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Nirvana rebirth, the impact of dynamic absorptive capacity and resource bricolage on dual innovation, and on the interference of improvisation

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Abstract: Innovation has always been regarded as an important factor for enterprises to maintain competitive advantage. The purpose of this study is to explore which organisational capabilities of enterprises support the innovative enterprises. This paper uses structural equation model to study 597 Chinese high-tech enterprises. The results show that dynamic absorptive capacity is positively correlated with dual innovation; resource bricolage partially mediates the relationship between dynamic absorptive capacity and dual innovation; improvisation interferes with resource bricolage and dual innovation. In view of the importance of dynamic absorptive capacity and resource bricolage, high-tech enterprises not only need to fully utilise dynamic absorption capacity, but also fully utilise idle and minimum resources to solve the resource shortage problem of innovative enterprises and respond to market demand. In addition, this study extends the theories of dynamic absorptive capacity, resource patchwork, and dual innovation to further extend the theory of improvisation.

Keywords: dynamic absorptive capacity; dual innovation; resource bricolage; improvisation.

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1 Introduction

Firms are more likely to succeed by leveraging external knowledge, technological capabilities, and innovative experiences (Emiliano de Souza et al., 2022). Dynamic absorptive capacity helps firms to continuously acquire new knowledge and new skills and experiences in a volatile business environment, thereby increasing their chances of success (Rodríguez-Serrano and Martín-Armario, 2019). Firms build their capabilities to better generate innovation performance (Scuotto et al., 2017; Teece, 2018). In recent years, more and more studies have focused on dynamic absorptive capacity and the process of enterprise innovation activities (An et al., 2021; Nguyen, 2022), has become a key driver of enterprise innovation performance (Makhloufi et al., 2021; Hurtado-Palomino et al., 2022; Gonzalez, 2022).

Dynamic absorptive capacity not only affects enterprise innovation, but also has been proved to have a significant impact on bricolage (Chen et al., 2022; Hu et al., 2022). Bricolage is an important practice in dealing with dynamic environments (Cunha, 2005). Dynamic absorptive capacity is the rapid absorption, integration, utilisation and transformation of external resources to respond to the market (Chen et al., 2020). The acquisition of external knowledge can improve the creativity of employees, and creative employees can break the conventional combination of resources and achieve bricolage (Schweisfurth and Raasch, 2018). Furthermore, resource bricolage creatively combines scarce resources to promote entrepreneurship (Halme et al., 2012), providing a guarantee for the sustainable development of innovative enterprises. The Kuankuan and Zhang (2022) believes that with the improvement of dynamic absorptive capacity of enterprises, product innovation can be influenced by bricolage to achieve innovation performance growth. Therefore, this study focuses on the key factor of resource bricolage, and explores its mediating role between dynamic absorptive capacity and dual innovation.

In addition, enterprises need more resources in the process of innovation, and the change of innovation environment leads to waste of resources (Hu et al., 2022), which makes it easier for enterprises to fall into the dilemma of resource constraints (Lavie et al., 2010), so enterprises must pay attention to the use of resources (Hu et al., 2022). Patchwork is a special resource capability (Gundry et al., 2011), that can integrate and create new resources, and therefore, resource patchwork provides the resources needed for innovation (Liao et al., 2021). Moreover, the turbulent environment tends to weaken the competitive advantage of enterprises (Gunasekaran et al., 2017; Hughes et al., 2018). This situation requires enterprises to respond quickly and immediately, and managers must think quickly, coordinate all parties, and quickly adopt effective strategies to respond to rapid changes in the environment in a very short time; instant, action or improvisation of creativity and strategies (Hadida et al., 2015). Improvisation is the degree of integration of creation and execution in time, which affects the success of new products by utilising new knowledge (Liu et al., 2018) and helps enterprises effectively cope with the challenges of environmental uncertainty (Bingham and Eisenhardt, 2011). It is a strategic mode of enterprises. It is also a means of resource acquisition and creation (Hu et al., 2022), and has become a key element of research innovation (Hadida et al., 2015). However, in the process of improvisation, enterprises are constantly improving and trying new execution methods to cope with the changing environment. These improvements replace the old and incremental improvements. The same process occurs in everyday life, evolving through accidental and purposeful actions (Feldman and Pentland,

2003). It can be seen that improvisation may produce positive or harmful organisational results depending on how the company implements improvisation and environmental conditions, so this study introduces improvisation as a disturbing factor.

Although bricolage and improvisation are important factors for sustainable development and innovation of enterprises, they have attracted wide attention of scholars (Chege et al., 2020; Rampersad and Troshani, 2020). However, the relationship between resource bricolage and organisational improvisation has been neglected in the process of dynamic evolution (Baker and Nelson, 2005; Hu et al., 2022). There are few systematic and in-depth studies on the impact of resource bricolage on enterprise innovation (Liao et al., 2021). At present, there is no analysis of how enterprises evolve innovation through resource bricolage and improvisation from the perspective of dynamic evolution (Hu et al., 2022). Based on the dynamic absorptive capacity theory, this study regards dynamic absorptive capacity as the antecedent factor of innovation, and explores the mediating effect of resource bricolage on dynamic absorptive capacity and dual innovation, and the interference effect of improvisation on resource bricolage and dual innovation.

The purpose of this study is to solve the following questions: first, does dynamic absorptive capacity promote both exploitative innovation and exploratory innovation? Second, does dynamic absorptive capacity provide a strong guarantee for the effective use of resource bricolage, and does resource bricolage play an intermediary role between dynamic absorptive capacity and dual innovation? Third, is there improvisation in the process of enterprise innovation? Does improvisation interfere between resource bricolage and dual innovation?

Research contributions: firstly, we confirm that dynamic absorptive capacity can provide a strong guarantee for the effective use of resource bricolage, and dynamic absorptive capacity can affect enterprise innovation behaviour through resource bricolage, extending the theory of dynamic absorptive capacity. Secondly, from the perspective of resource bricolage, we can use idle and minimum resources to solve the problem of resource gap in the process of enterprise innovation, further expand the resource-based view, and contribute to the sustainable development strategy of enterprises. Finally, the study also found that improvisation is also an important capability of enterprise innovation, in view of its importance, enterprises should deploy this capability to provide theoretical support for enterprise innovation strategic decision-making.

