〈研究論文〉

Good Strategy, Good Entrepreneurship? Examining When and How Digital Business Strategy Drives Firm Strategic Entrepreneurship

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Data availability statement

The data that support the findings of this study are available from the corresponding author (YT), upon reasonable request.

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Abstract

Theory and practice suggest that digital business strategy may help enterprises to seek opportunities in competition. However, there is little knowledge about how and when digital business strategy works in driving strategic entrepreneurship. In order to address this issue, we used dynamic capability theory to discuss how digital business strategy can facilitate strategic entrepreneurship through the mediating role of absorptive capacity while also exploring the moderating role of market turbulence and technology turbulence in the relationship between digital business strategy and absorptive capacity. We test the hypotheses by conducting a survey study which use longitudinal date collected from 290 firms in China with digital features. Findings suggest that digital business strategy promotes the entrepreneurial orientation, accessing relational resources and relational embeddedness in firms, which is achieved mainly through enhanced absorptive capacity. Furthermore, market turbulence strengthens the relationship between digital business strategy and absorptive capacity, whereas technological turbulence plays an inverted U-shaped moderating role. The study contributes valuable theory and management insights concerning digital platform capabilities and strategic entrepreneurship.

Keywords Digital business strategy; Absorptive capacity; Strategic entrepreneurship; Environmental turbulence; Dynamic capabilities

Introduction

In the face of global competition and uncertain environments, including the impact of the crisis, how to seek opportunities and competitive advantages has become an important goal of organizations (McGrath & MacMillan, 2000). In an uncertain environment, firms should not only seek competitive advantages in existing business areas but also identify and make use of new opportunities. In this study, we focus on strategic entrepreneurship as it is closely related to how firms can gain competitive advantages in uncertain environments (Ireland et al., 2003). Strategic entrepreneurship refers to identifying, capturing, and developing new opportunities in the market to pursue competitive advantages and strategic objectives (Hitt et al., 2001; Ireland et al., 2003; Wickham, 2006). In pursuit of competitive advantages, firms actively seek new entrepreneurial opportunities in the external environment and integrate existing resources through internal and external entrepreneurial actions to develop and utilize these opportunities, thereby creating new values and competitive advantages (Hughes et al., 2021). Strategic entrepreneurial actions through the continuous promotion of finding opportunities and utilizing advantages are extensive. For example, the Ant Financial Services Group has developed from the initial subsidiary business of Alibaba into a comprehensive financial platform covering financial management, insurance, credit, and other services. This event is the embodiment of strategic entrepreneurship driving firm development. Huawei keeps the continuous innovation vitality through the strategic entrepreneurial behavior of intrapreneurship: it distributes dividends and equity to the company's internal staff, which reduces its staff turnover, cuts down cooperation expenses, and then stimulates the internal innovation vitality. The literature believes that strategic entrepreneurship enables organizations to keep a balance between seeking opportunities and seeking interests and has a positive impact on organizational performance (Shirokova et al., 2013). Based on the positive influence of strategic entrepreneurship on organizations, how to promote and implement strategic entrepreneurship needs further discussion.

Presently, the most valuable listed companies globally are all built on digitization (Li, 2022). Therefore, in response to environmental turbulence, many firms implement digital business strategy. Digital business strategy refers to a series of strategic plans and actions that firms utilize digital technology and digitized means to achieve business goals, enhance competitiveness, and create value (Mithas et al., 2013). The literature found the potential value of digital business strategy to firms (Hinings et al., 2018; Jun et al., 2022). For example, digital business strategy drives entrepreneurs' opportunity identification and development (Swartz et al., 2022). It also helps firms improve operational efficiency and access to external resources (Li & Chan, 2019) and realize efficient value co-creation (Blaschke et al., 2018) and even firm innovation and performance (Mithas et al., 2013). These studies revealed the importance of digital business strategy for opportunity seeking, value co-creation, and innovation, which all seem to be closely related to strategic entrepreneurship. The reason is that the underlying logic of these studies indicates that firms can build digital business strategy to get closer to opportunities, relationship networks, and resources (de Reuver

et al., 2018; Sutherland & Jarrahi, 2018). Unfortunately, we have not seen the key evidence linking digital business strategy with strategic entrepreneurship (Nambisan, 2017; Srinivasan & Venkatraman, 2018), which makes the potential significance of digital business strategy in strategic entrepreneurship neglected. To better seek opportunities and advantages, firms need to have a good digital business strategy to change their internal resources and capabilities (Mithas et al., 2013). On the one hand, market risks restrict firms' ability to seek business opportunities, so they need to use digital strategies to deepen their identification of strategic information and entrepreneurial resources in the entrepreneurial ecosystem. On the other hand, market competition threatens the existing competitive advantage of firms, so they need to use digital strategies to cooperate with stakeholders to seek new resources and create value. Considering the lack of theoretical insight into the functionality of digital business strategy in strategic entrepreneurship, we will take a step forward in the literature on digital business strategy and strategic entrepreneurship. More importantly, we follow a research agenda from the literature (Nambisan, 2017). The existing literature largely ignored the role of digital technology in entrepreneurship, as they mainly focused on entrepreneurship in a technology-intensive environment (including digital technology). That is, technology is only regarded as the background of empirical work (Bingham & Haleblian, 2012). Concerning the typical characteristics of digital strategies (e.g., openness and interactivity), these are helpful to the potential generation of entrepreneurship and the dynamic emergence and evolution of entrepreneurial opportunities (Nambisan, 2017, p. 11). However, at present, we have not conducted an in-depth discussion on these potential insights. Therefore, we follow the research theme 1 proposed by Nambisan (2017).

