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Article

Absorptive Capacity, Strategic Flexibility, Bricolage, and Product Innovation: Empirical Evidence from Chinese SMEs

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Abstract: There have been relatively few researches that determine the role of bricolage in mediating the empirical relationship between strategic flexibility and product innovation. However, most of the research has studied strategic flexibility to engage the absorptive capacity and facilitate product innovation. The Bricolage approach emphasizes utilizing existing resources in product innovation and explores the mechanisms behind bricolage. A resource-based approach to product innovation involves combining resources in the development process in a concrete manner. This is a groundbreaking study since it is the first to examine empirically how absorptive capacity affects product innovation through bricolage and the serial mediation of strategic flexibility. As a consequence of presenting our results, we concluded that absorptive capacity positively and significantly influences product innovation through the serial mediation of strategic flexibility and bricolage. For strategic flexibility to play a role in supporting product innovation, bricolage is one of the mechanisms that can be utilized. This study contributes to the literature on strategic flexibility by examining the effect of strategic flexibility on bricolage and product innovation from the standpoint that absorptive capacity enhances the strategic flexibility of high-tech SMEs in China. Furthermore, this research offers new insights into the relationship between absorptive capacity and product innovation. In addition, it also provides insight into the economic opportunities that may result from product innovation in transition economies such as China.

Keywords: strategic flexibility; bricolage; absorptive capacity; product innovation; SMEs

1. Introduction

As Cohen and Levinthal (1990) stated in a seminal paper, finding new information, assimilating it, and using it to drive business practices is a crucial step toward innovation. A firm's ability to absorb information is known as its absorptive capacity (AC) and is largely determined by its knowledge. When it comes to allocating resources to innovation, AC can influence a company's decision-making process. As a byproduct of its regular activities, a company is more likely to develop and maintain AC if the knowledge it wants to implement is purely related to its existing skills. In Cohen and Levinthal (1990), firms who want to obtain or use knowledge unrelated to their ongoing interests should allocate individual efforts toward creating AC. Firms may not even be aware of AC's existence as an investment option. Although it may be attractive to invest in training its technical talent to accommodate knowledge gained from new fields, its management may be reluctant. To learn, adapt, and implement updated knowledge coming from other companies, the ability of the organization to learn, adapt, and implement external knowledge is critical (Cohen and Levinthal, 1990; Bradford and Saad, 2014). Joint ventures are often used to transfer knowledge. Fang and Zou (2010) found that collective learning capacity would cause foreign and local organizations to become less dependent on one another. In contrast, absorptive learning capacity would force them to become more dependent. As a result of these findings, international joint ventures are at risk of instability due to partner learning. It is argued by Lane and Lubatkin (1998) that if two firms are similar, they can

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learn from each other. The paper by Egbetokun and Savin (2014) demonstrates that firms that collaborate share complementary information to expand their understanding of the other's business. As for firm performance, they found that AC, which creates new knowledge fueled by innovation, determines the amount of external knowledge absorbed. Liao et al. (2012) examined that the effects of multiple spillovers are affected by different aspects of AC. They suggest that AC explains productivity differences in Chinese firms. A firm's choice of AC partners may also depend on the level of investment it is willing to make to overcome the understanding/novelty trade-off, as described in Egbetokun and Savin (2014). Firms cannot only compete with internal resources but must also use new technologies to stay competitive and grow, according to Ernawati and Flanagan (2012). Hence, investing in AC is a prerequisite to innovation.

(Dean et al., 1998; Forbes & Milliken, 1998) Pointed out that small companies often suffer resource disadvantages compared to their larger competitors. Small firms are at a competitive disadvantage due to their smaller size, lack of economies of scale, limited financial resources, and lower management skills, as noted by Brinckmann et al, (2019) and Brozovic (2018). Because small manufacturing companies must spend a large sum of money on equipment and plants, they are confronted by a high-risk environment (Thompson & Bates, 1957). Research shows that small and medium-sized businesses fail at more excellent rates than large organizations (Lu & Beamish, 2001; Terziovski, 2010). The firms' size and structure also enable them to adapt to changing environments promptly (Fiegenbaum & Karnani, 1991). By quickly reacting to changes in the environment, small firms can gain a competitive advantage over more prominent organizations. In this sense, strategic flexibility has contributed to competitive advantage (Zahra et al., 2008). Using prior literature, strategic flexibility is defined in this paper as an organization's ability to adjust its strategy to remain competitive.

Strategic flexibility enhances the competitiveness of small businesses. However, it is underdeveloped in SME research (Brozovic, 2018). Several scholars have argued that the more excellent resources of large firms allow them to demonstrate greater strategic flexibility (Nordin et al., 2013; Aaker, 2005; Pauwels & Matthyssens, 2004). According to researchers, small companies, especially those in the manufacturing industry, can exploit these resource shortages by increasing their strategic flexibility using appropriate methods (Santos-Vijande et al., 2012; Nadkarni & Herrmann, 2010; Zahra et al., 2008). If the SMEs intend to improve their strategic flexibility , they must learn the strategies of efficient resource management (Brinckmann et al., 2019).