2 Dynamic absorptive capacity theory

Dynamic capabilities refer to the ability of enterprises to effectively grasp the ever-changing business opportunities and to continuously establish, transform, reorganise and integrate internal and external resources to cope with the rapidly changing environment (Eisenhardt and Martin, 2000). Zott (2003) emphasises that dynamic capabilities are embedded in routine processes, which are conducive to organisational change and development. These capabilities allow companies to reconfigure resources and adapt to changing markets to gain a competitive advantage. Barney (1991) proposed that dynamic capabilities affect the ability of enterprises to create and deploy the required knowledge to build other organisational functions (such as marketing, distribution and production). Moreover, in a dynamic environment, where products are rapidly outdated

and require continuous innovation, the need for organisational learning is particularly high (Lichtenthaler, 2009), requiring a strong reliance on external knowledge. By continuously identifying and assimilating new and valuable external technical knowledge and applying it to meet the needs of customers (Gerstlberger et al., 2022). Teece (2019) considers this 'continuous evolutionary adaptation' as a characteristic of dynamic capabilities. When firms absorb external knowledge, they must integrate the absorbed knowledge with internal resources into the transformation to meet the challenges of rapid environmental change (Chen et al., 2020). In a rapidly changing business environment, firms need to incorporate dynamic capabilities into the field of absorptive capacity theory (Eisenhardt and Martin, 2000), that is, dynamic absorptive capacity. It is the ability of enterprises to continuously learn and absorb knowledge, internalise, integrate resources, reconfigure resources, and utilise and develop resources in response to the rapidly changing external environment (Chen et al., 2020). Dynamic absorptive capacity is not only a process that continuously promotes the acquisition, absorption and utilisation of knowledge, especially implicit knowledge, but also a higher-order skill that can detect new opportunities and achieve strategic flexibility (Rodríguez-Serrano and Martín-Armari, 2019).

This paper applies dynamic absorptive capability to the innovation level of high-tech enterprises, and further studies the dynamic absorptive capability in the field of enterprise sustainable development strategy. It may provide more abundant resources for dual innovation. Dynamic absorptive capacity is also an open process that requires interaction with multiple stakeholders, through the integration of internal and external network resources, the improvement of existing knowledge bases, the enrichment of internal resource reuse and integration, and the continuous development of innovation processes (Kim and Choi, 2018).

3 Literature review and hypothesis

3.1 Dynamic absorptive capacity and dual innovation

Benner and Tushman (2003) divides dual innovation into exploitative innovation and exploratory innovation, and defines exploitative innovation as a small range of innovation behaviour with low risk within the scope of the original technology, generally with short and predictable return on investment, which is the repair of the existing technology by the enterprise. Exploratory innovation is a new attempt for enterprises to carry out large-scale innovation with high risk outside the scope of the original technology, with long return on investment, high uncertainty and high probability of innovation failure. Exploratory innovation, by definition, pursues more new knowledge and resources (March, 1991), while exploitative innovation builds on existing knowledge, technology, and markets (Lin and Chang, 2015). Therefore, for innovative enterprises, knowledge is an important source of innovation.

Knowledge is one of the factors that can help enterprises achieve growth and competitive advantage (Kaur and Kaur, 2019), and has a significant impact on the implementation of innovative growth and development strategies (Agramunt and Berbel-Pineda, 2018; Schweisfurth and Raasch, 2018). However, knowledge can not directly bring competitive advantage to enterprises, but need to acquire knowledge, use knowledge, transform knowledge into energy, and help enterprises achieve their goals

(Franco et al., 2016), Therefore, absorptive capacity has a positive effect on innovation and has an important impact on innovation (Marco-Lajara et al., 2023). At the same time, knowledge is not a static resource, but a dynamic capability of a specific resource (Zahra and George, 2002), which is embedded in organisational practices and processes through which enterprises acquire, absorb, transform and utilise knowledge to generate dynamic organisational capabilities. That constitutes a dynamic absorptive capacity (Alves and Galina, 2020). The primary goal of enterprises to use external knowledge is to innovate. Through dynamic identification, absorption and application of external knowledge in a form suitable for business, promoting technological innovation is an important prerequisite for improving sustainable competitiveness (Nguyen, 2022).

Studies have shown that organisations with weak dynamic absorptive capacity have difficulty in achieving better innovation performance (An et al., 2021). Therefore, dynamic absorptive capacity has become the main driver of competition among R&D-intensive firms (An et al., 2021). It plays a key role in the process of exploitative innovation (Ferreras-Méndez et al., 2016), and organisations with strong dynamic absorptive capacity can quickly identify, acquire and utilise complementary knowledge and resources lacking in cooperative networks. Transforming it into the internal R&D and innovation process of the organisation based on digestion and absorption, accelerating the innovation process (Lucena and Roper, 2016), can improve the innovation efficiency and innovation performance of enterprises (Liu et al., 2021). Based on this, we propose the following assumptions:

H1a Dynamic absorptive capacity has a positive impact on exploitative innovation.

H1b Dynamic absorptive capacity has a positive impact on exploratory innovation.

3.2 The impact of resource bricolage on the relationship between dynamic absorptive capacity and dual innovation

Can enterprises bring competitive advantages to enterprises through resource bricolage? Some researchers believe that resource bricolage can stimulate product innovation, improve R&D within enterprises, promote the development of new products, and have a positive impact on innovation performance, thus helping to enhance the competitive advantage of enterprises (Fuglsang and Sørensen, 2011; Wu et al., 2017). Lavie et al. (2010) believe that both exploratory innovation and exploitative innovation can improve enterprise performance, but they will compete for enterprise resources and easily make enterprises fall into the dilemma of resource constraints. When enterprises have limited or no additional resources, bricolage has important strategic significance for enterprises and can take on new challenging tasks (Busch and Barkema, 2021). That is to say, bricolage is a strategic process that uses idle and minimal resources at hand to go beyond the scope of current activities (Ott et al., 2017).

Furthermore, the firm can be seen as an organisation that innovates and scales at low cost, and bricolage is often seen as a local source of low-cost innovation (Busch and Barkema, 2021). Addressing resource constraints is often the starting point for bricolage, in which firms often rely on resource bricolage (Busch and Barkema, 2021). Therefore, bricolage has become an important mechanism for early exploration and development, and the use of bricolage to develop product and market scope is particularly important for enterprises (Tasavori et al., 2018). In the entrepreneurship literature, bricolage is increasingly recognised as a viable strategy to address resource constraints in poverty

settings (Tasavori et al., 2018). Studies have shown that bricolage can stimulate product innovation, improve R&D within enterprises, and promote the development of new products (Wu et al., 2017). Witell et al. (2017) also believes that bricolage can help enterprises identify new opportunities, bring business model innovation, and gain sustainable competitive advantage. In other words, resource bricolage is not only a good strategic orientation for enterprises in resource shortage, but also a good strategic guidance for other enterprises. Enterprises can get rid of resource constraints through 'bricolage' so as to overcome obstacles and create new value, which is an important factor directly affecting innovation.