Although digital business strategy has advantages in deploying information technology resources (Mithas et al., 2013; Mikalef & Pateli, 2017), if firms cannot digest, absorb, and transform these resources, then benefiting from digital business strategy to promote strategic entrepreneurship seems difficult. The literature showed that although firms' competitive advantages are derived from acquired knowledge and resources, visible results (e.g., performance) also depend on absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002). Absorptive capacity refers to the ability of firms to identify, acquire, process, and apply external knowledge (e.g., external new technological information) (Todorova & Durisin, 2007). If firms have a better absorptive capacity, they are more likely to identify key resources and opportunities in uncertain environments (Schweisfurth & Raasch, 2018; Zahra & George, 2002). The current literature has not identified the value of absorptive capacity in connecting digital business strategy and strategic entrepreneurship (Hughes et al., 2014; Kohtamäki et al., 2020). Therefore, we focus on absorptive capacity as a key intermediary mechanism. Furthermore, the literature suggested that the performance of firms' absorptive capacity is also affected by the dynamic environment (VandenBosch et al., 1999), which is mainly reflected in market turbulence and technological turbulence. Under high market turbulence, the influx of new customers and the rapid change in demand will increase the information load and information update speed on the platform. In this case, identifying and absorbing information on digital business strategy

may become difficult for firms. Under high technological turbulence, the rapid technological change in the industry creates new market opportunities (Chen & Wu, 2011) but increases the cost of firms to build digital business strategy (Slater & Narver, 1994). Therefore, the relationship between digital business strategy and absorptive capacity needs to be considered in the context of market turbulence and technological turbulence. Given that discussing the functionality of dynamic capabilities (digital business strategy and absorptive capacity) in uncertain environments has always been unknown and ongoing, we continue to discuss these key issues.

This study is expected to make the following theoretical and practical implications. First, we discuss the specific relationship between digital business strategy and strategic entrepreneurship. Although previous literature suggested that digital strategy can bring a range of benefits to entrepreneurship, it does not propose the value of some specific strategies in promoting strategic entrepreneurship (Nambisan, 2017; Srinivasan & Venkatraman, 2018). In addition, little attention is paid to the special field of strategic entrepreneurship (entrepreneurial behaviors of incumbent firms) in the digital era. Thus, our efforts can advance the literature on digital entrepreneurship (digital business strategy and strategic entrepreneurship). Second, we propose an intermediary mechanism (absorptive capacity) that has not been discussed in the literature to link digital business strategy with strategic entrepreneurship. The existing literature mainly explored the possible influence mechanism of digitization on entrepreneurship through some cases and qualitative research. However, the role of absorptive capacity (a specific mechanism) between digital business strategy and strategic entrepreneurship is not proven (Hughes et al., 2014; Kohtamäki et al., 2020). Therefore, our efforts can provide new insights into the relationship between digital business strategy and strategic entrepreneurship. Third, we consider the effects of digital business strategy in uncertain environments. The literature on dynamic capability theory called for us to examine the effectiveness of firms' capabilities (e.g., digital business strategy) in specific environments. Thus, our response to the literature promotes the development of dynamic capability theory (Barreto, 2010; Wang & Ahmed, 2007). Finally, our efforts can inspire firms to effectively identify and absorb external resources and opportunities in uncertain environments, which can help them better carry out strategic entrepreneurship in practice.

Theory framework

Mithas et al. (2013) believed that digital business strategy represents the ability to deploy information and communication technology-based resources and combine them with other internal and external resources. As digital business strategy is becoming a new source of competitive advantages in the digital economy (Rai & Tang, 2010), its role has been confirmed in several ways. In terms of firm performance, digital business strategy can have a positive and indirect impact on the performance of small and medium-sized enterprises through network capability (Mithas et al., 2013). In addition, digital business strategy can improve the innovation performance of organizations through organizational readiness (Jun et al., 2022). In terms of innovation, digital orientation and digital capability have a positive impact on digital innovation (Khin & Ho, 2020). Digital capa-

bility also has a significant impact on the sustainable competitive advantage and innovation strategy of firms. In terms of value creation, digital business strategy not only influences value creation by adopting business model innovation (Karimi & Walter, 2021) but also develops new paths of value creation by maintaining a healthy IT infrastructure portfolio to keep smooth connections with dynamic business environments (Li & Chan, 2019). In terms of strategic development, the wider the range of adopting new technologies, the greater the strategic changes (Van-Zeebroeck et al., 2023). In addition, the visualized firm digital twin system provides better practices for strategic management decisions in the changing business world (Yan et al., 2022).

On the whole, research on digital business strategy is abundant, but some limitations exist. First, the research results of digital business strategy are mostly confined to broad topics, such as firm performance, innovation, value creation, or strategic development. However, discussion on some specific strategic behaviors of firms (e.g., strategic entrepreneurship) is limited. Second, new theoretical perspectives are not provided, and the mechanisms of digital business strategy on results are ambiguous. The current literature on entrepreneurial behaviors and results was mainly based on the resource-based view (Conner, 1991; Alvarez & Busenitz, 2001)), network perspective (Aldrich & Dubini, 1991; Hoang & Antoncic, 2003), institutional perspective (Nee, 1992; Hiatt et al., 2018), and others. Therefore, the effectiveness of digital business strategy on strategic entrepreneurship from dynamic capability theory is worth examining. Third, whether digital business strategy will yield benefits in uncertain environments is unclear. In the VUCA era, firms are faced with many uncertainties, and they need to think about how to build dynamic capabilities (e.g., digital business strategy) in uncertain environments to obtain sustainable competitive advantages. However, such questions have not been answered in the current literature. Notably, as an integrated action of strategic and entrepreneurial behaviors taken by organizations in response to uncertain environments, strategic entrepreneurship can motivate firms to obtain competitive advantages in the market (Ziyae & Sadeghi, 2021). In summary, linking digital business strategy, absorptive capacity, and strategic entrepreneurship seems beneficial to breaking through the limitations of the current literature.