The lack of resources appears to give SMEs a structural advantage compared to those large ones (Verdu-Jover et al., 2006; Ebben & Johnson, 2005). Smaller firms are more responsive to consumer tastes and preferences due to the absence of bureaucracy and diversification in large firms (Brozovic, 2018; Ebben & Johnson, 2005). Because large firms have difficulty adapting quickly to new business environments, small ones can better develop meta-flexibility. The other effective way to enhance strategic flexibility for small companies is to focus on the right markets and communicate with the right people (Celuch & Murphy, 2010). Therefore, companies with greater strategic flexibility are likely to perform better overall and grow internationally (Tolstoy, 2014; Zhang et al., 2014).

Studies on small companies have first found that they can enhance their strategic flexibility through the formation of networks (Cho et al., 2021). As a result, their coordination with partners can be made easier (Tolstoy, 2014). Cognitive capabilities and managerial flexibility are necessary for small businesses to increase their strategic flexibility (Shukla et al., 2019). There is not enough information about the strategies small businesses can use to learn strategic flexibility, which is helpful in product innovation through bricolage. The present study highlights the role of AC as a key to improving the performance of small firms by enhancing their strategic flexibility.

We argue that SMEs can efficiently develop relationships with suppliers to achieve synergistic collaboration by network theory (Eggers et al., 2017; Tolstoy, 2014; Borgatti & Foster, 2003). Further, it has been found by Zhou et al. (2014), Li et al. (2006), and Li (2002)

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that the ability of small firms to absorb new information is positively correlated with strategic flexibility.

China's fast growth and dynamic and dysfunctional institutional environment make it an ideal setting for testing the research hypotheses. China had an estimated 38 million small and medium-sized enterprises in 2019 (Statista; 2021). In China, small and medium-sized companies makeup 94% of the economy, generate 60% of the GDP and create about 70% of all urban jobs. Most SMEs operate in the services sector, mainly in wholesale, retail, and leasing, while another 30% are in the industrial sector. According to the OECD, about half of China's business tax revenues come from SMEs. There is no uniform way of classifying SMEs in China. This is due to different criteria applied to different economic sectors based on the number of employees, annual revenue, and total assets. In contrast, small construction companies can have a maximum business value of US$8.5 million, while a medium-sized agricultural business must have at least 500 employees. Comparatively speaking, SMEs in China tend to be larger than those in many other economies.

Several factors that predict strategic flexibility in emerging economies have been examined in previous research, including CEO personality (Nadkarni & Herrmann, 2010), alliances to develop new products (Dai et al., 2018), and IT support (Chen et al., 2017). This study examines how AC impacts product innovation and tests strategic flexibility and bricolage as mediators between AC and product innovation. By demonstrating, empirically and theoretically, how strategic flexibility and bricolage mediate between absorptive capacity and product innovation, the study will make a significant contribution to both the existing theoretical and empirical literature. The majority of the studies focusing on the impacts of strategic flexibility have been conducted in the context of market entry (Claussen et al., 2018), innovation (Li et al., 2010; Wei et al., 2014; Kato & Zhou, 2018), firm performance (Combs et al., 2011; Chen et al., 2017; Guo & Cao, 2014), energy efficiency (Schulze & Heidenreich, 2017) and competitive advantage (Nadkarni & Narayanani, 2007; Dreyer & Gronhaug, 2004). We extend the literature by studying how strategic flexibility and bricolage transfer the effects of AC on product innovation. As bricolage exercises involve a specific procedure that must be followed to develop a new product, they can serve to increase understanding of the impact of strategic flexibility on product innovation. Besides being pertinent to the literature on strategic flexibility (Brozovic, 2018) and bricolage (Desa & Basu, 2013), and absorptive capacity (Reid, 2018), this paper also contributes to the existing body of knowledge on very similar topics.

Following is an overview of the rest of the study. In section 2, we describe the background of the study and give a critical review of the relevant literature. In Section 3, the data collection instrument, sample, and statistical methods are presented. The results of the analysis are presented in Section 4. Having concluded the study, section five discussed the implications of the findings.

2. Research Background and Conceptual Framework Development

2.1. Strategic Flexibility

By continually adapting resources and strategic actions to a constantly changing environment, flexibility is viewed as a way of adapting to a constantly changing environment. Strategic flexibility can be seen as the use of valuable resources to create a competitive advantage from a resource-based perspective (Sanchez, 1995). For a company to weather the external pressures of the market and consumers, it needs to adapt to competitive threats in various ways. Given external challenges and threats, as well as technological advances, it is necessary to confidently redirect and relocate resources and production processes (Bock et al., 2012). Therefore, the flexibility of resources used to develop new products is defined as strategic flexibility. In uncertain markets, these resources can improve a company's core competitiveness (Zhou & Wu, 2010; Eisenhardt & Martin, 2000). Flexibility in an organization's strategy is conducive to expanding innovation resources (Li et al., 2017). Thai firms are more likely to adapt their strategies to the economic downturn (Grewal & Tansuha, 2001) and enter new markets in the US aviation sector (Claussen

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et al., 2018). Companies need to ensure they can meet market demands. As a service provider, we must provide flexible workers (Kato & Zhou, 2018), an adaptable supply chain (Ko et al., 2018), and flexible manufacturing processes (Jesus et al., 2018).