In addition, Vanevenhoven et al. (2011) argues that there are two types of resource bricolage: external bricolage, which includes activities that enable firms to access potential resources in the external environment; and internal bricolage, which involves the internal resources of firms and plays a role in their operations and management. Dynamic absorptive capacity is the rapid absorption, integration, utilisation and transformation of external resources to respond to the market (Chen et al., 2020). Xie et al. (2018) believe that high-tech enterprises are highly dependent on organisational learning and knowledge absorption, and have good absorptive capacity, which can help enterprises establish and improve the existing knowledge base. The acquisition of external knowledge can improve the creativity of employees, and creative employees can break the conventional combination of resources and achieve bricolage (Schweisfurth and Raasch, 2018).

Based on the above views of scholars, this study argues that the ability to identify, absorb, transform and utilise market-oriented, that is, dynamic absorptive capacity, is the premise of affecting the effective use of enterprise resources. Enterprises with strong dynamic absorptive capacity can transform external potential and valuable resources into internal available resources, and effectively piece together and manage existing resources to solve the problem of resource scarcity in the process of innovation, reduce costs and time, and enhance the development efficiency of new products and new technologies. Based on this, the following assumptions are proposed:

H2a Resource bricolage plays a positive mediating role between dynamic absorptive capacity and exploitative innovation.

H2b Resource bricolage plays a positive mediating role between dynamic absorptive capacity and exploratory innovation.

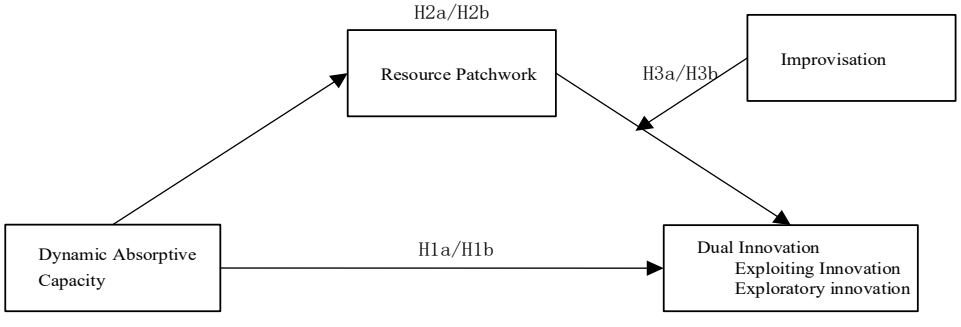
3.3 The influence of relationship among improvisation, resource bricolage and dual innovation

Improvisation refers to the interdependence of business decisions in a changing environment, a concept that scholars have likened to adaptive execution in jazz performance or improvisational comedy and drama (Lewin, 1998; Zack, 2000). The improvisational nature highlights that the design and execution processes are simultaneous, rather than a priori, sequential, and orchestrated (Di Domenico et al., 2010).

Cunha et al. (2001) argue that improvisation plays an important role in the development of new products and markets. As the product development process of a firm is iterative, it requires constant modifications through regular interactions with the market

and its customers (Tasavori et al., 2020). This is in line with 'emergent co-creation', which emphasises the process of developing products through improvisation (Garud and Karnøe, 2003). Therefore, in the development of each new business activity, enterprises constantly develop new resources and skills, and use improvisation to solve the problems encountered in business activities (Huber and Glick, 1993). Witell et al. (2017) further research shows that enterprises use improvisation in the development and start-up stage of service innovation, through the combination of intuition, imagination and creativity of improvisation. This has led to novel solutions that have been embraced by customers (Duymedjian and Rüling, 2010). Improvisation plays an important role in the improvement and creation of enterprises (Hu et al., 2022). In other words, whether enterprises carry out exploratory innovation or exploitative innovation, they can not do without improvisation.

Figure 1 Study architecture diagram



Source: Prepared by the author (2023)

Moreover, bricolage requires the ability to improvise (Tasavori et al., 2020). Resource bricolage is where entrepreneurs improve, imagine, combine, and find new, unexpected resources (Miettinen and Virkkunen, 2005). Improvisation is the combination of knowledge accumulation and experience with intuition, creativity and problem solving (Duymedjian and Rüling, 2010). For, a strong network of external resources and collaborators is essential for the successful development of transformative improvisation (Tasavori et al., 2020). Research has shown that bricolage plays a role in capabilities and behaviours such as improvisation in business and has a significant impact on business outcomes (Baker and Nelson, 2005). Enterprises mobilise internal and external resources through bricolage, and after acquiring resources, they begin to develop products and market scope, a process based on improvisation, thus achieving growth (Tasavori et al., 2020). Based on this, the following assumptions are proposed:

H3a Improvisation positive mediates the relationship between resource bricolage and exploratory innovation.

H3b Improvisation positive mediates the relationship between resource bricolage and exploitative innovation.

According to the above literature discussion and research hypothesis, this study proposes the research framework in Figure 1.

4 Sampling methods and data collection

4.1 Data collection

The data used in this study were collected using questionnaires. This study adopted a stratified random sampling method to improve the questionnaire's representativeness. The main function of stratified random sampling is to increase the representativeness of the sample. In the sample selection, the list of the first batch of high-tech enterprises published on the official website of China's High-tech Enterprise Identification and Management in 2020 was adopted, with 11,203 manufacturers in Hunan Province and four first-tier cities as the research matrix – including 2,189 in Hunan, 1,395 in Beijing, 2,263 in Shanghai, 1,485 in Guangzhou, and 3,871 in Shenzhen. Ghiselli et al. (1981) proposed that the number of questionnaires distributed should be at least 5 to 10 times the number of items in the questionnaire. In this study, there were 56 questions and the total number of questionnaires distributed was at least 280. In this study, 750 samples were randomly selected from the maternal population: 150 from Hunan, 100 from Beijing, 150 from Shanghai, 100 from Guangzhou, and 250 from Shenzhen. The questionnaire was distributed on 5 February 2022, and sent to each senior management member on a company-by-company basis (senior management members refer to those who are fully responsible for the organisation, mainly focusing on communicating with the outside world and determining the organisation's overall policies, including CEO, general managers, deputy general managers, and chief engineers). To increase the number and smooth the recovery of questionnaire responses, follow-up was conducted via telephone calls and e-mail two weeks after the questionnaire was delivered. As of 10 May 2022, a total of 657 questionnaires were collected, and 597 were valid, excluding invalid questionnaires with missing values, incorrect answers, or random answers, with an effective rate of 79.60%.

After collecting the questionnaires, in order to understand the structure of the collected valid samples, this study analyses the sample structure according to the four characteristic variables of industry, establishment years, number of employees and turnover. Among them, from the industry data, it can be seen that the eight industries included in China's high-tech enterprises have been included, of which the electronic information industry accounts for the highest proportion, 44.6%. It shows that the electronic information industry of high-tech enterprises in China is significantly more than other industries. From the part of years of establishment, enterprises with ten years or less account for 52.6%, indicating that high-tech enterprises have a relatively short period of establishment. From the perspective of the number of employees, enterprises with 100 employees or less account for the largest proportion, accounting for 54.6%; due to the short establishment period of high-tech enterprises, enterprises with 100 employees or less account for a large number. From the perspective of turnover, there are 243 enterprises with a turnover of 0.1 to 10 million yuan, accounting for 40.7% at most; as the high-tech enterprises have been established for a short period of time, are small in scale and are in the initial stage of development, the income of enterprises is relatively weaker than that of mature enterprises.