Dynamic capabilities are the abilities to integrate, build, and reconstruct the internal and external capabilities of firms to cope with the rapidly changing external environment (Teece et al., 1997). The relationship between dynamic capabilities and the competitive advantages of firms has been widely valued by scholars (Helfat & Peteraf, 2003; Sirmon et al., 2007). Strategic entrepreneurship is characterized by seeking opportunities and seeking advantages simultaneously, which can be divided into three dimensions: entrepreneurial orientation, accessing relational resources, and relational embeddedness (Hughes et al., 2021). Notably, the high uncertainty of entrepreneurial situation requires more flexible strategies (Alvarez & Barney, 2007), which accords with the important connotation of dynamic capabilities. In essence, digital business strategy are the centers of public knowledge, enabling organizations to rapidly encode, store, and distribute large amounts of knowledge based on digital technologies. Moreover, digital business strategy is a trigger for increasing firms' vitality (Mithas et al., 2013). It can facilitate internal communication and resource coordination in

organizations, improve relationship skills, and increase knowledge about partners (Mithas et al., 2013; Helfat & Campo-Rembado, 2016). Therefore, digital business strategy can enhance the internal and external communication capabilities of organizations based on the knowledge provided by digital business strategy. It can also optimize the absorption and distribution of knowledge (Mithas et al., 2013), thereby enhancing absorption capacity. Essentially, absorptive capacity is a specific dynamic capability, and firms with superior absorptive capacity can better identify opportunities and resources and develop new ones (Zahra & George, 2002). Therefore, dynamic capability theory can explain why digital business strategy promotes strategic entrepreneurship by improving absorptive capacity (Barreto, 2010; Teece et al., 1997; Wang & Ahmed, 2007). Nevertheless, the increasingly fierce market competition and the rapid updating of technologies make the organizations face higher market and technological turbulence. Therefore, the impact of digital business strategy on absorptive capacity and even strategic entrepreneurship may be affected by environmental turbulence. To sum up, based on dynamic capability theory (Teece et al., 1997), we systematically explore the influence mechanism of digital business strategy on strategic entrepreneurship, the mediating effect of absorptive capacity, and the moderating effects of market turbulence and technological turbulence, to expand the relevant research on digital business strategy and strategic entrepreneurship.

Hypotheses

Digital business strategy and strategic entrepreneurship

Entrepreneurial orientation is considered a strategic decision-making concept and mode with innovation, advanced actions, and the courage to take risks adopted by firms to enter new business fields (Covin & Slevin, 1989). Digital business strategy has a significant advantage in cultivating the entrepreneurial orientation of firms. First, digital business strategy cultivates firms' innovation ability. Based on the construction of open sharing platforms and technology networks, digital business strategy can effectively mobilize different technologies to be truly integrated and updated. Therefore, when firms have digital business strategy, various integrated technologies will dynamically penetrate into the whole process from creative ideas to commercial applications, thereby continuously stimulating the innovation ability of the firms. Second, digital business strategy enables firms to take action in advance. The network effect formed by digital business strategy effectively integrates and dynamically matches resources at both ends of supply and demand. In addition, the openness of the platforms and the sharing of big data resources provide many entrepreneurial opportunities (Srinivasan & Venkatraman, 2018). Therefore, firms with digital business strategy can obtain entrepreneurial resources and opportunities more efficiently, thereby adopting innovation strategies and establishing competitive advantages earlier and more quickly than their competitors (Rauch et al., 2009). Third, digital business strategy fosters the risk-taking characteristics of firms. Digital business strategy, with their ecosystem hub status, unique digital technologies, and powerful abilities of resource integration, provide entrepre-

neurs with empowerment in technologies, channels, brands, and others. This case will help firms take more risks and be more open and adventurous in developing new products or introducing new technologies. Thus, these arguments lead to the following hypothesis:

Hypothesis 1a: Digital business strategy promotes the entrepreneurial orientation of a firm.

Entrepreneurial resources are one of the key elements for the survival and development of entrepreneurial firms (Timmons, 1999). However, most firms will face serious resource constraints in entrepreneurship. In this case, managers can make strategic choices about relationships by exploiting relational resources to ease the resource constraints in their entrepreneurial resource portfolio. Relational resources reflect firms' ability to establish and maintain stable cooperative relationships with their partners (Wong & Karia, 2010), which is scarce and inimitable. With its unique advantages, digital business strategy provides a feasible way for firms to access relational resources. On the one hand, digital business strategy gather and connect many social participants so that firms can obtain relational resources by contacting social participants. For example, through continuous channel expansion, e-commerce platforms can gather many merchants, whereas continuous advertising and discount promotion also attract several consumers. Therefore, based on the relational resources established by digital business strategy, start-ups can enter e-commerce platforms to provide relevant products or services to meet the matching between supply and demand and gain entrepreneurial advantages. On the other hand, digital business strategy introduce many new social relationships and expand the network of relational resources. Several new jobs have been developed owing to the digital business strategy, such as ride-hailing drivers, food delivery workers, and livestream salesmen. Firms with digital business strategy can take full advantage of these new types of social relationships to acquire and access potential relational resources and then develop their products and services. In summary, these arguments lead to the following hypothesis:

Hypothesis 1b: Digital business strategy promotes the accessing relational resources of a firm.

Relational embeddedness refers to an informal network formed among firms, suppliers, customers, and others. It focuses on the connection of social relationships, which will affect the degree of knowledge sharing (Andersson et al., 2002). Relational embeddedness determines the quantity and quality of resources in the network and then influences the organizational behaviors and performance of firms (Granovetter, 2018). Thus, relational embeddedness seems crucial for strategic entrepreneurship, where resources play an important role (Hughes et al., 2021). Notably, digital business strategy supported by technologies, such as big data, cloud computing, and the Internet of Things, provide good opportunities for firms' relational embeddedness. Digital business strategy are interdependent systems with the characteristics of relational embeddedness (Täuscher & Laudien, 2018). They are interwoven with institutions, markets, and technologies, thereby facilitating firms to build relationships of trust with network participants, such as suppliers, customers,

and large digital platform firms. In addition, digital business strategy have fundamentally changed the competitive relationship between firms and promoted strategic cooperation between competitors to achieve relational embeddedness. Apple, for example, competes fiercely with Google on the operating system but has long used Google as its default search engine. Hence, digital platform-based relational embeddedness among firms replaces the traditional zero-sum game and enables firms to integrate and utilize resources in a wider range, thereby constructing ecological competitive advantages (Alberti-Alhtaybat et al., 2019). Therefore, these arguments lead to the following hypothesis:

Hypothesis 1c: Digital business strategy promotes the relational embeddedness of a firm

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Mediating role of absorptive capacity

The innovation performance of firms depends not only on the accumulated knowledge but also on the ability to transform knowledge into actions (Jantunen, 2005). In addition, the feasible tool of the transformation is the firms' absorptive capacity. Absorptive capacity is the ability to identify, acquire, digest, and apply external new knowledge. Its essence is to apply external information to business activities, promoting firm innovation (Cohen & Levinthal, 1990). In the digital era, digital business strategy can effectively enhance firms' absorptive capacity with its powerful digital technologies. As a shared space, digital business strategy enables coordination and interactions among firms, business partners, consumers, and others and motivate members to share knowledge and experience with others. This kind of cross-departmental and cross-organizational interaction expands the ways firms acquire knowledge and information, which is conducive to firms' efficient identification and acquisition of knowledge and information needed for strategic entrepreneurship. Of course, the developed information networks have brought considerable valuable information but also make firms face the problem of information overload. Through big data analysis, algorithm optimization, and personalized recommendation of digital business strategy, firms can efficiently analyze and integrate the needed data. Then, they match, digest, and apply these data according to their characteristics to accurately provide customers with products and services. For employees, digital business strategy also lowers the threshold of learning so that they can access knowledge in various fields, thereby improving their skills and traits to absorb more knowledge. Therefore, these arguments lead to the following hypothesis:

Hypothesis 2a: Digital business strategy promotes the absorptive capacity of a firm.

Absorptive capacity is a dynamic capability (Wang & Ahmed, 2007). Its positive effects have been proved by many studies in the strategic decision-making of firm innovation. When firms have a higher absorptive capacity, they will predict business opportunities more accurately and make more active use of them (Cohen & Levinthal, 1990). Absorptive capacity also enables firms to implement explorative and exploitative innovation strategies simultaneously, thereby influencing the redesign of existing business models (Müller et al., 2021). As seen above, the current literature reflected the importance of the absorptive capacity for strategic

decision-making in innovation. Therefore, as a decision-making model of innovation strategies (Covin & Slevin, 1989), entrepreneurial orientation can also be positively influenced by absorptive capacity. Specifically, the connotation of absorptive capacity affects all three aspects of entrepreneurial orientation. Among them, the identification and acquisition ability in absorptive capacity can help firms acquire substantial knowledge from the outside to more accurately predict market demand and business opportunities, and they can then take proactive actions. Digestion ability can accelerate firms to solve complex problems, reduce the uncertainty of the entrepreneurial process, and thus increase firms' ability to take risks to explore new business directions. Application ability is conducive to promoting firms to efficiently integrate existing knowledge and apply it to actual operations. It helps to avoid the path dependence of firms on existing knowledge and truly realizes the transformation from knowledge to innovation. Hence, these arguments lead to the following hypothesis:

Hypothesis 2b: Absorptive capacity promotes the entrepreneurship orientation of a firm.

A high level of absorptive capacity may improve the ability of firms to perceive and seize cooperation opportunities with external networks (Terstriep & Lüthje, 2018). The reason is that it increases the compatibility of new knowledge and enables firms to gain value from the new knowledge. Moreover, as an ability related to learning and knowledge, absorptive capacity represents an important part of firms' internal ability. It inspires firms to learn the knowledge they do not have and grasp the nature of future technological development more accurately (Cohen & Levinthal, 1994). As an important external knowledge, relational resources may also be affected by absorptive capacity. First, firms with strong absorptive capacity can efficiently learn and digest external knowledge, thereby establishing a complete knowledge structure, process, and mechanism. The improvement of knowledge reserve enables firms to access more unknown channels and business partners, thereby making it easier to access relational resources. Then, the high knowledge reserve of firms can improve their creativity, help them manage existing relational resources more effectively (Sirmon et al., 2007), and create opportunities and approaches to access relational resources by constructing new relationship models. In addition, as a dynamic capability, absorptive capacity can improve the flexibility of firms. When the relationship between the firms and the outside changes or goes wrong, firms with a high level of absorptive capacity can quickly acquire and apply the latest solutions. Thus, they can timely update and improve their access to relational resources. These arguments lead to the following hypothesis:

Hypothesis 2c: Absorptive capacity promotes the accessing relational resources of a firm.

Relational embeddedness reflects the relationship of knowledge sharing built by cooperative members based on trust and reciprocity. Notably, absorptive capacity is a kind of ability to identify, acquire, digest, and apply knowledge. Hence, its key significance to knowledge is possibly related to relational embeddedness to some extent. Coincidentally,

Kodama (2008) found that the absorptive capacity of firms helps to strengthen the ties between firms and universities, thereby improving the innovation performance of scientific and technological cooperations. This finding provides us with a kind of speculative evidence that absorptive capacity may promote the relational embeddedness of firms. First, firms with strong absorptive capacity can bring the latest knowledge, technology, and resources to their partners to help them benefit from each other. They can also obtain necessary resources from their partners, which is essentially a win–win cooperation. When both sides hope to gain more benefits from each other, they will increase their mutual economic and social interactions in frequency, depth, and breadth, manifested as deeper relational embeddedness. Second, firms with strong absorptive capacity can more easily understand the needs of partners and efficiently provide corresponding products and services. This case is conducive to increasing the trust of partners and their willingness to further cooperation. In addition, the stronger the absorptive capacity of the firms, the better the effect of applying the new knowledge acquired from the relationship networks to the operations management in organizations (Tsai, 2001). Gradually, firms' excellent performance will attract more partners to actively establish relational embeddedness with them. Therefore, these arguments lead to the following hypothesis:

Hypothesis 2d: Absorptive capacity promotes the relational embeddedness of a firm.