The ability to allocate and coordinate resources in a competitive marketplace will reduce uncertainty by focusing on resource allocation and coordination. The key to flexible resource management is to allocate and coordinate resources. Resources should be defined as a range of products that could be developed and manufactured by using those resources (Zhou & Wu, 2010). Altering resource usage ensuring that the changeover process is as short and inexpensive as possible (Sanchez, 1995; Sanchez & Heene, 1997). Accordingly, coordination flexibility can be defined as the ability to coordinate the deployment of new product designs and allocate resources effectively so that product strategies can be adjusted (Brozovic, 2018).

By identifying market opportunities and deploying resources dynamically, strategic flexibility creates new dominant logic in product competition. Flexibility allows firms to take full advantage of the available options to coordinate their resources by utilizing resource coordination processes efficiently. The new information systems that assist information systems development can provide SMEs with an efficient means for making quick decisions and enhancing their ability to utilize market resources effectively (Levy & Powell, 1998; Hitt et al., 1998). Strategic flexibility refers to minimizing the difficulties and costs associated with changing an enterprise's resources and its strategies (Ebben & Jonshon, 2005). This model provides guidelines for enterprise managers to use advanced technologies to create new markets for new products by redesigning, redeploying, and redeploying the resource chain to create brand new products (Chen et al., 2017). Our discussion of strategic flexibility emphasizes the ability to innovate new products and adapt to changing circumstances. Several studies have shown that strategic flexibility increases the efficiency of research and development processes by influencing the amount of innovation that can be applied during decision-making (Schulze & Hiedenreich, 2017). Consumers are attracted to them when they are introduced to new product families (Kandemir & Acur, 2012; Brozovic, 2018). It is crucial to have strategic flexibility to create value for customers and compete effectively in the market.

2.2. Bricolage

Specifically, bricolage is argued to explain differential firm behavior and outcomes in conditions that are not as extreme as those outlined in Baker and Nalson's "create something from nothing" theory (Baker & Nalson, 2005). Bricolage refers to combining scarce resources creatively within a large organization to foster entrepreneurship, according to Halme, Lindeman, and Linna (2012). One of the basic assumptions behind Bricolage is the scarcity of resources (Welter et al., 2016). Bricolage, in other words, is a term that refers to the application of combinations of handy resources to adapt to new problems and opportunities, a concept that is becoming increasingly prominent in modern management theory (Duymedjian & Ruling, 2010; Fisher, 2012). Bricolage occurs in the opportunity-formation process when underdeveloped or unrelated resources are combined to create opportunities. Resource scarcity appears to be both a problem and a possibility in an uncertain world from Bricoleur's perspective.

Further, organization researchers have improved their methods and literature when they combine them with bricolage frames. Reconfiguring and redeploying resources is the basis of this form of bricolage. Resources are refurbished for new purposes other than those initially intended for them. Baker & Nalson (2005) and Mair & Marti (2009) suggest that product innovation can occur through recombination processes between existing resources. Several studies show that bricolage enables organizations to alleviate concerns about resource constraints by increasing improvisation within the organization and recombining assets (Tasavori et al., 2018).

Bricolage innovatively emphasizes the repurposing of resources to create a new product or service. Therefore, organizational capacities are prerequisites for bricolage.

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Bricoleurs can use these resources to achieve their creative objectives by creatively combining and utilizing them (Guo et al., 2016). Combinations of capacities, absorption capacities, and exploratory orientations are among them. Rather than bricolage resources when faced with non-supportive normative institutions (Desa, 2012), firms are more likely to leverage resources to acquire resources when they have supportive normative institutions (Desa, 2012). When a company is faced with a shortage of resources, bricolage may provide a solution. The process of bricolage often involves taking advantage of external knowledge and developing creative ideas, but the results are imperfect, so they add value to exexisting resources (Andersen, 2008; Ferneley & Bell, 2006). Bricolage competencies play a vital role in the innovation process, such as renewing resources when they are unavailable, improvising reallocation processes, and partnering with external entities. These capabilities impact service innovation outcomes (Witell et al., 2017). Transfer of knowledge and protection of information (Krylova et al., 2016), speed and creative innovation of new products (Wu et al., 2017). An et al. (2018) identify opportunities, while Halme et al. (2012) analyze organizational performance. From subjective knowledge, bricolage can be used to develop new products and services. This can offer entrepreneurship opportunities and identify unique market demands and contribute to identifying entrepreneurship opportunities.

2.3. Absorptive capacity and strategic flexibility

Changing environments require companies to manage and transform their knowledge stock. If the companies develop the absorptive capacity for sustaining the competitive advantage, they can increase their strategic flexibility and realize more product innovations. Zahra and George (2002) argued that four components demonstrate the absorptive capacity: two are associated with potential absorption (knowledge acquisition and understanding), and two with actual absorption (knowledge transformation and utilization). The ability to absorb knowledge is high for firms with cross-functional interfaces, rotate jobs, and involve employees in the decision-making process (Jansen et al., 2005). Connectedness and socialization tactics are organizational mechanisms that facilitate the realization of absorption capacities (Jansen et al., 2005). Each dimension of absorption capacity plays different roles. The potential absorptive capacity of companies enables them to uncover sustainable development options in a competitive environment. Zahra and George (2002) and Jansen et al. (2005) reflect that, although the organizations can acquire and assimilate knowledge, they may not be capable of transforming and exploiting that capacity to generate profits.

