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The Effects of Absorptive Capability and Innovative Culture on Innovation Performance: Evidence from Chinese High-Tech Firms*

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Abstract

The innovation of enterprises allowed firms to promote technological innovation as an important choice to improve sustainable competitiveness. This study aims to investigate the relationship between absorptive capacity and innovation performance of Chinese high-tech enterprises and focuses on the mediating role of innovation culture in high-tech enterprises. Data came from surveying high-tech enterprises in China, and the reliability analysis, factor analysis, and correlation analysis, path analysis (SEM) were analyzed using SPSS23, AMOS. The results show that intellectual capital composed of human capital, structural capital, and relational has a significant impact on acquisition performance; intellectual capital is composed of human capital; structural capital has a significant influence on innovation performance; and absorptive capital has a significant impact on innovation performance. In addition, innovative culture plays a partial mediating role between absorptive capacity and innovation performance. The findings of this study suggest that, to ensure the better absorption and operation of knowledge, high-tech enterprises can accumulate more knowledge, promote the transformation of knowledge into technology, and strengthen the capability of knowledge absorptive capacity, and at the same time, create an innovation culture atmosphere and encourage employees to develop new products to achieve enterprise goals in order to promote the improvement of innovation performance.

Keywords: Absorptive Capacity, Innovation Performance, Innovative Culture, High-tech Firms

JEL Classification Code: M16, C83, L20

1. Introduction

In a firm, technological innovation is not only a driver of growth, but also an inexhaustible driver of sustainable competitive advantage (Cefis & Marslli, 2011). New scientific and technological revolutions and industrial changes have presented new challenges to firms' technological innovation of enterprises that allowed firms to promote technological innovation as an important choice to improve national competitiveness (Mu, 2017). In China, the development of high-tech firms is a solid foundation for becoming an innovative country and an important role in the process of technological innovation. It plays an important role in stimulating the national economic growth of China, thereby promoting industrial structure upgrading, and improving the level of technological competition (Yuan et al., 2018). The essence of technological innovation is to create new knowledge, to upgrade process technology through new knowledge, and to develop innovative products to achieve the purpose of innovation performance in a firm (Jimenez & Valles, 2011).

Because knowledge can help firms achieve growth and gain a competitive advantage, the more knowledge a firm possesses, the stronger its competitiveness (Filieri & Alguezaui, 2014). How a firm manages its knowledge and the ability to absorb new knowledge may have substantial effects on the firm's implementation of development

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strategies and innovation growth (Slater, Olson, & Sorensen, 2012). Nonetheless, the process from acquiring knowledge to effectively using knowledge is not easy; high-tech firms continue to explore and mine. Although firms can acquire knowledge, they do not have the corresponding ability to transfer knowledge processing to increase the benefits of them (Zahra & George, 2002). Because knowledge cannot directly bring competitive advantages to firms, they need to use knowledge to truly transform it into energy and enable them to achieve the goal of success (Valentim et al., 2015). Therefore, to use external knowledge in external environments, firms should first identify new knowledge, continuously digest them, and develop in a form that conforms to interests. This capability is called "absorptive capacity" (Cohen & Levinthal, 1990). Absorptive capacity enables firms to transform acquired knowledge into productivity, promotes the innovation ability of enterprises, formulates competitiveness, and promotes them to stand out from the competition (Chang et al., 2014). Besides, it can accelerate the improvement of knowledgeability and the ability to process knowledge. On the other hand, absorptive capacity can promote firms' innovation performance (Wang, 2008). Thus, improving the absorptive capacity of corporate knowledge is a crucial driver for firms to continuously improve their innovation capabilities (Limaj et al., 2016).

In addition to mastering knowledge, firms need cultural supplies to form synergy and continuously promote the improvement of their innovation capabilities (Valentim et al., 2015). Corporate culture would promote the firm's knowledge management level and innovation and development. How employees create and use innovative abilities in work and organization not only represents the use of their knowledge and abilities, but also depends on the influence of the atmosphere, such as the interaction of organizational culture with overall environmental factors. To support this perspective it is, in general, believed that organizational culture plays a key role in creating and sustaining innovation (Martins & Terblanche, 2003). Innovative culture can not only inspire the creation of new ideas and the sharing of values among employees, but also help the efficient creation and transformation of knowledge to promote the rapid development of high-tech enterprises in the process of commercialization (Naqshbandi & Kamel, 2017). Organizational culture in a firm can reflect the values and thoughts of employees, and, at the same time, affect the innovative behavior of them. The ability of employees to create and use innovation in work and organization depends not only on personal differences, but also on environmental and contextual factors, such as organizational culture and management style, and the interaction of these contextual factors. Therefore, organizational culture plays an important role in maintaining the innovation process (Martins & Terblanche, 2003).