For firms, the complexity of digitization means that digital business strategy may not improve firm performance directly but through dynamic capabilities (Mithas et al., 2013). However, many kinds of sub-capabilities of dynamic capabilities exist, and the specific dynamic capability between digital business strategy and strategic entrepreneurship should be further clarified. Notably, some studies showed that firms' innovation performance needs the transforming effect of absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002). Zhao et al. (2021) found that absorptive capacity plays a complete mediating role between internal knowledge sharing and organizational innovation performance. Considering the positive significance of absorptive capacity as a knowledge transforming agent on firm innovation performance, numerous knowledge resources provided by digital business strategy must also be transformed by absorptive capacity. Thus, they are likely to promote strategic entrepreneurship and improve innovation performance.

Specifically, first, the effect of digital business strategy in promoting entrepreneurial orientation can only be realized through knowledge absorption and transformation. The reason is that the key to entrepreneurship orientation is to collect, analyze, and master entrepreneurial information. Second, although digital business strategy provides considerable knowledge and resources, not all resources can allow firms to access relational resources. Instead, it requires firms to screen them to identify and use the information they need. In addition, the premise of relational embeddedness is that firms need to collect and analyze the needs of their business partners in advance. Then, they should digest and apply their knowledge to provide the required services for them. Only in this way can the two parties reach a consensus based on trust and reciprocity. In summary, these arguments lead to the following hypotheses:

Hypothesis 3a–3c: Digital business strategy promotes the entrepreneurship orientation (H3a), the accessing relational resources (H3b), and the relational embeddedness (H3c) of a firm by improving absorptive capacity.

Moderating effect of environmental turbulence

Market turbulence refers to the degree of volatility and unpredictability of the market environment faced by organizations (Sheng et al., 2011). To adapt to the constantly changing market environment, firms need to improve their absorptive capacity to obtain market resources and opportunities (Cohen & Levinthal, 1990). Building digital business strategy is an effective approach, but it requires high costs, as it must deploy information and communication technologies, which may require significant investment (Yunis et al., 2018). Moreover, building digitally connected management systems and participating in digital platform construction require large consumption of resources. Therefore, compared with building digital business strategy, the profit from it that exceeds the cost is the most sought-after goal of firms. When market turbulence is low, consumer demand and external competition are relatively stable (Kibbeling et al., 2013). Firms can make use of the existing ways to obtain relatively stable resources and information at a low cost and cope with the risks brought by external market turbulence according to their inherent resources and capabilities. In this way, the value gained by building digital business strategy at a heavy cost is not significant enough. From another aspect, when market turbulence is high, firms are troubled by unpredictable competition and a shortage of external resources (Sheng et al., 2011). Under such a circumstance, firms are often motivated to build digital business strategy to improve absorptive capacity. That is, they can better integrate and utilize external critical knowledge to reduce the negative impact of high market turbulence. To sum up, these arguments lead to the following hypothesis:

Hypothesis 4a: Market turbulence has a positive moderating effect on the relationship between digital business strategy and absorptive capacity.

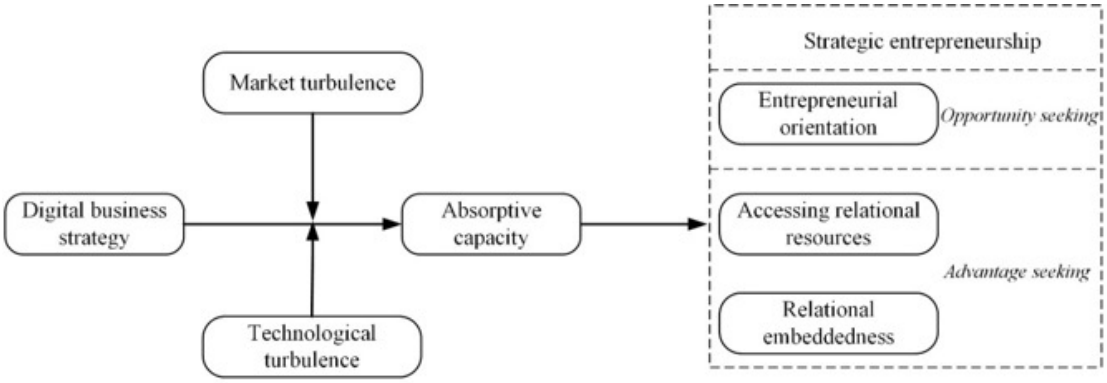
Technological turbulence is defined as the degree of volatility and unpredictability of technological changes in products or services (Terawatanavong et al., 2011). When technological turbulence is low, the value of firms' original technologies can remain unchanged for a long time (Autry et al., 2010). Therefore, firms can use and improve the existing technologies to meet their own development needs, and the value of investing substantial costs to build digital business strategy to enhance absorptive capacity is relatively low. In the case of high technological turbulence, the rapid update of new technologies makes predicting the changing trend of industrial technologies difficult for firms (Wu et al., 2017). As a result, new knowledge brought about by digital business strategy can also become outdated in a short time, and the absorption of outdated knowledge may not be of high value. In addition, absorptive capacity is characterized by path-dependence and time accumulation (Zahra & George, 2002), that is, it is based on firms' experience, and greatly improving it in a short time is difficult. Therefore, when technological turbulence is too sudden and unpredictable, investing in building digi-

tal business strategy to improve absorptive capacity makes little sense. By contrast, when technological turbulence is at a medium level, investing in digital business strategy to promote absorptive capacity may be most beneficial because the technological environment is changing but stable enough (Tsai et al., 2015). In such a technological environment, firms can not only acquire new technologies and resources through digital business strategy but also have enough time to absorb and apply these new resources to maintain competitive advantages. To sum up, these arguments lead to the following hypothesis:

Hypothesis 4b: Technological turbulence has an inverted U-shaped moderating effect on the relationship between digital business strategy and absorptive capacity.

The proposed conceptual model is presented in Fig. 1.

Fig. 1 The proposed conceptual model



Method

Sample and procedure

We obtained firm data through two waves of surveys, which started in April 2020 and ended in November 2021. The samples were mainly from firms in central, eastern, and southeast China, mainly involving manufacturing, service industries, and the Internet. We aimed to explore how digital business strategy could affect strategic entrepreneurship by improving absorptive capacity. Thus, the samples we chose needed to have some digital features. For example, these firms were building digital business strategy, relying on them to make management decisions and obtain information about partners or customers. We regarded absorptive capacity as the key link between digital business strategy and strategic entrepreneurship. Therefore, we also considered the initiative of firms in enhancing absorptive capacity and carrying out strategic entrepreneurship. Generally, these firms we chose were appropriate.