4.2 Measurement

In this study, the maturity scale published in authoritative journals was used to measure the seven-point scale proposed by Likert. In order to ensure the validity and reliability of the items, 100 enterprises were selected for pre-investigation. In terms of reliability, validity and internal consistency, Wu (2010) proposed that the α value of Cronbach's is greater than the 0.7, indicating that the scale has high reliability.

The dynamic absorptive capacity was measured by the scale of Rodríguez-Serrano and Martín-Armario (2019) with 25 items; after testing, the total Cronbach's α value of dynamic absorptive capacity was 0.965 > 0.7, and CITC was greater than 0.4. Resource bricolage refers to eight items in the scale of Senyard et al. (2009); after testing, the total Cronbach's α value of resource bricolage is 0.942 > 0.7, and the mean value of CITC is >0.4. According to the classification of Benner and Tushman (2003), dual innovation is divided into exploitative innovation and exploratory innovation, which are 6 and 7 items respectively, and the scale of Benner and Tushman (2003) is used; After inspection, the total Cronbach's α value of utilisation innovation is 0.895 > 0.7, and the CITC is greater than 0.4. The total Cronbach's α value of exploratory innovation is 0.950 > 0.7, and the CITC is greater than 0.4. Improvisation refers to the scale of Vera et al. (2016) with three items; after testing, the total Cronbach's α value of improvisation is 0.929 > 0.7, and the CITC is greater than 0.4.

The total Cronbach's α of all the above latent variables is greater than 0.7, and the CITC is greater than 0.4, indicating that the scale is reliable and the analysis items are correlated. In addition, compared with the total alpha value of the scale, the reliability of the 'deleted alpha coefficient' of all latent variable analysis items did not increase significantly after deleting any of the analysis items. It means that the analysis items in the scale used for all the above latent variables do not need to be revised or deleted, and the internal consistency is good (Wu, 2010).

5 Analysis and results

In this study, structural equation model was used to verify the research hypotheses with SPSS 25.0 and Mplus 8.3 software. The analysis steps followed the recommendations of the Anderson and Gerbing (1988), that is, to verify the reliability and validity of the measurement data through the evaluation measurement model, and then to verify the research hypotheses mainly to examine the relationship between the variables.

5.1 The reliability and validity

Table 1 shows the reliability and validity test. The results show that:

1 KMO is greater than 0.7 (between 0.767 and 0.980), and Bartlett sphericity test is 0.000, which meets the KMO decision criteria proposed by Wu (2010), indicating that the variables are completely suitable for factor analysis.

2 The α coefficient value of each variable Cronbach's was greater than 0.7 (between 0.895 and 0.965), indicating that the variables had good internal consistency and the scale had high reliability.

3 Through confirmatory factor analysis (CFA), the loading of each factor is greater than 0.6 (between 0.699 and 0.938), which meets the criteria proposed by Wu (2010), indicating that the scale has good validity.

According to the suggestion of Hu and Bentler (1995), the reference value of χ^2/df was less than 5, the reference values of CFI and TLI were greater than 0.90, and the reference values of RMSEA and SRMR were less than 0.08. The model fit metrics for this study are χ^2 = 1,800.165, df = 1,120, χ^2/df = 1.607, CFI = 0.968, TLI = 0.966, RMSEA = 0.032, and SRMR = 0.054, indicating a good model fit.

Table 1 The reliability and validity test

Variable	*Question items*	*The loading of factor*	*The alpha coefficient of Cronbach's α*	*KMO*	*P-value*
Dynamic absorptive capacity	Dynamic absorptive capacity 1	0.741	0.965	0.980	0.000
	Dynamic absorptive capacity 2	0.728			
	Dynamic absorptive capacity 3	0.742			
	Dynamic absorptive capacity 4	0.735			
	Dynamic absorptive capacity 5	0.726			
	Dynamic absorptive capacity 6	0.715			
	Dynamic absorptive capacity 7	0.736			
	Dynamic absorptive capacity 8	0.762			
	Dynamic absorptive capacity 9	0.699			
	Dynamic absorptive capacity 10	0.747			
	Dynamic absorptive capacity 11	0.752			
	Dynamic absorptive capacity 12	0.720			
	Dynamic absorptive capacity 13	0.767			
	Dynamic absorptive capacity 14	0.723			
	Dynamic absorptive capacity 15	0.743			
	Dynamic absorptive capacity 16	0.713			
	Dynamic absorptive capacity 17	0.735			
	Dynamic absorptive capacity 18	0.753			
	Dynamic absorptive capacity 19	0.747			
	Dynamic absorptive capacity 20	0.762			
	Dynamic absorptive capacity 21	0.735			
	Dynamic absorptive capacity 22	0.728			
	Dynamic absorptive capacity 23	0.750			
	Dynamic absorptive capacity 24	0.768			
	Dynamic absorptive capacity 25	0.699			

Notes: χ = 1,800.165, df = 1,120, χ^2/df = 1.607, CFI = 0.968, TLI = 0.966, RMSEA = 0.032, SRMR = 0.054.

Table 1 The reliability and validity test (continued)

Variable	*Question items*	*The loading of factor*	*The alpha coefficient of Cronbach's α*	*KMO*	*P-value*
Exploratory innovation	Exploratory innovation 1	0.872	0.950	0.946	0.000
	Exploratory innovation 2	0.871			
	Exploratory innovation 3	0.880			
	Exploratory innovation 4	0.865			
	Exploratory innovation 5	0.878			
	Exploratory innovation 6	0.879			
	Exploratory innovation 7	0.893			
Exploiting innovation	Exploiting Innovation 1	0.804	0.895	0.912	0.000
	Exploiting Innovation 2	0.828			
	Exploiting Innovation 3	0.794			
	Exploiting Innovation 4	0.825			
	Exploiting Innovation 5	0.790			
	Exploiting Innovation 6	0.821			
Resource bricolage	Resource bricolage 1	0.844	0.942	0.956	0.000
	Resource bricolage 2	0.839			
	Resource bricolage 3	0.851			
	Resource bricolage 4	0.847			
	Resource bricolage 5	0.847			
	Resource bricolage 6	0.840			
	Resource bricolage 7	0.848			
	Resource bricolage 8	0.847			
Improvisation	Improvisation 1	0.938	0.929	0.767	0.000
	Improvisation 2	0.935			
	Improvisation 3	0.935			

Notes: χ = 1,800.165, df = 1,120, χ^2/df = 1.607, CFI = 0.968, TLI = 0.966, RMSEA = 0.032, SRMR = 0.054.