Although corporate knowledge and innovation are complementary to each other, specific development on them should be further understood. After all, the form in which the absorptive capacity of knowledge can affect technological innovation has not yet been accurately identified (Su et al., 2013). Research conducted by Kostopoulos et al. (2011) confirmed this view in the sense that they would be linked to innovation, especially with the development and innovation of high-tech products. Most of the current research has focused on competitive advantage and knowledge resources. To better understand the innovation achievements of high-tech firms, further research is necessary to identify the relationship between absorptive capacity and innovative culture (Zahra & George, 2002; Tsai & Yang, 2017).

Although the previous article mentioned some advantages that absorptive capacity may bring to a firm, the different dimensions of absorptive capacity would also affect the results of innovation performance (Engelman et al., 2017). Because the various dimensions of absorptive capacity are mutually independent and complementary (Zahra & George, 2002), in the domain of knowledge management, the concept of absorptive capacity has not been fully developed (Mariano & Walter, 2015). Likewise, relevant research has discussed innovative culture would have different effects on innovation performance (Naranjo-Valencia et al., 2011). Specifically, in high-tech firms, scholars should pay more attention to the development of innovative culture, in particular, innovative culture is reflected in different values and beliefs. Thus, further research should be conducted in this field (Yilmaz & Ergun, 2008). Moreover, Cohen and Levinthal (1990) and subsequent literature have not specifically explored how corporate culture affects knowledge absorptive capacity, and gains related innovation capabilities from knowledge exchange and acquisition (Kim et al., 2016). For high-tech firms, this perspective has been focused on in the sense that they need to pay attention to the role of knowledge and innovative culture for their success. In theory and practice, there has been little research on the relationship between the various dimensions of knowledge absorptive capacity and corporate innovation performance. Few studies have examined a systematic theory of knowledge absorptive capacity and completed multi-dimensional empirical verification of knowledge absorptive capacity (Xie et al., 2018).

Against this backdrop, based on the above research gaps, our study focuses on the four dimensions of absorptive capacity atmosphere and deeply investigates the role of each dimension of absorptive capacity on innovative culture and corporate innovation performance (Naranjo-Valencia et al., 2011). The ability of a firm to attain good innovation performance also depends on a wealth of knowledge to cope with the dynamic environment (Teece, 2007). Due to the limitations of previous research on the absorptive capacity dimension, our article adds innovative

culture as an intermediary factor to explore the overall. We assume that absorptive capacity can influence the micro-mechanism of corporate innovation performance through innovative culture. Through specific empirical research, we aim to provide an understanding of the role of absorptive capacity on innovation performance and strengthen the process of managing absorptive capacity and the integration of innovative culture to help high-tech enterprise leaders strengthen. The use of corporate knowledge management deepens corporate innovation performance and competitiveness in future development.

2. Conceptual Framework and Research Hypotheses

2.1. Relationship between Absorptive Capacity and Innovation Performance

In the era of the knowledge economy, the rapid development of information and knowledge also promoted the development of knowledge management research (Flatten et al., 2011). Cohen and Levinthal (1990) emphasized that learning and innovation need to be fully interactive and combined to complete a firm's R&D innovation and described absorptive capacity as the ability of it to recognize new knowledge, absorb the knowledge, and use knowledge in the external environment in order to attain the firm's goals.

Based on Cohen and Levinthal's (1990) perspective, Zahra and George (2002) proceeded from the theory of dynamic capability and believed that absorptive capacity is a series of norms and practices possessed by firms. Firms acquire, digest, and transform through norms and conventions. In addition to the ability of a firm to use, the integration of these capabilities is a kind of dynamic capability, which can effectively enhance the competitiveness of the firm.