To be innovative, an organization must build a portfolio of capabilities, including identifying critical resources, acquiring them, deploying them, and identifying more options (Johnson et al., 2003). Additionally, to handle increasingly complex customer requests, these capabilities enable firms to respond to changing market conditions and demands, as observed by Dosi, Nelson, & Winter (2001), Davies & Brady (2000), and Eisenhardt & Martin (2000). This is why such firms maintain profitability during unadorned economic shock (Makkonen et al., 2014). The ability to absorb environmental changes is measured as the ability of a firm to recognize changes in the environment facilitates, the placement of essential capabilities, the ability to allow more optimal allocation of resources and efficient use of capabilities, and contributing to the renewal of skills and knowledge. The potential absorptive capacity of an organization can improve the competitive advantage, as several scholars have suggested (Jansen et al., 2005; Volberda, Foss, & Lyles, 2010). It is critical for a firm to continuously acquire and integrate external knowledge as a by-product of its absorptive capacity. Identifying the challenges and opportunities, and reconfiguring their resources according to the changing environment, is only possible for companies with well-developed acquisition and integration capabilities (Zahra & George, 2002). Firms that adopt more strategic flexibility will be likely to quickly and appropriately react to the challenges and opportunities, provided they can gain and assimilate external knowledge.

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Hypothesis 1 (H1): Absorptive capacity has a positive impact on strategic flexibility.

2.4. Strategic Flexibility and Bricolage

Many theories suggest that the ability to redistribute and reconfigure a company's resources and develop new products quickly greatly influences its bricolage strategies. Combs et al. (2011) contend that a firm competitive advantage may be affected by the strategic actions taken to leverage resources (resource-based theory). Using flexible plans emphasizes the flexibility of resource utilization (Dai et al., 2018) in product development to take advantage of improvisation and bricolage, which increases the likelihood of these two outcomes. To adapt to changing deployment patterns, flexible resources allow the company to apply its resources to produce and distribute a variety of products (Sanchez, 1995). Using bricolage activity, entrepreneurs could satisfy the constraints of the environment by exploiting scarce resources (Salunke et al., 2013).

Coordinating the mobilization of production resources requires strategic flexibility, which can be accomplished by modifying the product strategy, reconfiguring the production chain, or redeploying production resources effectively. By optimizing their engagement when creating products and seeking a satisfying outcome, the RBV logic allows firms to maximize resources. To reduce the difficulty and cost of switching between resources, we can enhance our ability to use and coordinate resources more effectively. The dynamic and efficient reallocation of low-cost resources within an organization can be accomplished more efficiently and effectively. To assist company employees in performing their assigned duties and functions, low-cost resources are available. Enterprises must engage in higher levels of bricolage (Meng et al., 2020) to capture different resources and efficiently and cost-effectively restructure the supply chain.

In companies with strategic flexibility, resources overlap, and redundant resources are utilized, whereas firms without such flexibility lack such efficiency. Hence, it can be explained that firms with high levels of strategic flexibility have redundant or overlapping resources by an increase in bricolage activities. Many companies face a shortage of resources regularly, and as a result, they seek bricolage solutions to solve their problems. Alternatively, bricolage also provides firms with a way to generate value by innovating. Having a flexible strategy is an excellent advantage for a business, as it enables it to make the most of internal and external resources and capabilities as well as to create value through a variety of activities (Sanchez, 1997); its effect increases return on value creation (Brozovic, 2018). Firms can utilize a strategy of strategic flexibility to attract resources and capabilities internally and externally (Sanchez and Heene 1997). There is an increased likelihood of value creation through bricolage activity and enhanced value creation (Brozovic, 2018). To conclude these arguments and those in 2.3, we have formulated the following hypotheses:

Hypothesis 2 (H2): Strategic flexibility has a positive impact on bricolage

Hypothesis 3 (H3): Strategic flexibility mediates the effect of absorptive capacity on bricolage.

2.5. Bricolage and product innovation

Bricolage is an innovative mechanism proposed by Welter et al. (2016) and Halme et al. (2012) to generate creative solutions to the perceived scarcity of resources. As the result of bricolage, opportunities are formed that demand improvisation, skills, effective communication, and organizational capability. In this way, bricolage affects the outcome of a firm in a significant way. Bricolage is a method for mobilizing and integrating resources, using available resources and coordinating different activities to develop a new product from the bottom-up (Halme et al., 2012). In discovering the surroundings and associated opportunities, Bricolage uses everything you already have at home to create new product development pathways (Suire, 2019). Wu and Liu (2022) showed in their study that organizations can use bricolage to invent green products positively, but the results are dependent on the involvement of different stakeholders. An adequate understanding of the

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product can be achieved by testing the product concept in practice, which gives a clear picture of the product and can provide insights into the product development process. By using existing networks, bricolage can be made more productive by generating product ideas and creating materials that are easily accessible using readily available resources (Fisher, 2012).

The art of bricolage uses new and old materials to achieve unique and meaningful results by merging materials, concepts, and human insight. It has long been known that recombination and redeployment of resources are critical forces behind new inventions since they are essential components of innovation (Wu et al., 2017). Senyard et al. (2014) argued that creating innovation through bricolage is crucial for finding new solutions and exploiting new opportunities for newly resource-constrained firms. Senyard et al. (2014) note that these recombinations can lead to the development of innovative products and other innovations, both of which are vital for bringing innovations and products into the marketplace. With the emergence of new opportunities and challenges, there have been changes in the way companies combine low-cost resources and deal with resource scarcity. As a result, enterprises that develop bricolage are more likely to come up with innovative solutions than those that do not.