5.2 Descriptive statistics, correlation analysis and common method differences

5.2.1 Descriptive statistics and correlation analysis

Table 2 shows the data distribution, mean, standard deviation and Pearson correlation coefficient matrix of each variable. The results showed that the absolute value of skewness of each dimension of the measured variables was between 0.045 and 1.342, and the absolute value of kurtosis was between 0.610 and 3.17, which met the requirements of normal distribution (Zhu and He, 2004).

In addition, the combined reliability (CR) of the five latent variables is greater than 0.7 (between 0.920 and 0.967), the average variation extraction (AVE) value is greater than 0.5 (between 0.544 and 0.876), and the square root of AVE is greater than the Pearson correlation coefficient, which meets the proposed criteria of Wu (2010). CR was

more than 0.6 and AVE was more than 0.5, which indicated that the scale had good convergent validity and discriminant validity.

Table 2 Reliability and validity of latent constructs, AVE and Correlation

	Exploratory innovation	*Exploitative innovation*	*Dynamic absorptive capacity*	*Improvisation*	*Patchwork of resources*
Exploratory innovation	*0.876*				
Exploitative innovation	0.304*	*0.810*			
Dynamic absorptive capacity	0.482**	0.287**	*0.737*		
Improvisation	0.411**	0.239**	0.272**	*0.935*	
Patchwork of resources	0.630**	0.371**	0.529**	0.464**	*0.845*
Average value	4.5908	5.6823	4.9286	5.1981	4.9953
Skewness	–0.045	–1.342	–0.324	–1.152	–0.080
Kurtosis	–0.894	3.17	0.647	1.951	–0.610
SD	1.37048	0.83698	1.01465	1.26209	1.06117
CR	0.959	0.92	0.967	0.955	0.952
AVE	0.769	0.657	0.544	0.876	0.715

Notes: *p < 0.05, **p < 0.01, ***p ≤ 0.001; the italic value is the arithmetic square root of AVE; the off-diagonal elements are the variable correlations.

Source: Prepared by the author (2023)

5.2.2 Common method bias

Because all measures were collected in the same survey instrument, univariate tests were needed to address common methodological differences. In this pap, that most commonly used Harman single factor analysis method is use. In Table 3, the explained variance value of the first principal component before rotation is 38.852% < 40%, indicating that the common method bias test is passed (Wu, 2010).

Table 3 Common method bias test

Ingredient	*Initial eigenvalue*	*% of variance*	*Cumulative%*	*Extract the square*	*% of variance*
1	19.038	38.852	38.852	19.038	38.852
2	5.279	10.773	49.625	5.279	10.773
3	3.182	6.493	56.118	3.182	6.493
4	2.114	4.314	60.433	2.114	4.314
5	1.816	3.706	64.139	1.816	3.706

Source: Prepared by the author (2023)

6 Structural equation model analysis

6.1 Analysis of the direct and mediating effects

6.1.1 Direct effect analysis

This study first reports the path coefficient of the independent variable to the dependent variable. The full model consists of three submodels. Model 1 regresses exploitative innovation on dynamic absorptive capacity and resource bricolage; model 2 regresses resource bricolage on dynamic absorptive capacity; model 3 regresses exploratory innovation on dynamic absorptive capacity and resource bricolage; and collates and analyses the operation results. Model fit metrics are: χ^2 = 1,800.165, df = 1,120, χ^2/df = 1.607, CFI = 0.968, TLI = 0.966, RMSEA = 0.032, and SRMR = 0.054. All of them are in line with the standard recommended by the Hu and Bentler (1995), indicating that the fitting degree of the hypothesis model is good.

Table 4 shows that all independent variables of direct effect model 1, model 2 and model 3 have significant effects on the dependent variable. Among them, dynamic absorptive capacity has a positive impact on exploitative innovation ($\beta = 0.124$, $t = 2.122$, $p = 0.034 < 0.05$), so H1a is established. Dynamic absorptive capacity has a positive impact on exploratory innovation ($\beta = 0.199$, $t = 2.953$, $p = 0.003 < 0.05$), so H1b holds. Because dynamic absorptive capacity can quickly identify, acquire and utilise complementary knowledge and resources lacking in the cooperation network, and digest, absorb, transform and utilise them into the internal R&D and innovation process of the organisation. Accelerate the innovation process (Lucena and Roper, 2016) and play a key role in the innovation process (Ferreras-Méndez et al., 2016).

Dynamic absorptive capacity has a positive impact on resource bricolage ($\beta = 0.555$, $t = 7.594$, $p = 0.000 < 0.05$), enterprises obtain external resources through dynamic absorptive capacity, and quickly absorb, integrate, utilise and transform (Chen et al., 2020), which can improve employee creativity. Creative employees can break the conventional combination of resources and achieve bricolage (Schweisfurth and Raasch, 2018).

Resource bricolage has a positive effect on exploitative innovation ($\beta = 0.335$, $t = 5.393$, $p = 0.000 < 0.05$, and resource bricolage has a positive effect on exploratory innovation ($\beta = 0.554$, $t = 9.707$, $p = 0.000 < 0.05$, Exploratory innovation and exploitative innovation can improve enterprise performance, but they will compete for enterprise resources and easily make enterprises fall into the dilemma of resource constraints. When enterprises have limited or no additional resources, bricolage has important strategic significance for enterprises and can take on new challenging tasks (Busch and Barkema, 2021).

6.1.2 Analysis of mediating effect

According to Cheung and Lau (2008), the bootstrap method can be used to test the stability of mediation models. In this study, the sample size was set to 5,000 and 95% confidence intervals were defined for the bias-corrected nonparametric percentiles. During the analysis, there was a mediating effect for confidence intervals that did not contain 0, and there was no mediating effect if 0 was included.

Table 4 Direct and mediated effects

Assume the path		*Non-normalised path coefficient*	*Standard error*	*t*	*P value*	*Normalised path coefficients*	*LLCI*	*ULCI*
Direct effect	Dynamic absorptive capacity – exploratory innovation	0.265	0.090	2.953	0.003	0.199	0.132	0.412
	Resource bricolage – exploratory innovation	0.741	0.076	9.707	0.000	0.554	0.557	0.904
	Dynamic absorptive capacity – resource bricolage	0.553	0.073	7.594	0.000	0.555	0.437	0.644
	Dynamic absorptive capacity – exploitative innovation	0.096	0.045	2.122	0.034	0.124	0.012	0.191
	Resource bricolage – leveraging innovation	0.259	0.048	5.393	0.000	0.335	0.158	0.357
Model 1: mediating effect	Total effect: X-Y	0.239	0.046	5.159	0.000		0.149	0.309
	Direct effect: X-Y	0.096	0.045	2.122	0.034		0.012	0.191
	Total indirect effect: X-M-Y	0.143	0.027	5.371	0.000		0.101	0.201
Model 2: mediating effect	Total effect: X-Y	0.675	0.103	6.538	0.000		0.509	0.830
	Direct effect: X-Y	0.265	0.090	2.953	0.003		0.132	0.412
	Total indirect effect: X-M-Y	0.410	0.046	8.989	0.000		0.319	0.486

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

Source: Prepared by the author (2023)

Because dual innovation is composed of exploitative innovation and exploratory innovation, this mediating effect analysis involves two sub-models. Model 1 takes "dynamic absorptive capacity as independent variable, resource bricolage as mediating variable, and exploitative innovation as dependent variable"; model 2 is a structural equation model with dynamic absorptive capacity as the independent variable, resource bricolage as the intermediary variable, and exploratory innovation as the dependent variable.