In order to further strengthen the description of absorptive capacity, Camisón and Forés (2010) believed that some organizations could identify and digest external knowledge, but cannot effectively integrate knowledge. Therefore, after a firm acquires external knowledge, it must consider effective integration with existing knowledge. High-tech firms need to constantly develop new products in the production and operation environment, which to a certain extent requires the firms to have the ability to acquire, transfer and use internal and external knowledge (Tseng et al., 2011). Therefore, producing innovative products to meet the needs of the industry is constantly adapting to the changing market environment by absorbing external knowledge (Lichtenthaler, 2009).

The key to high-tech firms is innovation acquisition, assimilation, and use of knowledge as key driving forces for firm innovation and development (Ali & Park, 2016). The ability of a firm to acquire and to digest knowledge can help the firm improve its knowledge. Firms can increase their knowledge reserves through the entire knowledge system process to enhance their competitiveness and to strengthen technological innovation performance by deepening the connotation of knowledge (Morant et al., 2018). After all, a firm's absorptive capacity, not only requires knowledge from the outside, but also requires the firm to transform and to use existing knowledge, which can promote the firm's assimilation and integration with the existing know-how to ensure that the innovation activities went smoothly (Cruz-Gonzalez et al., 2015). Firms often obtain resources from the outside and transform them into useful resources, which can support the innovation outcome (Bojica & Fuentes, 2012). Because this is based on the competitiveness of knowledge and technology, firms would consider transforming knowledge into operational power to achieve the purpose of innovation. New products and services are the embodiment of the value of a firm (Carrion et al., 2012). Therefore, the process of firm innovation is the process of continuous accumulation and utilization of knowledge. A firm's creative and intellectual competitiveness is inseparable from the external knowledge absorptive capacity of the firm. Absorptive capacity can promote innovative technology and learn among firms. A firm's communication of knowledge and the cultivation of corporate innovation capabilities can improve its innovation performance (Leal-Rodriguez et al., 2014). Based on this, we propose the following hypotheses:

H1: *Absorptive capacity has a significant positive effect on innovation performance.*

H1-1: *Acquisition capability has a significant positive effect on innovation performance.*

H1-2: *Assimilation capability has a significant positive effect on innovation performance.*

H1-3: *Transformation capability has a significant positive effect on innovation performance.*

H1-4: *Exploitation capability has a significant positive effect on innovation performance.*

2.2. Relationship between Innovative Culture and Innovation Performance

In the era of the knowledge economy, facing the requirements of global competition and changes in market environments, firms consider innovation as a key element to maintain competitive advantage (Santoro et al., 2018). Innovative culture means a culture that encourages innovation or encourages risk-taking. It can quickly face changes in the market environment and respond in time, share knowledge and values in the group, and put ethics and beliefs into practice (Ali & Park, 2016). Because such

a culture can guide employees to accept innovation as a part of corporate values and can motivate employees to perform innovative behaviors (Hartmann, 2006), innovative culture seems an important factor that affects the development of new products. Innovative culture strengthens the use of technical knowledge because there is a close relationship between technical knowledge and product innovation and because effective use of elements of technical knowledge can actively complete the enterprise's ability to use resources (Lee et al., 2009).

Innovation performance represents the ability of employees to create new products and values for the firm and to show innovation efficiency (Winby & Worley, 2014). From this level, products produced by a firm have unique creativity and bring huge potential to the market (Kim & Lee, 2013). In a good corporate culture, if a firm can respond well to market demand, continuously developing new products would improve product performance, market value (Song et al., 2015) and employee performance (Sapta et al., 2021). In technology-based firms, developing an innovative culture based on the technical level can allow employees to participate, to be willing to take responsibility and risk, to exert creativity, and to promote the firm to have good competitiveness in new product development (Claver et al., 1998). Actively creating a culture, a firm can constantly taps market opportunities to highlight its competitive advantage (Menguc & Auh, 2006; Sijabat et al., 2020). High-tech firms should pay more attention to the cultivation of spiritual power, which can affect employees' continuous development of innovative thinking and can promote the development of innovative capabilities (Kim & Lee, 2013) and firm performance (Muafi et al, 2020). Therefore, firms should promote an innovative culture featuring bold, adventurous, free, and proactive, thereby conductively improving innovation performance (Kalay & Lynn, 2015). Because the innovative culture of various functional departments of a firm originates from the firm's innovation activities and promotes the innovative development of the firm (Kaasa & Vadi, 2010). Based on this, we proposed the following hypothesis:

H2: *Innovative culture has a significant positive effect on innovation performance.*

2.3. Relationship between Absorptive Capacity and Innovative Culture

Firms could use external knowledge to improve the level of an innovative culture. Knowledge acquired from the outside is input into new products, new processes, and management innovation. After the knowledge is absorbed, the level of knowledge and culture of the firm would be expanded (Lichtenthaler, 2009). In fact, strengthening knowledge absorptive capacity and promoting knowledge sharing-level depend on a trust relationship between two communicators in the firm. This trust relationship is also a manifestation of the innovative culture (Andrews & Delahaye, 2000). A firm can transform and utilize this knowledge by integrating acquired and absorbed knowledge into the firm's operations, thereby improving the firm's innovative culture (Camisón & Forés, 2010). Acquisition capability has a significant effect on innovative culture. Because firms have a multi-faceted culture of innovation, in an open innovation atmosphere, acquisition capability, assimilation capability, transformation capability and exploitation capability would ensure the continuous upgrading of the knowledge base, while there are driving the development of innovative culture (Molina & Llorens-Montes, 2006).

For the acquisition, assimilation, and transformation of knowledge, it is very important to strengthen cooperation and interaction in firms. Organizations with a culture of cooperation are more likely to accept knowledge sharing (O'Dell & Grayson 1999). At the same time, knowledge absorptive capacity helps firms to transform knowledge into innovative products and services, which includes innovative culture (Leal-Rodriguez et al., 2014). Because knowledge-transfer ability is the ability of a firm to develop and improve practices that help to combine existing knowledge with acquired and absorbed knowledge for future use (Flatten et al., 2011). In a firm, employees can continuously acquire and digest knowledge and apply it to production and services. There should be sufficient trust and common values in the middle to help the firm gain a competitive advantage (Lane et al., 2001). Based on this perspective, we proposed the following hypotheses:

H3: *Absorptive capacity has a significant effect on innovative culture.*

H3-1: *Acquisition capability has a significant positive effect on innovative culture.*

H3-2: *Assimilation capability has a significant positive effect on innovative culture.*

H3-3: *Transformation capability has a significant positive effect on innovative culture.*

H3-4: *Exploitation capability has a significant positive effect on innovative culture.*

2.4. Mediating Effect of Innovative Culture

Knowledge exists in the human social environment and is not just a manifestation of symbols. Therefore, it is necessary to strengthen knowledge management to pay close attention to values. The absorptive capacity of knowledge often promotes the better development of innovative culture and guides firms to tap the innovation capabilities of employees (Lemon & Sahota, 2004). Therefore, a firm's innovation activities are based on the benchmark of innovative culture

in the sense that culture is social innovation activities that can affect individuals and the whole. Specifically, in high-tech firms, to better develop new products and technologies, they need support of innovative ideas and should be encouraged in terms of innovative culture, and should advocate the spirit of new product development (Zien & Buckler, 1997). Sharing values, beliefs and behaviors, and being able to take risks and responsibilities, guiding employees to actively join, and stimulating employees' creativity are all key to an innovative culture (Ali & Park, 2016). Indeed, innovative culture is not only the presentation of behavior, but more importantly, it emphasizes the creation of innovative values and creativity. Innovative culture can reflect proactive values and a tolerant and open environment (Jing et al., 2011). A firm with an innovative culture can help its employees share knowledge and fulfill their mission to the enterprise (Cavaliere & Lombardi, 2015).

Innovative culture can promote the learning of culture, which can better help firms process and generate new knowledge (Woodman et al., 1993). Because knowledge absorptive capacity is a process capability, it corresponds to the complete process of knowledge recognition, acquisition, digestion and utilization. The ability of a firm to absorb knowledge can encourage its employees to actively diverge thinking, new knowledge, strengthen the interaction and circulation of ideas, and create an atmosphere of corporate innovative culture (Lee & Choi, 2003). By strengthening the ability of knowledge mining and utilization and by ensuring some of the ability of knowledge acquisition and utilization, firms can better promote the development of innovative culture (Harrington & Guimaraes, 2005). Efficient creation and transformation of knowledge can promote an innovative culture in the development of society and can encourage employees to strengthen the creation of new ideas and the sharing of values, and can help promote the rapid development of the firm in the process of commercialization (Naqshbandi & Kamel, 2017). Innovative firms can strengthen the knowledge acquisition and interaction of enterprises, and help enterprises to absorb knowledge quickly. Therefore, this is also an important factor in promoting firm innovation and development (Janz & Prasarnphanich, 2003). At the same time, the absorptive capacity of knowledge of a firm affects the development of innovative culture and also affects the innovation performance of the firm (Burcharth et al., 2014). Based on this, we proposed the following hypothesis:

H3: *Innovative culture plays a mediating role between absorptive capacity and innovation performance.*

3. Research Methodology

3.1. Data Collection and Sample

Comrey (1988) believed that more than 300 samples are good for factor analysis. In accordance with its requirements, 500 copies were distributed in our research to collect data. Respondents to a developed questionnaire are managers in high-tech firms in China. As Chinese high-tech firms are concentrated in the eastern coastal areas, we mainly collected data from managers participating in exhibitions related to high-tech firms in the Yangtze River Delta region from December 12, 2019, to January 12, 2020. A total of 445 questionnaires were returned. Except for 30 questionnaires that were unsatisfactorily answered, 415 questionnaires were finally analyzed. Using SPSS 23.0 and AMOS 21.0, we empirically analyzed data with structural equation modeling. Statistics of the sample shows that the majority of respondents were male (57.35 %); and the majority were 25 to 35 years old (46.02%). Most of them had a bachelor degree or above; they were mainly employed in information technology and optomechanical integration industries; firms were established more than five years ago; and the average annual income of the firms was more than RMB 100 Million Yuan.

3.2. Measures

In our study, the design of the questionnaire survey was generalized regarding the theoretical foundation of the predecessors. To avoid concentration bias, we used the 5-point Likert scale, which ranges from 1 (we strongly disagree) to 5 (we strongly agree). Absorptive capacity was divided into four dimensions: acquisition capability, assimilation capability, transformation capability, and exploitation capability. We borrowed from Jansen et al. (2005), Flatten et al. (2011), Engelman et al. (2017) to develop 20 questions. For the dimension of innovative culture, our study referred to Terziovski (2010), Castro et al. (2013), and Aksoy (2017) to formulate five questions for evaluation. Part of the research on innovation performance used Hagedoorn and Cloodt (2003), Han and Li (2015), and Zhang et al. (2019) to measure innovation performance.

4. Data Analysis and Results

4.1. Evaluation of Measurement Model

We conducted an exploratory factor analysis and a confirmatory factor analysis to test a measurement model. Table 1 shows the factor loading, composite reliability, Cronbach's alpha, and AVE estimated measurement items for each structure. Reliability analysis refers to the accuracy of the results measured by the scale tool, using Cronbach's alpha coefficient as the evaluation parameter. We found that the reliability of all variables is above 0.6, which shows that there is inherent consistency. The chi-square degree of freedom ratio is 2.012; RMSEA is 0.049; CFI, NFI, and TLI values are also close to 1, which can meet relevant standards. Table 1 shows that the model fits the data well and the convergence validity meets a requirement.

Table 1: Factor Loadings, Reliability, and Average Variance Extracted

Construct	Item	Factor Loading	Cronbach's α	CR	AVE
Acquisition Capability	AC1	0.867	0.930	0.931	0.730
	AC2	0.879			
	AC3	0.822			
	AC4	0.847			
	AC5	0.855			
Assimilation Capability	SC1	0.85	0.931	0.932	0.732
	SC2	0.857			
	SC3	0.881			
	SC4	0.869			
	SC5	0.82			
Transformation Capability	TC1	0.81	0.904	0.905	0.657
	TC2	0.83			
	TC3	0.799			
	TC4	0.838			
	TC5	0.774			
Exploitation Capability	EC1	0.81	0.914	0.914	0.680
	EC2	0.805			
	EC3	0.832			
	EC4	0.852			
	EC5	0.822			
Innovative Culture	IC1	0.811	0.906	0.907	0.661
	IC2	0.829			
	IC3	0.8			
	IC4	0.818			
	IC5	0.807			
Innovation Performance	IP1	0.787	0.915	0.916	0.687
	IP2	0.872			
	IP3	0.844			
	IP4	0.833			
	IP5	0.805			

Notes: CMIN/df = 2.012, CFI = 0.958, NFI = 0.921, TLI = 0.953, IFI = 0.958, RMSEA = 0.049.