To obtain reliable data, the participants were mainly middle and senior managers who have a comprehensive grasp of firm information, such as CEO and senior managers.

We built a data survey bridge with the help of some professors, MBA students, and businessmen. Before the survey, we communicated with the senior managers and got their approval. Then, we sent the questionnaires to the respondents via e-mail and told them what they needed to pay attention to in the answering process. Finally, participants returned the completed questionnaires through e-mail. A potential response bias may exist in the questionnaire survey, so the potential response bias was reduced. First, we offered a reward of 50 yuan to every manager who completed the questionnaires to encourage them to answer these questions as truthfully as possible. Second, we believed that compared with material incentives, these managers were more interested in how to conduct daily business management and operation. We have long been in close contact with firms in many business fields, particularly some high-tech and Internet firms. During this period, we have accumulated considerable practical experience. Continuous cultivation in academic research also provided a solid theoretical foundation and knowledge. Therefore, we promised to provide free and open online courses (strategic management and human resource management) for every manager who completed the questionnaires to guide them to answer the questions truthfully. Finally, according to the ethical principles of the investigation, we explicitly kept confidential information in the questionnaires.

Using cross-sectional data to reflect the causal relationship between variables was difficult, and a multi-stage longitudinal investigation was feasible (Kaynak, 2003). Therefore, to improve the reliability of the results and avoid common method deviation, we collected data in two waves. In the first wave, we asked the managers to complete the scales of digital business strategy, absorptive capacity, market turbulence, technological turbulence, and control variables (firm information, competition intensity, and legal inefficiency). In the second wave, we asked managers to complete the strategic entrepreneurship scale (three dimensions). We started the first data collection in April 2020, with a total of 364 questionnaires distributed and 349 returned. The valid questionnaires after excluding unqualified ones were 323. The eliminating rules were mainly eliminating the incomplete answers, continuous answers (8 items or more), and questionnaires with evident deviations in feedback. Before the empirical study, we conducted a long-term follow-up survey and case interviews with some firms. We found that most firms generally take at least one year to build digital business strategy to produce results. Therefore, the second collection began in June 2021, and we asked managers to complete the strategic entrepreneurship scale. Based on the valid sample in the first wave, 323 questionnaires were distributed, 308 were collected, and 290 were valid. Finally, we numbered and matched all the data and input them into the database. For the sample matching, we asked participants to leave the last four digits of their mobile phone numbers in both waves.

In this study, the industry distribution was diverse, with the service accounting for 7.6%, manufacturing accounting for 29.3%, Internet accounting for 40.7%, and other industries accounting for 22.4%. For the firm scale, firms with 100–300

employees accounted for 48.7%. For the firm age, 43.5% have been established for more than 10 years. In addition, the geographical distribution of firms was relatively dispersive, accounting for 31.4% in the eastern, 32.1% in the central, 26.6% in the southern, and 10.0% in other regions. In conclusion, the firms were of different sizes, ages, industries, and regions (Table 1), which showed that the samples were highly representative and convincing.

Table 1 Basic characteristics of samples

Characteristic	Type	Frequency	Percentage
Firm type	Internet	22	7.60%
	Manufacture	85	29.30%
	Service Sector	118	40.70%
	Other	65	22.40%
Scale	Under 100 people	99	34.10%
	101~200 people	77	26.60%
	201~300 people	64	22.10%
	More than 300 people	50	17.20%
Firm age	Under 5 years	48	16.50%
	5 ~ 10 years	116	40.00%
	11 ~ 15 years	86	29.70%
	Over 15 years	40	13.80%
Location	East China	91	31.40%
	Central China	93	32.10%
	South China	77	26.60%
	Other	29	10.00%

Note: N = 290.

Variables

The scales used in this study mainly referred to foreign mature scales and were designed in the form of a Likert seven-point scale, with scores ranging from 1 (totally disagree) to 7 (totally agree). These scales need to be appropriately revised according to the research context in this study, which was beneficial to improving the reliability of the research data. We mainly followed the following steps. Before formulating the scales, we invited teachers from English major and management major to translate the scales in a forward-backward way, then we sent the translated scales and the original foreign scales to the other two teachers from English major and management major to discuss and revise. Finally, we formed the final Chinese scales. Then we revised and improved the scale items through expert consultation and structured interviews. Lastly, through a small-scale preliminary survey of service firms in Xiamen and Quanzhou, and using statistical methods such as exploratory factor analysis, we revised and improved the scales again to form the final survey questionnaires.

The scale of digital business strategy (DBS) came from the research of Ukko et al. (2019) containing 8 items with a typical item such as “Our company is familiar with the development and use of digital technology”. In this study, Cronbach’s α was 0.840. Since the establishment and implementation of digital business strategy cannot be completed in a short time, the words “recent three years” are added and highlighted in the questionnaire description. We referred to the multi-dimensional absorptive capacity (AC) scale developed by Flatten et al. (2011), which mainly evaluated the ability of firms to absorb, assimilate, transform and develop knowledge and information. We focused on the comprehensive absorptive capacity of firms, so we integrated it into one dimension. The scale consisted of 14 items, such as "our company can work more effectively by adopting new technologies". Cronbach's α was 0.965 in this study. For the measurement of market turbulence (MT) and technological turbulence (TT), we referred to the scale developed by Jaworski and Kohli (1993). There were six items in the market turbulence, such as "in the industry, customers' product preferences will change with time". Technological turbulence consisted of five items, such as "it is difficult for us to predict how the technology of our industry will change in the future". In this study, Cronbach's α was 0.871 and 0.824 respectively. Drawing on the relevant literature (Hughes et al., 2021), we divided strategic entrepreneurship (SE) into two aspects: opportunity seeking and advantage seeking, including entrepreneurial orientation (EO), accessing relational resources (AR), and relational embeddedness (RE). For entrepreneurial orientation, we referred to the measurement of Covin and Slevin (1989), which contained 9 items. A typical item such as "we often try new ideas", and Cronbach's α was 0.915 in this study. For accessing relational resources, we referred to the measurement of Sarkar et al. (2001), which contained five items. A typical item such as "the stakeholders of firms depend on each other to a certain extent to achieve higher competitive performance", and Cronbach's α was 0.876 in this study. Finally, we referred to Andersson et al. (2002) to measure relational embeddedness. This dimension contained five items with a typical item such as "keeping a close relationship with other firms can help us improve our business performance". Cron-

bach's α was 0.820 in this study.