In Table 4, the analysis of mediating effect is the output includes total effect, direct effect, total indirect effect, etc. The bootstrap sampling test was used to study the mediating effect.

Table 4 shows that the bootstrap 95% confidence interval of the total effect of model 1 mediation effect is 0.149–0.309, and the test results do not include 0, indicating that the total effect is significant. The direct effect is 0.012–0.191, and the test results do not include 0, indicating that the direct effect is significant. The 95% confidence interval of 'X-M-Y' bootstrap is 0.101–0.201, and the test results do not include 0, which indicates that this mediating effect path exists. When the mediating variable is added to the model, the independent variable significantly affects the dependent variable, which can be identified as partial mediation, so H2a is established. Model 2 The bootstrap 95% confidence interval of the total effect of the mediating effect is 0.509–0.830, and the test results do not include 0, indicating that the total effect is significant. The direct effect is 0.132-0.412, and the test results do not include 0, indicating that the direct effect is significant. The 95% confidence interval of 'X-M-Y' bootstrap is 0.319–0.486, and the test results do not include 0, which indicates that this mediating effect path exists. When the mediating variable is added to the model, the independent variable significantly affects the dependent variable, which can be identified as partial mediation, so H2b is established. Exploratory innovation and exploitative innovation can both improve enterprise performance, but they will compete for enterprise resources and easily make enterprises fall into the dilemma of resource constraints (Lavie et al., 2010). When enterprises have limited or no additional resources, bricolage is of great strategic significance to enterprises (Busch and Barkema, 2021) and is a feasible strategy to solve resource constraints in poverty environment (Tasavori et al., 2018). There are two kinds of resource bricolage: internal and external; external bricolage includes activities that can enable enterprises to obtain potential resources in the external environment (Vanevenhoven et al., 2011). Dynamic absorptive capacity is the rapid absorption, integration, utilisation and transformation from external resources (Chen et al., 2020). The acquisition of external knowledge can improve the creativity of employees, and creative employees can break the conventional combination of resources and achieve bricolage (Schweisfurth and Raasch, 2018).

6.1.3 Analysis of the moderating effect

6.1.3.1 Model 1: moderating effect test

In this paper, the potential regulatory structural equation method is used to test the role of regulatory variables. When the standardised coefficient of interaction $P < 0.05$, it indicates that the regulation effect is significant (Kelava et al., 2011). Because dual innovation is composed of exploitative innovation and exploratory innovation, this mediating effect analysis involves two sub-models. Model 1 takes dynamic absorptive capacity as independent variable, resource bricolage as mediating variable, exploitative innovation as dependent variable, and improvisation as moderating variable; model 2 is a structural equation model with dynamic absorptive capacity as the independent variable, resource bricolage as the intermediary variable, exploratory innovation as the dependent variable, and improvisation as the moderating variable.

Model fit metrics for the moderating effect of model 1: χ^2 = 1,326.024, df = 731, χ^2/df = 1.8139, CFI = 0.963, TLI = 0.960, RMSEA = 0.037, SRMR = 0.043, it meets the

standard recommended by the Hu and Bentler (1995), indicating that the fitting degree of the hypothesis model is good. Table 5 shows that the normalised path coefficient of interactive item resource bricolage * improvisation on exploitative innovation is 0.368, t = 5.407, p = 0.000 < 0.05, indicating that interactive item resource bricolage * improvisation has a positive moderating effect on exploitative innovation, so H3a is established.

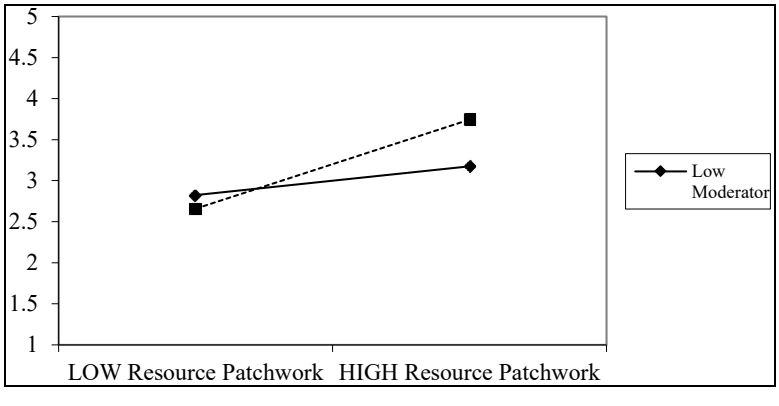
Table 5 Latent regulatory structural equation analysis of the relationship between resource bricolage and exploitative innovation in improvisation

Variable relationship	*Unnormalised path parameters*	*Standard error*	*t*	*p*	*Normalised path parameters*
Resource bricolage – exploitative innovation	0.127	0.056	2.256	0.024	0.175
Improvisation – exploitative innovation	0.124	0.044	2.802	0.005	0.200
Resource bricolage and improvisation interactive items – exploiting innovation	0.211	0.039	5.407	0.000	0.368

Source: Prepared by the author (2023)

In order to further explore the moderating effect of improvisation, this study also drew a moderating effect model diagram (see Figure 2). When the value of the moderating variable improvisation is lower, the higher the degree of the independent variable dynamic absorptive capacity is, the higher the degree of the dependent variable exploitative innovation is. Therefore, H3a is established. Due to the intuition, imagination and creativity of improvisation used by enterprises in the development and start-up phase of innovation, innovative solutions are brought about and recognised by customers (Duymedjian and Rüling, 2010; Witell et al., 2017). Therefore, improvisation plays an important role in the development of new products and markets (Cunha et al., 2001).

Figure 2 The moderating effect of resource bricolage on dynamic absorptive capacity and exploitative innovation



Source: Prepared by the author (2023)

Testing the mediated mediating effect of model 1

In order to further test the mediated mediating effect, the coefficient multiplication method proposed by Hayes (2015) was used to analyse the mediated mediating effect. According to the difference analysis method proposed by Edwards and Lambert (2007), the moderating effect of the mediating effect was further verified.

