ambidextrous combination having a greater influence on the competitive advantages of service enterprises, this is possibly because the productions of service companies are susceptible to environmental

changes, requiring the flexibility generated by ambidextrous combination to meet the diverse needs of customers (Sampson & Froehle, 2006) These findings suggest that enterprises engage in ambidextrous combination instead of ambidextrous balance, especially service companies.

5.2.4 A Discussion on the Multiple Mediating Effects of Dynamic Capabilities and Ambidextrous Innovation

In term of the mediating effects of the interaction of dynamic capabilities and ambidextrous combination, the results showed that the relationship between enterprise networks and competitive advantages was mediated by the interaction of dynamic capabilities and ambidextrous combination but not by the interaction of dynamic capabilities and ambidextrous balance. This is because dynamic capabilities can absorb more resources, which can help enterprises to break path dependencies and create flexible organizational structures (Teece, 2007), giving them sufficient resources to achieve ambidextrous combination; therefore, those enterprises with strong dynamic capabilities are more likely to achieve ambidextrous combination, which is consistent with previous research (Judge & Blocker, 2008). However, the mediating effect of the interaction of dynamic capabilities and ambidextrous balance was rejected, which is contrary to the assumption of ambidextrous balance, which claims that ambidexterity is difficult for companies to achieve due to limited resources, path dependence, and organizational rigidity (Andriopoulos & Lewis, 2009; March, 1991); therefore, those companies with strong dynamic capabilities usually find it difficult to achieve ambidextrous balance. Overall, these findings suggest that Chinese high-tech enterprises with strong dynamic capabilities should engage in ambidextrous combination instead of ambidextrous balance.

The results of the group analysis also showed that only ambidextrous combination in small-size enterprises was promoted by dynamic capabilities. It may be that small-scale enterprises usually lack resources, which compels them to build dynamic capabilities (Mckelvie & Davidsson, 2009). Besides, the organizational structure of small-scale enterprises is relatively simple, which makes it easy to adjust the organizational structure quickly to meet the needs of ambidextrous innovation (Ebben & Johnson, 2005; Rice & Hamilton, 1979); therefore, ambidextrous

combination is easier for small enterprises to achieve. On the contrary, large enterprises are slow to respond to new opportunities due to their huge organizational structure (Cohen & Levinthal, 1990). This huge organizational structure of large enterprises renders it difficult for them to coordinate all their departments or all their resources in a short time to respond to changes. Thus, small enterprises with stronger dynamic capabilities can easily achieve ambidextrous combination through dynamic capabilities.

5.3 Academic Contribution

5.3.1 Academic Contribution

Overall, this study contributes to the extension of ambidexterity theory and dynamic capability theory by testing the relationship between enterprise networks, dynamic capabilities, ambidextrous innovation, and competitive advantages. Different from Batjargal (2007), who claimed that “the structural hole theory is also suitable for companies locating in countries that advocate individualist culture instead of companies locating in countries that advocate collectivist culture”, this study showed that network centrality has a positive effect on ambidextrous combination and competitive advantages, expanding the scope of enterprise network theory applications.

Moreover, this study clarified the internal mechanism between enterprise networks and competitive advantages from the dynamic capability and ambidextrous innovation perspectives and provided explanations for “why different companies have different competitive advantages with the same network resources”. Besides, our findings provide path support for ambidextrous combination by testing the full mediation of dynamic capabilities, which clarified the importance of dynamic capabilities to the process of solving the innovation dilemma.

5.3.2 Practical Contribution

The results of this study also provide insights for organization management. For corporate executives, our findings encourage them to strengthen their communication with other companies in the “business circle” to obtain corporate social capital that can significantly improve their performance, especially for Chinese manufacturing companies that occupy the central position in supply chains (Peng & Luo, 2000); resource sharing is also the purpose of the Chinese Government’s setting up of high-tech zones. Moreover, this study reminds corporate executives to build dynamic capabilities because whether key and invisible resources stored in the enterprise network can be obtained depends on the enterprise’s capability (Kemper et al., 2011). Therefore, dynamic capabilities are a crucial factor for engaging in ambidextrous combination or gaining competitive advantages (Judge & Blocker, 2008; Wei & Lau, 2012).