Improvising, or solving problems creatively, is associated with bricolage, and it has evolved as an essential organization competency (Vera & Crossan, 2005). Innovative, consumer-friendly products and solutions can be developed by improving imagination and creativity (Du et al., 2019). When teams use external and internal information about the market to design new products, improvisation leads to improved organizational scalability (Kyriakopoulos, 2011). By recombining and reusing resources for new purposes and applications, employees can demonstrate incremental innovation capabilities, further enhancing their competitive advantage (Liu et al., 2018; Suarez & Montes, 2019). Baker & Nalson, 2005; Baker et al., 2003) investigate Bricolage as a method for developing new products from existing resources (Baker & Nalson, 2005). Whenever the reallocation of resources is discussed within a new methodology, it is essential to note that we are discussing the use of crucial resources, such as social capital and innovative ideas (Boxenboum & Linda, 2011). Creating new products using bricolage creates a new destiny (Wu et al., 2017).

Bricolage can also drive corporate entrepreneurship by helping identify and exploit opportunities for entrepreneurship and influencing the choice of entrepreneurial activities such as reconfiguring manufacturing resources and developing new products. Baker and Nelson (2005) describe bricolage as using readily available resources to solve a new problem or take advantage of a new opportunity (Baker & Nelson, 2005). Having the capability to make do means that we will more likely take proactive measures to respond to challenges and opportunities than delay in finding a solution where we have handy resources, demonstrating that active engagement can sometimes lead to surprisingly positive results (Desa & Basu, 2013). In light of the literature review presented above and the hypotheses are given in 2.3 and 2.4, the following hypotheses have been proposed:

Hypothesis 4 (H4): Bricolage has a positive effect on product innovation.

Hypothesis 5 (H5): Bricolage mediates the effect of strategic flexibility on product innovation.

Hypothesis 6 (H6): Strategic flexibility and bricolage serially mediate the effect of absorptive on new product development.

Considering all of the hypotheses as drawn above based on a rigorous literature review, a summary of the relationships among absorptive capacity, strategic flexibility, bricolage, and new product development is summarised in Figure 1. To test the stated hypotheses, absorptive capacity has been used as an independent variable, strategic flexibility and bricolage, respectively have been used as the first level and second level mediating variables, and new product development has been used as the dependent variable. As absorptive capacity increases, its effects are likely mediated by strategical flexibility and bricolage on product innovation. Direct mediation of strategic flexibility between absorptive capacity and product innovation and of bricolage between absorptive capacity and

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product innovation has also been tested in this study based on relationships among these variables reported by previous literature.

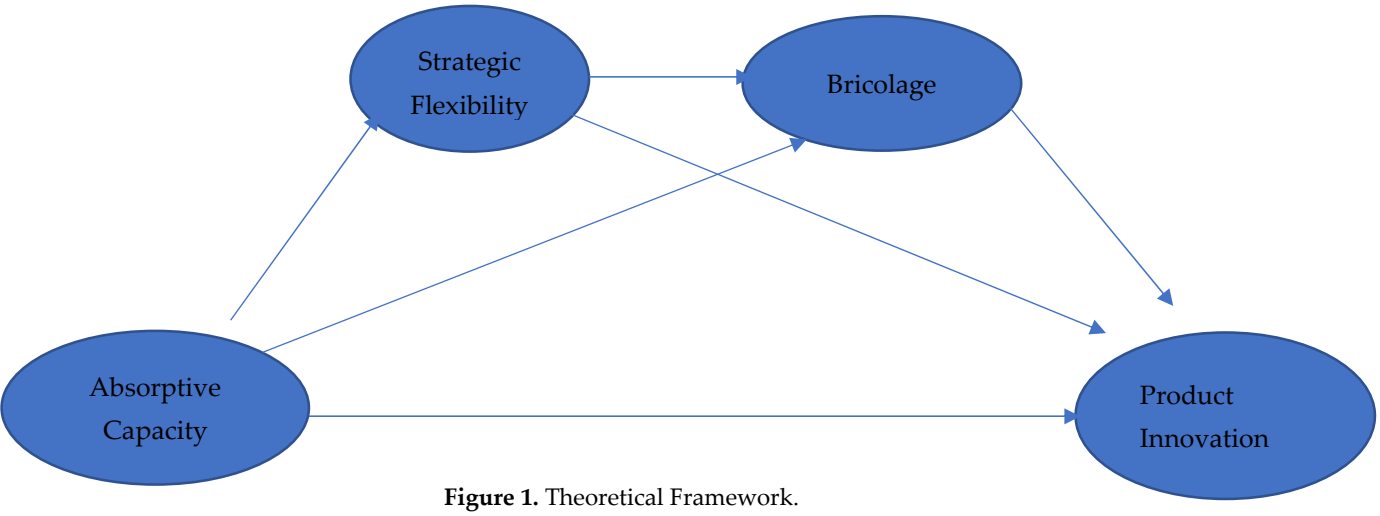

Figure 1. Theoretical Framework.