Considering that firms' absorptive capacity and strategic entrepreneurship may be affected by firm type, scale, age, and location, we took them as control variables to make the results more reliable. In addition, according to the research of Bao et al. (2020), we also considered the influence of competitive intensity and legal inefficiency. For competitive intensity, we referred to Jaworski and Kohli (1993), which contained five items. A typical item such as "the competition in this industry is cruel", and Cronbach's α was 0.868 in this study. Referring to Bao et al. (2020), the legal inefficiency evaluated the degree of illegal and unfair behaviors (such as piracy and counterfeiting) in the industry. The scale contained six items, like "many illegal competitive behaviors in our industry, such as fraud and imitation", and Cronbach's α was 0.905 in this study.

Results

Reliability and validity analysis

In this study, the reliability of the formal survey data was tested again through reliability and validity (Table 2). The scales were found to pass factor analysis with factor loading ranging from 0.695 (> 0.5) to 0.821. It was also found that Cronbach's α value, factor loading, construct reliability (CR) and average variance extracted (AVE) of all factors met the requirements. Secondly, through the Harman single-factor test (Harman, 1976), factor analysis was conducted on all items of nine variables in the collected data. The first main component obtained without rotation accounted for 27.56%, which did not exceed the critical value of 40%. By adding latent factors (Podsakoff et al., 2003), it was found that the variance of the goodness of the model fit was $\Delta(\chi 2/df) = -0.011$, $\Delta CFI = 0.002$, $\Delta TLI = 0.001$ and $\Delta RMSEA = 0.000$, and the variance was not significant. Therefore, the common method bias was well controlled.

Finally, to examine the discriminant validity among variables, we made a confirmatory factor analysis (Table 3). The results showed that the fitting degree of the single-factor model was the worst, while the fitting degree of the nine-factor model ($\chi 2/df=1.470$, CFI = 0.926, TLI = 0.923, SRMR = 0.047, RMSEA = 0.040) met the requirements and was superior to other models. It indicated that the six factors in this study had great discriminant validity.

Table 2 Scale items and exploratory factor analysis

Variable	Item	Loading	α	CR	AVE	Variable	Item	Loading	α	CR	AVE
Digital business strategy	DBS1	0.763	0.920	0.935	0.645	Entrepreneurial orientation	EO1	0.775	0.915	0.930	0.598
	DBS2	0.827					EO2	0.83			
	DBS3	0.803					EO3	0.74			
	DBS4	0.802					EO4	0.834			
	DBS5	0.797					EO5	0.735			
	DBS6	0.844					EO6	0.775			
	DBS7	0.806					EO7	0.768			
	DBS8	0.782					EO8	0.802			
Absorptive capacity	AC1	0.877	0.965	0.969	0.692	Accessing relational resources	EO9	0.695	0.876	0.912	0.678
	AC2	0.857									
	AC3	0.84					AR1	0.697			
	AC4	0.875					AR2	0.828			
	AC5	0.81					AR3	0.921			
	AC6	0.844					AR4	0.829			
	AC7	0.841					AR5	0.827			
	AC8	0.836					RE1	0.728			
	AC9	0.787					RE2	0.74			
	AC10	0.802				Relational embeddedness	RE3	0.865	0.820	0.877	0.590
	AC11	0.818					RE4	0.776			
	AC12	0.792					RE5	0.725			
	AC13	0.851					MT1	0.782			
	AC14	0.817					MT2	0.753			
Legal inefficiency	LI1	0.813	0.868	0.919	0.656	Market turbulence	MT3	0.81	0.871	0.903	0.609
	LI2	0.861					MT4	0.782			
	LI3	0.775					MT5	0.761			
	LI4	0.812					MT6	0.793			
	LI5	0.783					TT1	0.721			
	LI6	0.813					TT2	0.742			
Competitive intensity	CI1	0.81	0.905	0.915	0.683	Technological turbulence	TT3	0.758	0.824	0.877	0.590
	CI2	0.855					TT4	0.779			
	CI3	0.81					TT5	0.836			
	CI4	0.833									
	CI5	0.824									

Notes: N = 290; Construct reliability (CR), average variance extracted (AVE).

Table 3 Results of confirmatory factor analysis

Model	*χ2/df*	*CFI*	*TLI*	*SRMR*	*RMSEA*
Nine-factor model: DBS, AC, EO, AR, RE, MT, TT, CI, LI	1.470	0.926	0.923	0.047	0.04
Eight-factor model: DBS+AC, EO, AR, RE, MT, TT, CI, LI	1.838	0.868	0.862	0.058	0.053
Seven-factor model: DBS+AC+EO, AR, RE, MT, TT, CI, LI	2.820	0.785	0.775	0.078	0.068
Six-factor model: DBS+AC+EO+AR, RE, MT, TT, CI, LI	2.658	0.738	0.727	0.081	0.075
Five-factor model: DBS+AC+EO+AR+RE, MT, TT, CI, LI	2.832	0.710	0.698	0.088	0.079
Four-factor model: DBS+AC+EO+AR+RE+MT, TT, CI, LI	3.205	0.650	0.637	0.100	0.087
Three-factor model: DBS+AC+EO+AR+RE+MT+TT, CI, LI	3.437	0.612	0.599	0.105	0.091
Two-factor model: DBS+AC+EO+AR+RE+MT+TT+CI, LI	3.798	0.555	0.539	0.117	0.098
One-factor model: DBS+AC+EO+AR+RE+MT+TT+CI+LI	4.316	0.472	0.454	0.128	0.107

Notes: N = 290; Digital business strategy (DBS), absorptive capacity (AC), entrepreneurial orientation (EO), accessing relational resources (AR), relational embeddedness (RE), market turbulence (MT), technical turbulence (TT), legal inefficiency (LI), competitive intensity (CI).