For high-tech zone managers, we suggest that they establish a “dialogue mechanism” with enterprises to promote resource sharing; moreover, high-tech zone managers need to build information exchange platforms to guide enterprises in sharing resources. We also remind high-tech zone managers to give priority admissions to service companies that lack innovative resources.

For government policies makers, we suggest that they guide different enterprises to achieve ambidextrous innovation. For instance, manufacturing enterprises with resource advantages should use policy incentives to promote their engagement in ambidextrous innovation, while service companies with high intentions to engage in ambidextrous innovation need sufficient resources; therefore, the Chinese Government should provide more knowledge resources by improving the training mechanism of innovative talents or promoting knowledge generation and sharing between companies. Besides, we suggest that the Chinese Government uses manufacturing companies as a pilot for ambidextrous innovation before fully promoting ambidextrous innovation.

5.4 Limitations and Future Research

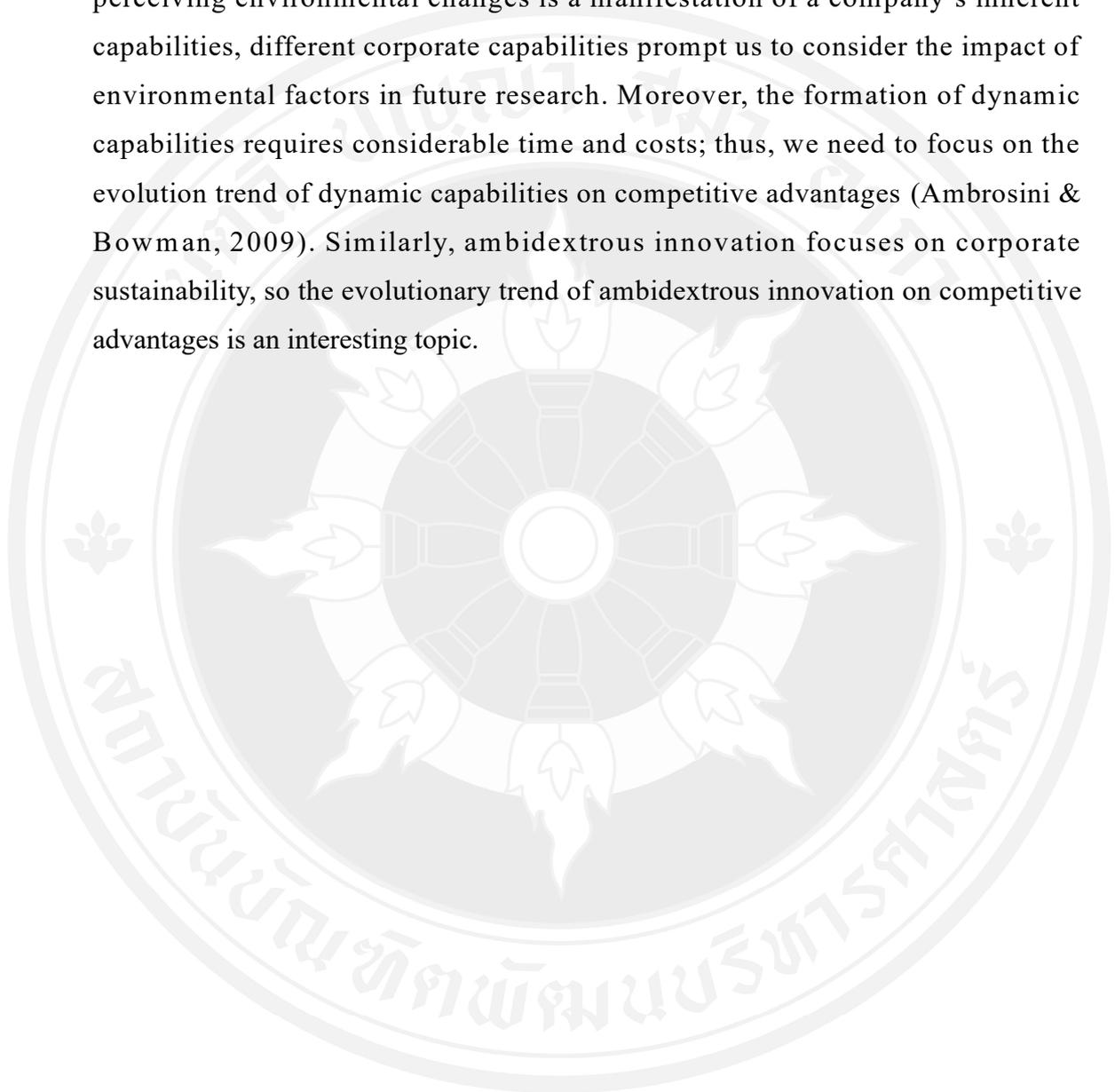
5.4.1 Limitations

In spite of the findings, there are limitations that need to be considered. In relation to the survey scope of the data, this study only collected samples from Beijing Zhongguancun and Shenzhen National High-Tech Zones, ignoring the impact of regional differences on enterprises, which may affect the generalizability of the research results. Regarding the collection method and quantity of questionnaires, this study distributed electronic questionnaires through WeChat and friends due to the COVID-19 pandemic, so the randomness of the samples could not be guaranteed. Concerning the data types, this study used cross-sectional data to test the hypotheses, making it difficult to predict the dynamic trends (Katz, 2001). For example, the positive effect of ambidextrous innovation on competitive advantages was lower than that of exploration or exploitation, so it is possible that the long-term effect of ambidextrous innovation has not been shown (Greener, 2008).

The characteristics of enterprise networks include tie characteristics, structural characteristics, and cognitive characteristics. Cognitive characteristics are susceptible to human factors and difficult to measure; therefore, this study ignored the effects of cognitive characteristics on competitive advantages, dynamic capabilities, and ambidextrous innovation. Besides, both dynamic capabilities and ambidextrous innovation are products of environmental changes, such as environmental dynamics and environmental competitiveness, but this study neglected the impact of environmental factors. Moreover, this study only investigated the static relationship between enterprise networks, dynamic capabilities, ambidextrous innovation, and competitive advantages, making it difficult for companies to understand the long-term effects of ambidextrous innovation on competitive advantages.