3. Methodology: Data Collection and Analysis

3.1. Data:

A large province in southwest China, Sichuan is known as the 'Province of Abundance.' As the most critical province in western China, it acts as the economical route linking the south-western hinterland of the country with south and central Asia. In October 2010, the State Council approved the establishment of the Chengdu Hi-tech Comprehensive Free Trade Zone, which passed national approval on February 25, 2011. A comprehensive free trade zone for high-tech products and services has been established in Chengdu, integrating the former export processing zone and the Chengdu Bonded Logistics Center. The industries located in Chengdu mainly consist of manufacturing notebook computers, tablet computers, wafer production, chip packaging testing, electronic components, precision machining, and biopharmaceutical products. Several top 500 and multinational companies, including Intel, Foxconn, Texas Instruments, Dell, Morse, etc., have chosen Chengdu Hi-Tech Comprehensive Free Trade Zone as their headquarters.

Chengdu Hi-Tech Comprehensive Free Trade Zone ranked No.1 in the national comprehensive free trade zones for three consecutive years in 2020, with 549.1 billion yuan in total import and export revenue. This represents 68% of the province's total foreign trade import and export volume (Sichuan Statistical Year Book, 2019). Branches of 270 Fortune 500 companies have been established in Chengdu, where 14 consulates exist (The Telegraph, 2019). To conduct this study, a structured questionnaire adapted from Flatten et al. (2011) to measure absorptive capacity, and from Meng, Lei, Jiao, and Tao (2020) to measure strategic flexibility, bricolage, and product innovation was distributed among CEOs, CMOs and General Managers of 425 high-tech SMEs situated in Chengdu including information technology, machine manufacturing, electronic, communication equipment, and pharmaceutical companies. The respondents were asked to rate their responses on a five-point Likert Scale. Manifestation of the constructs employed in the study has been made using six items for Absorptive Capacity, five items for Strategic Flexibility (SF), four items for Bricolage (BR), and five items for Product Innovation (PI), as shown in Table 4. From the distributed questionnaires, 304 useable questionnaires were received back with a response rate of 71.5 percent. The companies whose CEOs and Managers were asked to provide data were on average 8.5 years old. The surveyed companies are running their business with 175 employees on average, while the number of employees in these companies varies from 82 to 515. The percentage of the information technology, machine manufacturing, electronic, communication equipment, and pharmaceutical companies included in the sample is 31.9, 24.0, 16.8, 16.4, and 10.9, respectively.

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3.2. Analysis:

Before running the mediation analysis, the reliability of the data was determined through Cronbach's Alpha. To extract the factors from each of the multiple-item constructs, Principal Component Analysis (PCA) was run. In this study, PCA was employed with the varimax rotation method to maximize the captured variance of the multiple items of a construct in the extracted principal components. Kaiser-Meyer-Olkin (KMO) test was employed to check the sampling adequacy of the data, and Bartlett's test of sphericity (BTS) was employed to test the suitability of the data to perform PCA. Besides this, KMO, BTS, and factor loadings are used to check the discriminant and convergent validity of the data. To determine the relationships among variables as proposed in Figure 1, we employed mediation analysis using Process Macro developed by Hayes and Preacher (2014). Necessary statistics, i.e., R^2 and F-statistic have been also mentioned to show the overall performance of the regression models.

4:. Results of the Analysis:

Values of Cronbach's Alpha for each construct have been shown in Table 1. Hinton et al. (2004) describe four reliability levels: excellent reliability, high reliability, moderate reliability, and low reliability if the value of Cronbach's Alpha is 0.90 or above, from 0.71 to 0.90, from 0.50 to 0.70, and from 0.50 or below respectively. In case of present study, Values of Cronbach's Alpha vary from 0.84 to 0.89, which indicate a high level of reliability: AC (alpha = 0.89), SF (alpha = 0.84), BR (alpha = 0.84), and PI (alpha = 0.85). This indicates that each construct has internal consistency, as indicated by the high Cronbach's alpha value. Additionally, items within each construct measure the same content. Cronbach's value measures the reliability of measuring a construct, which is greater the higher the Cronbach's alpha value.

Table 1. Reliability of Measurements.

Constructs	Valid N	Number of items	Cronbach's alpha
Absorptive Capacity	296	06	0.89
Strategic Flexibility	296	05	0.84
Bricolage	299	04	0.84
Product Innovation	300	05	0.85

By combining PCA with varimax rotations, factor analysis has been performed to determine construct validity, including convergent and discriminant validity. The results of PCA are presented in Tables 2, 3, and 4. Our data were tested for sphericity and sampling adequacy using KMO's sampling adequacy and Bartlett's sphericity tests. Sample adequacy measures the relationship between variables, while sphericity corresponds to orthogonality. The two tests mentioned above can determine whether or not factor analysis is worthwhile, according to Hinton et al. (2004). An uncorrelated set of factors, which are simpler to understand, is obtained by factor analysis, which combines data from many items into one. Based on sampling adequacy, KMO indicates whether factor analysis is appropriate. KMO ranges from 0 to 1. Hutcheson and Sofroniou (1999) report that values above 0.9 are outstanding, those between 0.8 and 0.9 are good, and those above 0.7 are mediocre. Table 2 shows that the range of KMO values for the four constructs is between 0.799 and0.900. This is well above the recommended threshold of 0.60. Therefore, the factor analysis may be worthwhile.

Bartlett's sphericity test looks for relationships between items within a construct. In Bartlett's test, the null hypothesis is that there is no correlation between the items. It confirms the significance of a relationship between variables when the p-value is less than 0.05. Table 2 shows that all constructs have a p-value of less than 0.001, rejecting the null hypothesis of no relationship. Therefore, we can continue with the factor analysis.