Table 6 Mediated mediating effects of model 1

Regulating variable	*Indirect effects*	*Standard error*	*t*	*P value*	*Boots LLCI*	*Boots ULCI*
Low improvisation	–1.232	0.080	–15.326	0.000	–1.437	–1.083
High improvisation	1.232	0.051	24.245	0.000	1.156	1.363
Difference	0.301	0.066	4.561	0.000	0.196	0.477
Mediated mediating effect						
Index	0.195	0.045	4.292	0.000	0.117	0.304

Source: Prepared by the author (2023)

Table 6 shows that in the mediation of dynamic absorptive capacity through resource bricolage to exploitative innovation, when improvisation is low (one standard deviation below the mean), the mediation effect of dynamic absorptive capacity through resource bricolage to exploitative innovation is –1.232 ($P < 0.05$), bootstrap 95% confidence interval [–1.437, –1.083], excluding 0, the mediating effect was significant; when improvisation was high (one standard deviation above the mean), the mediating effect of dynamic absorptive capacity through resource bricolage to exploitative innovation was 1.232 ($P < 0.05$), bootstrap 95% confidence interval [1.156, 1.363], excluding 0, the mediating effect was significant. The mediating effect difference between the mediating path indirect effect value when the improvisation behaviour is high and the mediating path indirect effect value when the improvisation behaviour is low is 0.301 ($p < 0.05$), bootstrap 95% confidence interval [0.196, 0.477], excluding 0, and the difference is significant. In addition, the results of Table 6 show that the effect value of the judgment index of the moderating effect of resource bricolage on the indirect effect of dynamic absorptive capacity on exploitative innovation is 0.195 ($P < 0.05$), and the confidence interval is [0.117, 0.304], excluding 0, which indicates that the mediating effect of the moderating effect in the mechanism of dynamic absorptive capacity on exploitative innovation is significant.

6.1.3.2 Model 2: moderating effect test

Model fit indicators for the moderating effect of model 2: $\chi^2 = 1{,}399.641$, df = 770, $\chi^2/df = 1.8177$, CFI = 0.965, TLI = 0.963, RMSEA = 0.037, SRMR = 0.044, which met the criteria recommended by Hu and Bentler (1995). It shows that the fitting degree of the hypothesis model is good. Table 7 shows that the normalised path coefficient of interaction item resource bricolage * improvisation to exploratory innovation is 0.186, t value = 2.881, $p = 0.004 < 0.05$, indicating that interaction item resource bricolage * improvisation has a positive moderating effect on exploratory innovation, so H3b is established.

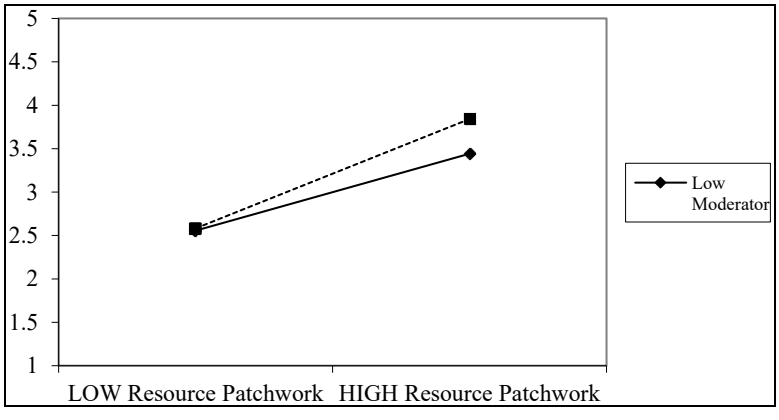
Table 7 Latent regulatory structural equation analysis of the relationship between resource bricolage and exploratory innovation in improvisation

Variable relationship	*Unnormalised path parameters*	*Standard error*	*t*	*p*	*Normalised path parameters*
Resource bricolage – exploratory innovation	0.545	0.074	7.370	0.000	0.444
Improvisation – exploratory innovation	0.225	0.062	3.638	0.000	0.213
Resource bricolage and improvisation interaction – exploratory innovation	0.182	0.063	2.881	0.004	0.186

Source: Prepared by the author (2023)

In order to further explore the moderating effect of improvisation, this study also drew a moderating effect model diagram (see Figure 2). When the value of the moderating variable improvisation is lower, the higher the degree of the independent variable dynamic absorptive capacity is, the higher the degree of the dependent variable exploratory innovation is. Therefore, H3b is established. As the product development process of a firm is iterative, it requires constant modifications through regular interactions with the market and its customers (Tasavori et al., 2020). This is in line with 'emergent co-creation', which emphasises the process of developing products through improvisation (Garud and Karnøe, 2003). Therefore, improvisation also plays an important role in the improvement and creation of enterprises (Hu et al., 2022).

Figure 3 The moderating effect of resource bricolage on dynamic absorptive capacity and exploratory innovation



Source: Prepared by the author (2023)

Testing the mediated mediating effect of model 2

Table 8 shows the mediating effect analysis results of model 2, i.e., "dynamic absorptive capacity as the independent variable, resource bricolage as the mediating variable, exploratory innovation as the dependent variable, and improvisation as the moderating variable."

Table 8 Mediated mediating effects of model 2

Regulating variable	*Indirect effects*	*Standard error*	*t*	*P value*	*Boots LLCI*	*Boots ULCI*
Low improvisation	–1.228	0.093	–13.149	0.000	–1.420	–1.055
High improvisation	1.228	0.052	23.456	0.000	1.137	1.337
Difference	0.262	0.093	2.805	0.005	0.115	0.473
Mediated mediating effect						
Index	0.238	0.068	3.517	0.000	0.124	0.391

Source: Prepared by the author (2023)

Table 8 shows that in the mediation of dynamic absorptive capacity to exploratory innovation through resource bricolage, when improvisation is low (one standard deviation below the mean), the mediation effect of dynamic absorptive capacity to exploratory innovation through resource bricolage is –1.228 ($P < 0.05$), bootstrap 95% confidence interval [–1.420, –1.055], excluding 0, the mediating effect was significant; when improvisation was high (one standard deviation above the mean), the mediating effect value of dynamic absorptive capacity through resource bricolage to exploratory innovation was 1.228 ($P < 0.05$), bootstrap 95% confidence interval [1.137, 1.337], excluding 0, the mediating effect was significant. The mediating effect difference between the mediating path indirect effect value when the improvisation behaviour is higher and the mediating path indirect effect value when the improvisation behaviour is lower is 0.262 ($P < 0.05$), bootstrap 95% confidence interval [0.115, 0.473], excluding 0, and the difference is significant. In addition, the results of Table 6 show that the indirect effect of resource bricolage on the influence of dynamic absorptive capacity on exploratory innovation has a moderating effect. The effect value of the judgment index is 0.238 ($P < 0.05$), and the confidence interval is [0.124, 0.391], excluding 0, which indicates that the moderating mediating effect in the mechanism of the influence of dynamic absorptive capacity on exploratory innovation is significant.