5.4.2 Future Research

To improve the generality and universality of the research conclusions, we will collect data from different places and expand the samples. Besides, because dynamic capabilities and ambidextrous innovation originate from environmental change and perceiving environmental changes is a manifestation of a company's inherent capabilities, different corporate capabilities prompt us to consider the impact of environmental factors in future research. Moreover, the formation of dynamic capabilities requires considerable time and costs; thus, we need to focus on the evolution trend of dynamic capabilities on competitive advantages (Ambrosini & Bowman, 2009). Similarly, ambidextrous innovation focuses on corporate sustainability, so the evolutionary trend of ambidextrous innovation on competitive advantages is an interesting topic.



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APPENDICES



Appendix A

Sources of Questionnaire Items

Sources of Questionnaire Items

Source	Measurement items	Deal
Chen, Lai, and Wen (2006)	CA1: Our company has a low-cost advantage compared with our competitors;	Adapted
	CA2: Our company has better-quality products or services than our competitors;	Adapted
	CA3: Our company has more R&D capabilities and innovation than our competitors;	Adapted
	CA4: Our company has better managerial capability than our competitors;	Adapted
	CA5: Our company has a better image than our competitors;	Adapted
	CA6: Our company has a higher profit level than our competitors;	Adapted
	CA7: The market growth of our company exceeds that of our competitors;	Adapted
	CA8: Our company is the first mover in important fields and occupies an important position;	Adapted

Enterprise Networks-Tie Strength (TS)

Source	Measurement items	Deal
Hansen (1999)	TS1: Our company maintains frequent contact with other organizations;	Adapted
	TS2: Our company and other organizations have mutual trust and common interests;	Adapted
	TS3: There are many opportunities for communication and cooperation between our company and other	Adapted

Source	Measurement items	Deal
	organizations;	
	TS4: Our company maintains close ties with other organizations than general ties;	Adapted
	TS5: Our company has established strategic alliances with other organizations;	Adapted

Enterprise Networks-Network Centrality (NC)