The correlation coefficient is shown in Table 2. Based on the analysis, we concluded that the dimensions of absorptive capacity are acquisition capacity, digestion capacity, transformation capacity, and utilization capacity. Innovative culture and innovation performance are significantly related. Among them, digestion ability has the lowest correlation with an innovative culture, at 0.273; and utilization ability has the highest correlation with innovation performance, at 0.489.

4.2. Structural Equation Model

Through hypothesis tests by means of estimating a structural equation model, we found standardized path coefficients as follows. Acquisition capability has a significant positive effect on innovation performance (β = 0.169, $p < 0.001$), thereby supporting H1-1. Assimilation capability has a significant positive effect on innovation performance (β = 0.169, $p < 0.001$), thus supporting H1-2. Transformation capability has a significant positive effect on innovation performance (β = 0.138, $p < 0.001$), thereby supporting H1-3. Exploitation capability has a significant positive effect on innovation performance (β = 0.245, p = 0.016 < 0.05), thus supporting H1-4. Innovative culture has a significant positive effect on innovation performance (β = 0.271, $p < 0.001$), thereby supporting H2. Acquisition capability has a significant positive effect on innovative culture (β = 0.126, p = 0.030 < 0.05), thus supporting H3-1. Assimilation capability has no significant positive effect on innovative culture (β = 0.099, p = 0.086), thereby failing to accept H3-2. Transformation capability has a significant positive effect on innovative culture (β = 0.147, p = 0.034 < 0.05), thus supporting H3-3. Finally, exploitation capability has a significant positive effect on innovative culture (β = 0.256, p = 0.001 < 0.01), thereby supporting H3-4.

4.3. Tests for Mediation

In order to test the mediating role of innovative culture between absorptive capacity and innovation performance, we set a confidence interval at the 95% level; bootstrapping was used to execute 5000 start-up samples. Regarding absorptive capacity as an independent variable, innovation performance is the dependent variable; and independent variables affect the dependent variable through intermediary variables. We found that, except the confidence interval of assimilation capability (L = –0.005 U = 0.074), which contains 0, the direct effect is significant 0.175** (0.010), and the indirect effect is insignificant 0.036* (0.050). Accordingly, the variable does not have a mediating effect. Confidence interval of acquisition capability [0.001–0.080] includes 0; direct effect is 0.176** (0.006) and indirect effect is 0.036* (0.046). Accordingly, it has a partial mediation effect; the confidence interval of the transformation of capability is [0.000–0.087], including 0; the direct effect is insignificant 0.124 (0.060); but the indirect effect is significant 0.036* (0.050), with a complete mediating effect. The confidence interval of exploitation capability is [0.017–0.117], including 0; the direct effect is 0.207** (0.002); and the indirect effect is

Table 2: Discriminant Validity

Constructs	Mean	SD	AC	SC	TC	EC	IC	IP
AC	4.24	0.85	0.832					
SC	4.29	0.83	0.384	0.835				
TC	4.38	0.78	0.356	0.387	0.801			
EC	4.36	0.75	0.430	0.399	0.446	0.791		
IC	3.90	0.79	0.296	0.273	0.300	0.344	0.814	
IP	3.90	0.86	0.445	0.434	0.417	0.489	0.472	0.776

Table 3: Results of Hypothesis Testing

Hypothesis	Estimate	S.E.	C.R.	*P*	Result
Acquisition Capability → Innovation Performance	0.169	0.048	3.518	***	Accepted
Assimilation Capability → Innovation Performance	0.169	0.048	3.526	***	Accepted
Transformation Capability → Innovation Performance	0.138	0.057	2.408	0.016	Accepted
Exploitation Capability → Innovation Performance	0.245	0.065	3.760	***	Accepted
innovative culture → Innovation Performance	0.271	0.048	5.678	***	Accepted
Acquisition Capability → Innovative culture	0.126	0.058	2.175	0.030	Accepted
Assimilation Capability → Innovative culture	0.099	0.058	1.719	0.086	Not Accepted
Transformation Capability→ Innovative culture	0.147	0.070	2.117	0.034	Accepted
Exploitation Capability → Innovative culture	0.256	0.078	3.281	0.001	Accepted

Notes: ***, **, and * is significant level at the 1%, 5% and 10% respectively.