7 Conclusions and discussion

Based on the theory of dynamic absorptive capacity, this paper studies the significance of dynamic absorptive capacity in promoting enterprise innovation with the intermediary role of resource bricolage, and reveals that the three organisational capabilities of dynamic absorptive capacity, resource bricolage and improvisation support the sustainable development and innovation of enterprises. Specifically, the following conclusions can be drawn:

First, dynamic absorptive capacity has a significant positive effect on dual innovation. This result supports the research hypothesis and is consistent with previous studies (Lucena and Roper, 2016; Ferreras-Méndez et al., 2016). Because dynamic absorptive capacity can quickly identify, acquire and utilise complementary knowledge and resources in the cooperation network, and digest, absorb, transform and utilise them into the internal R&D and innovation process of the organisation, thus accelerating the innovation process (Lucena and Roper, 2016); it can also improve employee creativity (Schweisfurth and Raasch, 2018). This study finds that dynamic absorptive capability

plays an important role in both exploitative innovation and exploratory innovation. In view of the importance of dynamic absorptive capability, enterprises need to deploy this capability to provide protection for sustainable development.

Second, resource bricolage partially mediates the relationship between dynamic absorptive capacity and dual innovation. resource bricolage contributes to the sustainability of innovative firms, consistent with previous findings (Fuglsang and Sørensen, 2011; Wu et al., 2017). Dynamic absorptive capacity is the rapid absorption, integration, utilisation and transformation from external resources (Chen et al., 2020). The acquisition of external knowledge can improve the creativity of employees, and creative employees can break the conventional combination of resources and achieve bricolage (Schweisfurth and Raasch, 2018). In addition, dual innovation is likely to make enterprises fall into the dilemma of resource constraints (Lavie et al., 2010). Bricolage is strategically important for firms when they have limited or no additional resources (Busch and Barkema, 2021). This study also finds that dynamic absorptive capacity can obtain resources from outside, which is the premise and basis for resource bricolage to obtain external resources, and provides a guarantee for the effective use of resource bricolage. At the same time, resource bricolage makes full use of idle and minimum resources to solve the problem of resource shortage in the process of innovation, and provides strong support for the sustainable development of enterprises. In addition, this study also proves that resource bricolage plays an important role in the relationship between dynamic absorptive capacity and dual innovation.

Third, improvisation plays a positive moderating role between resource bricolage and dual innovation. Previous studies have suggested that bricolage plays a role in the ability and behaviour of improvisation and has a significant impact on business outcomes (Baker and Nelson, 2005). Enterprises mobilise internal and external resources through bricolage, and after acquiring resources, they begin to develop products and market scope, a process based on improvisation, thus achieving growth (Tasavori et al., 2020). This study also finds that improvisation has an important impact on dual innovation and is an important capability of enterprise innovation behaviour. In view of its importance, enterprises should deploy this capability in innovation development strategy to bring more innovation performance growth for enterprises.

8 Research recommendations

The results provide suggestions for academia, industry and follow-up researchers. Academics, first of all, reveal that dynamic absorptive capacity plays an important role in enterprise innovation, and whether it is exploratory innovation or exploitative innovation, dynamic absorptive capacity plays a positive role, extending the theory of dynamic absorptive capacity. Furthermore, this paper extends the understanding of resource bricolage, reveals that dynamic absorptive capacity is the premise for resource bricolage to fully obtain external resources, and has a positive role in promoting the effective play of resource bricolage, while fully idle resources can effectively solve the problem of resource shortage in innovative enterprises, which makes up for the shortcomings of resource-based theory and resource dependence theory, and extends the research status of resource bricolage. It enriches the theory of resource bricolage. Finally, it is revealed that improvisation is an important ability in the field of enterprise innovation, and

improvisation plays an interference role in both exploratory innovation and exploitative innovation, which expands the understanding of improvisation in the field of innovation.

In the aspect of industry, this study mainly aims at the managers of high-tech enterprises. First of all, Because high-tech enterprises have faster innovation process, more modes and more obvious innovation characteristics, this kind of enterprises are pursuing new products and services faster, so temporary organisational action is inevitable. This study emphasises the important role of improvisation in the innovation process of high-tech enterprises in the face of high-speed environment. The results show that, under certain conditions, enterprise improvisation has a positive impact on its own innovation ability. Therefore, high-tech enterprises need to fully cultivate and utilise this ability in order to accelerate the improvement and innovation of enterprises. Moreover, correct strategic decision-making is the premise of sustainable development of enterprises. In view of the importance of dynamic absorptive capacity, high-tech enterprises should give full play to their ability to identify and absorb diverse external resources to respond to the market, and at the same time provide protection for resource bricolage to obtain external resources and effectively play. When enterprises have some idle resources, they need to make full use of idle resources, find new allocation models, reduce costs, innovate, enhance the core competitiveness of enterprises, and achieve sustainable development and economic growth. Finally, enterprises should strengthen the ability to deploy improvisation in order to improve their innovation performance, whether in exploitative innovation or exploratory innovation.

In terms of follow-up research, in view of the importance of dynamic absorptive capacity, dynamic absorptive capacity can be measured in dimensions, so as to have a deeper understanding of the impact of dynamic absorptive capacity on innovation, and future research can be measured in dimensions. Secondly, this study takes resource bricolage as a mediating variable between dynamic absorptive capacity and dual innovation. Because the impact of dynamic absorptive capacity on dual innovation may be affected by many mediating variables, more mediating variables can be taken into account in future research. Finally, the survey object of this study is high-tech enterprises. Previous studies believe that improvisation can promote and weaken innovation (Akgün and Lynn, 2002; Kyriakopoulos, 2011), that later research can expand the scope of investigation or investigate from the enterprise growth cycle, whether non-high-tech enterprises also need to have the ability of improvisation or whether there is a difference in the impact of improvisation on innovation in the enterprise growth cycle.

9 Limitations

This study has the following limitations. First of all, the samples used in this study are high-tech enterprises in five regions of China, which have been established for a relatively short period of time and are in the initial stage of enterprises. Future research can start with different life cycles of enterprises or non-high-tech enterprises to examine whether improvisation has a positive impact on other growth cycles of enterprises or non-high-tech enterprises. Secondly, the impact of dynamic absorptive capacity on dual innovation may be affected by many mediating variables, and future research can take more mediating variables into consideration, so as to form a more comprehensive understanding of the boundary conditions of the impact of dynamic absorptive capacity on dual innovation. Finally, this is a cross-sectional quantitative study, so the results only

confirm the relationship between the variables at that time. Future longitudinal studies or qualitative methods will help to further understand the dynamic process of the change of the relationship between the variables.

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