Source	Measurement items	Deal
Tsai (2001)	NC1: Most local companies know our company's name;	Adapted
	NC2: Other local companies have no difficulty in exchanging knowledge and technology with our company;	Adapted
	NC3: Other companies usually exchange knowledge and technology through our company;	Adapted
	NC4: Other local companies often obtain technical or business knowledge from us when they need technical advice or support;	Adapted
	NC5: Other local companies often provide our company with technical or business knowledge when we need technical advice or support;	Adapted

Dynamic Capabilities- Sensing Capability (SC)

Source	Measurement items	Deal
Pavlou and EI Sawy (2011)	SP1: Our company frequently scans the environment to identify new business opportunities;	Adapted
	SP2: Our company uses established processes to identify target market segments/changing customer needs;	Adapted
	SP3: Our company often reviews our product	Adapted

Source	Measurement items	Deal
	development efforts to ensure that they are in line with what our customers want;	
	SP4: Our company often use new ideas for product improvement and product creation;	Reversed

Dynamic Capabilities-Absorptive Capability (AC)

Source	Measurement items	Deal
Cui, Yu, and Cui (2008)	AZ1: Our company can often quickly acquire new knowledge;	Adapted
	AZ2: Our company could perceive the changes that external new knowledge may bring to our company;	Reversed
	AZ3: Our company can easily connect existing knowledge with new insights;	Adapted
	AZ4: Our company can quickly use new knowledge to develop new products or new services;	Adapted
	AZ5: Our company can quickly use new knowledge to revise the rules and regulations of the company;	Adapted

Dynamic Capabilities-Integration and Reconstruction Capabilities (IR)

Source	Measurement items	Deal
Protogerou, Caloghirou, and Lioukas (2011)	IP1: Our company can successfully introduce new or substantial changes to achieve our targets and objectives;	Adapted
	IP2: Our company can successfully adjust our business processes in response to shifts in our business priorities;	Adapted
	IP3: Our company can successfully reconfigure our business processes to come up with new productive	Adapted

Source	Measurement items	Deal
	assets;	
Gong (2011)	IG1: Our companies often communicate and share various resources;	Merge IG1 and IG3
	IG2: Our company can coordinate human resources to respond to task needs;	Merge IG2 and IG4
	IG3: Our company can strengthen the allocation of existing resources;	Merged
	IG4: Our company can successfully coordinate departmental relationships to meet task requirements;	Merged
	IG5: Our company can conduct cross-company communication and cooperation;	Adapted
	IG6: Our company can respond to environmental changes by reorganizing external resources or establishing strategic alliances;	Deleted

Ambidextrous Innovation-Exploratory Innovation (ERI)

Source	Measurement items	Deal
He and Wong (2004)	ERI1: Our company always tries to introduce new products;	Adapted
	ERI2: Our company always tries to expand our product range;	Adapted
	ERI3: Our company always tries to open up new markets;	Adapted
	ERI4: Our company always tries to enter new technological fields;	Adapted

Ambidextrous Innovation-Exploitative Innovation (EII)

Source	Measurement items	Deal
He and Wong (2004)	EII1: Our company always tries to improve the quality of existing products/services;	Adapted
	EII2: Our company always tries to improve the quality of existing products/services;	Adapted
	EII3: Our company always tries to improve the quality of existing products/services;	Adapted
	EII4: Our company always tries to improve the quality of existing products/services;	Adapted



Appendix B

Questionnaire

Questionnaire

No.

Thank you very much for participating in this survey. This questionnaire conducts a survey on high-tech enterprises with the purpose of understanding the relationship between enterprise network, dynamic capabilities, ambidextrous innovation and competitive advantage, so as to guide our country's high-tech enterprises to use enterprise networks to use social capital and enhance the innovation of high-tech enterprises level and help them to gain competitive advantages. The questionnaire has two part and includes 58 question items. it will take you about 5-10 minutes.

Thank you very much for your valuable insights during your busy schedule to complete this important questionnaire. Please read the question items carefully and make a choice. Your truthful filling is very helpful to my research. Thank you again for your support and help! I promise that all the content you fill in is only used for academic research and will be kept strictly confidential and will never be disclosed to the outside world. If you violate it, I will bear legal responsibility.