Table 4: Test of Mediation by Bootstrapping Approach

	Direct Effect	Indirect Effect	Total Effect	95% CI
Acquisition Capability - Innovative Culture - Innovation Performance	0.176** (0.006)	0.036* (0.046)	0.212*** (0.001)	[0.001–0.080]
Assimilation Capability - Innovative Culture - Innovation Performance	0.175** (0.010)	0.028 (0.101)	0.203** (0.002)	[–0.005–0.074]
Transformation Capability - Innovative Culture - Innovation Performance	0.124 (0.060)	0.036* (0.050)	0.160** (0.006)	[0.000–0.087]
Exploitation Capability - Innovative Culture - Innovation Performance	0.207** (0.002)	0.058** (0.006)	0.265*** (0.001)	[0.017–0.117]

0.058** (0.006). Accordingly, it has a partial mediating effect. In short, innovative culture is part of the mediating effect on absorptive capacity and innovation performance.

5. Discussion and Conclusions

In the era of the knowledge economy and China's implementation of innovation-driven development strategies, compared with traditional enterprises, the future development of Chinese high-tech firms comes mainly from the development of knowledge and technology. As knowledge is updated faster, it accelerates firm knowledge absorption. A firm's development of capabilities would provide strong support for its sustainable development. At the same time, the firm pays attention to the role of innovative culture, and continuously strengthens the competitiveness of the firm by strengthening the control of the innovative culture, and guarantees an important position in the market-based economy. Therefore, our research aimed

to explore the relationship among the absorptive capacity, innovative culture, and innovation performance of high-tech firms.

Absorptive capacity has a significant positive impact on innovation performance. This is consistent with the research conclusions of many scholars such as Zahra and George (2002). Absorptive capacity's four-dimensions – acquisition capability, assimilation capability, transformation capability, and exploitation capability – can well affect the innovation performance of firms. These firms continue to learn their own knowledge and use multiple channels to strengthen knowledge utilization mechanisms and better improve information utilization rates. The stronger knowledge absorptive capacity of a firm is, the more helpful it is to maintain the competitive advantage of the firm in the marketplace. Thus, absorptive capacity is very important to the innovation performance of the enterprise.

Absorptive capacity has a significant impact on innovative culture. The four dimensions of absorptive capacity have different effects on innovative culture (Cepeda-Carrion et al., 2012). The results of our study showed that acquisition capability has a significant impact on innovative culture. Firms can increase their knowledge reserves through the entire knowledge system process to enhance their culture. Because assimilation capability insignificantly helps innovative culture, it is necessary to strengthen the innovative culture of a firm by deepening the connotation of knowledge (Morant et al., 2018). After all, a firm's absorptive capacity not only requires knowledge obtained from the outside but also requires the firm to transform and use existing knowledge, which can create an innovative cultural atmosphere for the firm (Cruz-Gonzalez et al., 2015). Based on acquiring knowledge, transforming and using resources can support the innovation activities of firms (Bojica & Fuentes, 2012). Overall, absorptive capacity can further promote the development of an innovative culture.

Innovative culture can play a mediating role between absorptive capacity and innovation performance. Previous studies have used innovative culture as a moderating variable to better improve the relationship between knowledge absorptive capacity and innovation performance, which has been explained accordingly (Castro et al., 2013). Innovative culture can transform energy of expanding absorptive capacity and actively promote absorptive capacity into innovation performance (Naqshbandi & Kamel, 2017). Innovative culture may promote innovative ideas and concepts. A firm should use innovative concepts to instill knowledge capabilities, which can better reduce the disadvantages of knowledge in the firm. Firms should strengthen internal knowledge system management, build an atmosphere of innovative culture, and motivate employees strive to develop new products to achieve corporate goals, thereby promoting innovation performance.

There are several limitations of this research. Variables in future research should be more comprehensive for various indicators, variables should be increased or decreased, and should be detailed in order to enhance the validity of the questionnaire. In order to have a more detailed understanding of the specialized fields of high-tech companies, research can also be conducted on a specific industry. For example, specifically for the information technology industry, according to the development characteristics of information technology, design a scale suitable for the industry, and more accurately verify the research hypothesis.

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