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Table 2. KMO and Bartlett's test.

Constructs	Items	KMO Values	Bartlett's Test Values (Chi-square)	P Values of Chi-square
Absorptive Capacity	06	0.900	1209.529	.000
Strategic Flexibility	05	0.857	542.761	.000
Bricolage	04	0.799	482.203	.000
Product Innovation	05	0.861	570.563	.000

A construct whose principal components have an eigenvalue above 1 is considered a principal component and used in the analysis by Hinton et al. (2004). According to Table 3, all eigenvalues and variances of the constructs explained by the principal components were extracted. Based upon the eigenvalue over 1 criterion, a single principal component has been extracted from each of the constructs used in this study: AC (65.237% variance of the four items is explained), SF (61.587% variance of the five items is explained), BR (68.197% variance of the four items is explained), and PI (62.574% variance of the five items is explained).

Table 3. Eigenvalues and Total Variance Explained.

Construct	Components	Initial eigenvalues		
		Total	% of variance explained	Cumulative % of variance explained
Absorptive Capacity	**Comp 1**	3.914	65.237	65.237
Strategic Flexibility	**Comp 1**	3.079	61.587	61.587
Bricolage	**Comp 1**	2.728	68.197	68.197
Product Innovation	**Comp 1**	3.129	62.574	62.574

As per Straub et al. (2004), the factor loadings for all items should be greater than 0.40, and no cross-loading of items should exceed 0.40. Table 4 demonstrates that all related items are loaded on just one factor, with factor loadings ranging from 0.740 to 0.845 for all constructs used in this study. These results establish that the measured constructs being studied are valid. There is both discriminant validity (items that load on extracted factors have eigenvalues of at least 1 and no cross-loading above 0.40) and convergent validity (items that load on extracted factors have eigenvalues of at least 1 and all loadings over 0.40) in the construct validity. As a result, the data collected from the instrument are valid.

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Table 4. Descriptive Statistics and Factor Loadings.

Variables	Mean	Std. Dev.	Factor Loading
Absorptive Capacity			
Relevant information is searched every day.	2.9538	1.26249	0.814
Employees are motivated to use information sources.	2.9274	1.22664	0.814
Knowledge and Ideas are shared across all departments.	2.8680	1.25903	0.800
Inter-departmental support to solve the problems is appreciated.	2.9835	1.30830	0.814
Flow of information across departments is fast.	2.9834	1.31553	0.794
Inter-departmental meetings are arranged for information sharing.	2.9274	1.25334	0.810
Strategic Flexibility			
The resources are used for alternative purposes.	2.9834	1.31553	0.816
Alternative use of resources is complex and costly.	2.9274	1.25334	0.740
Resources can be used for alternative purposes quickly.	2.9967	1.29527	0.779
Reconfiguration of the chain of resources the firm can rely upon to develop, manufacture, and deliver its intended products to the targeted markets are based on environmental changes.	2.9106	1.28185	0.810
Support the firm's product strategy by implementing organizational structures.	2.9208	1.27910	0.776
Bricolage			
Existing and new inexpensive resources are used to meet the challenges.	2.8742	1.26703	0.839
Available resources are combined for new operations.	2.9604	1.30400	0.845
Resources are put together into workable solutions.	2.9109	1.30027	0.837
All useful resources are used to meet the new challenges.	2.9076	1.25468	0.780
Product Innovation			
New products are quickly introduced.	2.9538	1.27294	0.798
Our production facilities are more advanced than those of our competitors.	2.9507	1.30783	0.788
In comparison to our competitors, we get better market reaction to product innovations.	2.9208	1.31736	0.793
We make technologically advanced products.	2.9406	1.28534	0.793
We are more successful at innovation than our competitors.	2.8944	1.32052	0.783

Table 5 contains the results of three regression models. These results show a significant positive effect of AC (ß = 0.899, p <0.001) on SF, significant positive effects of AC (ß = 0.668, p <0.001) and of SF (ß = 0.40, p <0.001) on BR and significant positive effects of AC (ß = 0.34, p <0.001), SF (ß = 0.35, p <0.001) and of BR (ß = 0.24, p <0.001) on PI.

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Table 5. Regression Analysis.

Model	Dependent Variable	Independent Variable/s	Slope Coefficient	Necessary Statistics
1	SF	AC	0.899* (32.898)	R^2=0.79 F-Stat=1082.30 Sig.(F-Stat) = 0.00
2	BR	AC	0.668* (10.36)	R^2=0.76 F-Stat=445.27 Sig.(F-Stat) = 0.00
		SF	0.40* (8.37)	
3	PI	AC	0.34* (5.03)	R^2=0.80 F-Stat=383.91 Sig.(F-Stat) = 0.00
		SF	0.35* (5.97)	
		BR	0.24* (4.46)	

Note: * represents significance level at less than 1%.

Table 6 contains the result of the total effect of AC (ß = 0.87, p <0.001) on PI, which is positive and significant at less than a 1% significance level. The total effect model represents the sum of the direct and indirect effects of the independent variable on the dependent variable.

Table 6. Total Effect Model.

Dependent Variable	Independent Variable/s	Slope Coefficient	Necessary Statistics
PI	AC	0.87* (29.55)	R^2=0.76 F-Stat=873.28 Sig.(F-Stat) = 0.00

Note: * represents significance level at less than 1%.