Part 1: Demographics

1. Gender Male Female
2. Position Top manager Others
3. Place Zhongguancun of Beijing Shenzhen
4. Enterprises' Nature
 State-owned enterprises or state holding enterprises Foreign enterprises
 Private enterprises Others
5. Industry Manufacturing industry Service industry

6. Company age

 Less than 3 years 3~5 years 5~8 year More than 8 year

7. Company size

 Less than 100 employees 101~300 employees 301~500 employees More than 500 employees**Part 2: Measure items**

Please mark the number that is consistent with your company. Every item needs to be chose.

Competitive Advantage		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
CA1	Our company has a low-cost advantage compared with our competitors;	1	2	3	4	5
CA2	Our company has better-quality products or services than our competitors;	1	2	3	4	5
CA3	Our company has more R&D capabilities and innovation than our competitors;	1	2	3	4	5
CA4	Our company has better managerial capability than our competitors;	1	2	3	4	5
CA5	Our company has a better image than our competitors;	1	2	3	4	5

CA6	The market growth of our company exceeds that of our competitors;	1	2	3	4	5	
CA7	Our company has a higher profit level than our competitors;	1	2	3	4	5	
CA8	Our company is the first mover in important fields and occupies an important position;	1	2	3	4	5	
	Tie Strength		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
TS1	Our company maintains frequent contact with other organizations;	1	2	3	4	5	
TS2	Our company and other organizations have mutual trust and common interests;	1	2	3	4	5	
TS3	There are many opportunities for communication and cooperation between our company and other organizations;	1	2	3	4	5	
TS4	Our company maintains close contact with other organizations;	1	2	3	4	5	
TS5	Our company has established strategic alliances with other	1	2	3	4	5	

organizations;

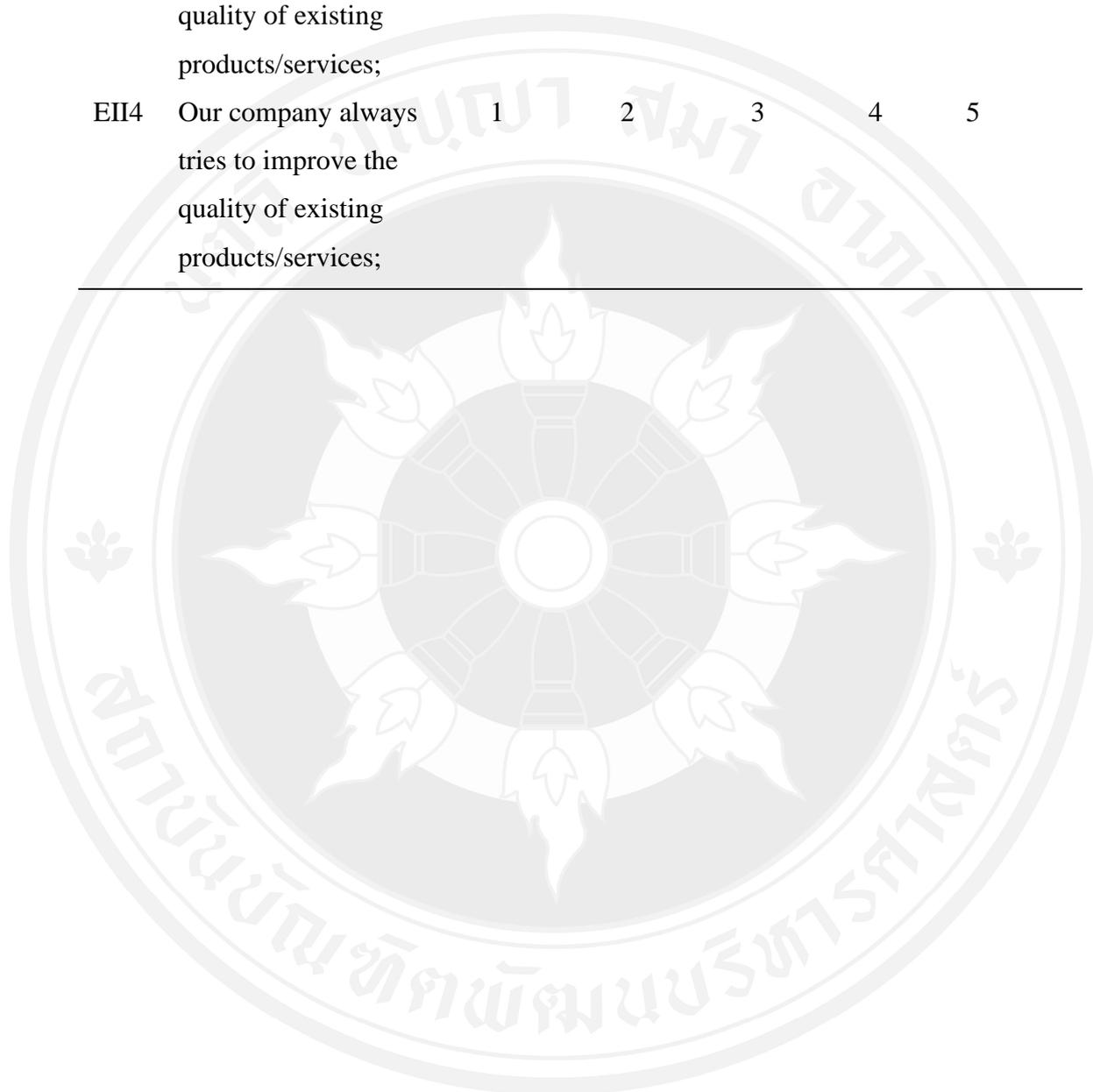
Network Centrality		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
NC1	Most local companies know our company's name;	1	2	3	4	5
NC2	Other local companies have no difficulty in exchanging knowledge and technology with our company;	1	2	3	4	5
NC3	Other companies usually exchange knowledge and technology through our company;	1	2	3	4	5
NC4	Other local companies often obtain technical or business knowledge from us when they need technical advice or support;	1	2	3	4	5
NC5	Other local companies often provide our company with technical or business knowledge when we need technical advice or support;	1	2	3	4	5
Sensing Capability		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SC1	Our company frequently scans the environment to	1	2	3	4	5

	identify new business opportunities;					
SC2	Our company often reviews our product development efforts to ensure that they are in line with what our customers want;	1	2	3	4	5
SC3	Our company uses established processes to identify target market segments/changing customer needs;	1	2	3	4	5
SC4	Our company cannot use new ideas for product improvement and product creation;	1	2	3	4	5
	Absorptive Capability		Strongly Disagree	Disagree	Neutral	Agree
						Strongly Agree
AC1	Our company can often quickly acquire new knowledge;	1	2	3	4	5
AC2	Our company cannot perceive the changes that external new knowledge may bring to our company;	1	2	3	4	5
AC3	Our company can easily connect existing knowledge with new insights;	1	2	3	4	5

AC4	Our company can quickly use new knowledge to develop new products or new services;	1	2	3	4	5
AC5	Our company can quickly use new knowledge to revise the rules and regulations of the company;	1	2	3	4	5
Integration and Reconstruction Capabilities		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
IR1	Our company can successfully introduce new or substantial changes to achieve our targets and objectives;	1	2	3	4	5
IR2	Our company can successfully adjust our business processes in response to shifts in our business priorities;	1	2	3	4	5
IR3	Our company can successfully reconfigure our business processes to come up with new productive assets;	1	2	3	4	5
IR4	Our company can successfully and quickly assign resources to meet task requirements;	1	2	3	4	5

IR5	Our company can successfully coordinate departmental relationships to meet task requirements;	1	2	3	4	5
IR6	Internal and external communication are important to our company;	1	2	3	4	5
Exploratory Innovation (ERI)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
ERI1	Our company always tries to introduce new products;	1	2	3	4	5
ERI2	Our company always tries to expand our product range;	1	2	3	4	5
ERI3	Our company always tries to open up new markets;	1	2	3	4	5
ERI4	Our company always tries to enter new technological fields;	1	2	3	4	5
Exploitative Innovation (EII)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
EII1	Our company always tries to improve the quality of existing products/services;	1	2	3	4	5
EII2	Our company always tries to improve the	1	2	3	4	5

	quality of existing products/services;					
EII3	Our company always tries to improve the quality of existing products/services;	1	2	3	4	5
EII4	Our company always tries to improve the quality of existing products/services;	1	2	3	4	5



BIOGRAPHY

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Master of Science (Management) 2012 Guangxi
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