Table 7 contains the result of the direct and indirect effects of ET on PI. The direct effect shows the extent an independent variable directly affects the dependent variable in the presence of mediating variables in a model but not through the mediating variables. The first model in the table shows that the direct effect of AC (ß = 0.34, LLCI>0, ULCI>0) on PI is positive and significant. The second model of Table VII shows the indirect effects of AC on PI. The indirect effect is the extent an independent variable affects the dependent variable through the mediating variables. The total indirect effect of AT (ß = 0.53, LLCI>0, ULCI>0) on PI is positive and statistically significant. It shows that one unit improvement in AC causes an improvement of 0.53 units in PI through SF and BR. The indirect effect of AC (ß = 0.32, LLCI>0, ULCI>0) on PI through SF is also positive and statistically significant. It shows that one unit improvement in AC causes an improvement of 0.32 units in PI through SF. Similarly, the indirect effect of AC (ß = 0.16, LLCI>0, ULCI>0) on PI through BR and the serial indirect effect of AC (ß = 0.05, LLCI>0, ULCI>0) on PI through SF and BR are positive and statistically significant.

Table 7. Direct and Indirect Effects Models.

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Model	Description of the Model	Slope Coefficient	LLCI	ULCI
Direct Effect	Direct Effect of AC on PI in the Presence of Mediating Variables	0.34	0.21	0.48
Indirect Effect	Total Indirect Effect of AC on PI	0.53	0.34	0.71
	Indirect Effect of AC on PI through SF	0.32	0.17	0.46
	Indirect Effect of AC on PI through BR	0.16	0.06	0.27
	Indirect Effect of AC on PI through SF and BR	0.05	0.01	0.10

5:. Discussion and Conclusion:

The present study has determined the effect of absorptive capacity on product innovation through the serial mediating effects of strategic flexibility and bricolage in the case of high-tech small and medium enterprises (SMEs) in Chengdu, China. The companies that have been surveyed for this study belong to the information technology, machine manufacturing, electronic, communication equipment, and pharmaceutical industries. SMEs face different opportunities and challenges than those of large enterprises. SMEs have a higher degree of adaptability and respond to the changes in the market and consumer preferences in a quick manner. However, the overall image of the Chinese companies has emerged as imitating companies rather than innovating companies. From being involved in imitation rather than in innovation, it can be construed that Chinese SMEs may have a lower level of absorptive capacity (Mean=2.94 on a five-point Likert Scale coded as 1 for strongly disagree and 5 for strongly agree) which results in a lower level of product innovation (Mean=2.93 on a five-point Likert Scale coded as 1 for strongly disagree and 5 for strongly agree).

Empirical findings of this study reveal that absorptive capacity directly and significantly affects the strategic flexibility, which positively and significantly affects the bricolage, which finally directly and significantly affects the product innovation. The direct effect of absorptive capacity on product innovation has also been tested in this study which is positive and significant. The result of serial mediation of strategic flexibility and bricolage between absorptive capacity and product innovation has been found positive and significant. From these findings, it is construed that absorptive capacity not only directly affects the product innovation, but it also creates more opportunities for product innovation through strategic flexibility and bricolage.

One of the contributions of our study is that in previous research in accordance with the theory of strategic flexibility, the direct effects of strategic flexibility on product innovation have been tested and found positive and significant (Zhou & Wu, 2010; Dibrell, 2014; Li et al., 2010). However, no study has been conducted to best our knowledge that could have tested the impact of absorptive capacity on product innovation using strategic flexibility and bricolage as mediating variables, respectively. According to this study, it is concluded that a significant role is played by absorptive capacity through strategic flexibility and bricolage in product innovation.

The study findings reveal that the level of absorptive capacity of SMEs in Chengdu China is on the lower side, as stated above. On the other side, SMEs are expected to exhibit a higher level of absorptive capacity (Eggers et al., 2017; Zhou et al., 2014; Tolstoy, 2014; Li et al., 2006; Borgatti & Foster, 2003; Li, 2002). This paradox invites the intention of Chinese Enterprises to build absorptive capacity in their processes which is a prerequisite of the product innovation, according to the findings of this study. To build the absorptive capacity, the firms should continuously search for the relevant information, motivate their employees to exploit all sources of information, and adopt the practice of sharing the ideas and supporting other departments to solve the problems. This may be achieved through arranging periodical inter-departmental meetings.

Further research is needed in light of the study's limitations. First of all, the cross-sectional nature of the data in this study makes it difficult to draw causal conclusions

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concerning strategic flexibility and bricolage. The research hypotheses of this study are supported by existing theory and empirical evidence. It is essential to conduct longitudinal research using archival data in the future to improve the robustness of the findings. Second, this study involved only 304 companies from Chengdu city, Sichuan, China. Therefore, the results could not necessarily be generalized to the whole country and other countries. However, the question remains of how well our results will be applied in emerging economies where the economic climate is more dynamic and uncertain or when rapid economic growth occurs. A collective belief system dominates Chinese culture, and hence managers in China are likely to react uniformly to new information. Accordingly, it is suggested that further analysis should be conducted to compare the firms with individualistic cultures with those with collective cultures. Hopefully, future research will examine the implications of strategic flexibility on decision-making and planning processes.

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