Descriptive statistics and correlation analysis

The purpose of descriptive statistical analysis (Table 4) was to preliminarily observe whether these samples were biased. We found that the mean value of the main variables in the model was between 4.76 and 5.24, and the standard deviation was between 0.69 and 1.21, which indicated that the investigated firms had initially built digital business strategy, and had a high level of absorptive capacity. In addition, the standard deviations of these variables were within a reasonable range, which indicated that there was no obvious deviation in the distribution of these samples. In all, these samples were appropriate and representative. Table 4 reported the correlation analysis. It showed that DBS was positively correlated with EO ($r = 0.463$, $p < 0.001$), AR ($r = 0.438$, $p < 0.001$), and RE ($r = 0.467$, $p < 0.001$). In addition, DBS was positively correlated with AC ($r = 0.657$, $p < 0.001$). AC was positively correlated with EO ($r = 0.489$, $p < 0.001$), AR ($r = 0.501$, $p < 0.001$), and RE ($r = 0.501$, $p < 0.001$). The verification of the correlation between variables provided preliminary evidence for the research hypotheses, laying a foundation for the follow-up tests.

Table 4 Descriptive statistics and correlation analysis of variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1.type													
2.scale	-0.074												
3.year	0.085	0.169**											
4.location	0.091	0.049	0.085										
5.DBS	-0.051	-0.054	0.035	-0.208***									
6.AC	-0.021	-0.051	0.003	-0.107	0.657***								
7.EO	-0.012	-0.1	-0.028	-0.031	0.463***	0.489***							
8.AR	0.003	-0.002	0.002	-0.087	0.438***	0.501***	0.499***						
9.RE	-0.005	0.008	0.006	-0.057	0.467***	0.501***	0.554***	0.457***					
10.MT	-0.038	-0.007	0.085	-0.094	0.167**	0.179**	0.089	0.051	-0.056				
11.TT	-0.046	-0.046	-0.041	0.032	-0.075	-0.220***	-0.201**	-0.094	-0.181**	0.012			
12.CI	0.048	-0.045	-0.012	-0.150*	0.050	0.048	-0.124*	-0.133*	-0.255***	0.165**	0.056		
13.LI	0.059	-0.076	0.020	-0.127*	0.085	0.030	-0.075	-0.011	-0.288***	0.189**	0.056	0.386***	
M	2.78	2.22	2.41	2.15	5.11	5.14	5.05	4.93	5.24	5.17	5	4.76	4.82
SD	0.88	1.09	0.92	0.98	0.89	0.92	0.78	0.87	0.69	0.9	0.79	1.12	1.21

Notes: N = 290; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Mean value (M), standard deviation (SD); Digital business strategy (DBS), absorptive capacity (AC), entrepreneurial orientation (EO), accessing relational resources (AR), relational embeddedness (RE), market turbulence (MT), technical turbulence (TT), legal inefficiency (LI), competitive intensity (CI).

Endogeneity test

In this study, the Durbin-Wu-Hausman test was used to evaluate endogeneity (Tang & Rai, 2012). Because AC was a mediating latent variable, according to the simultaneous equation, we only needed to test the endogeneity of the moderators. The MT and TT were taken as dependent variables, and DBS and other control variables were taken as independent variables for regression so that the residual errors of MT and TT were obtained and retained. Then, EO, AR, and RE were regressed respectively, and the coefficients of the above residuals were obtained. The results showed that the residual error of MT had no significant regression coefficients on EO (β = 0.025, $p > 0.05$), AR (β = -0.025, $p > 0.05$) and RE (β = -0.020, $p > 0.05$), and the residual error of TT had no significant regression coefficients on EO (β = -0.009, $p > 0.05$), AR (β = 0.016, $p > 0.05$) and RE (β = -0.042, $p > 0.05$), which indicated that this study had a good control of endogeneity.

Hypothesis test

After incorporating the control variables into the model, this study used SPSS 24 software to carry out regression analysis to test the hypotheses (Table 5). First, we found that DBS had a significantly positive impact on EO (β = 0.424, $p < 0.001$, M5), AR (β = 0.434, $p < 0.001$, M9), and RE (β = 0.390, $p < 0.001$, M13), so H1a, H1b and H1c were confirmed. At the same time, DBS had a significantly positive effect on AC (β = 0.690, $p < 0.001$, M2), so H2a was confirmed. In addition, AC had a significantly positive effect on EO (β = 0.419, $p < 0.001$, M6), AR (β = 0.475, $p < 0.001$, M10), and RE (β = 0.387, $p < 0.001$, M14), so H2b, H2c and H2d were confirmed. The above direct effect test results provided the basis for the following mediating effect test.

We used hierarchical regression (Baron & Kenny, 1986) to test the mediating role of AC (Table 5). Regarding EO as the dependent variable, the regression results showed that DBS had a significant positive impact on EO, but the coefficient decreased (β = 0.236, $p < 0.001$, M7), and AC had a significant positive impact on EO (β = 0.273, $p < 0.001$, M7), so AC played a mediating role between DBS and EO. Regarding AR as the dependent variable, the regression results showed that DBS had a significant impact on AR (β = 0.186, $p < 0.01$, M11), but the coefficient decreased, and AC had a significant positive impact on AR (β = 0.360, $p < 0.001$, M11), so AC played a mediating role between DBS and AR. Lastly, we regarded RE as the dependent variable. The regression results showed that the regression coefficient of DBS was significant (β = 0.215, $p < 0.001$, M15), but the coefficient decreased, and AC had a significant positive impact on RE (β = 0.254, $p < 0.001$, M15), so AC played a mediating role between DBS and RE. Therefore, H3a, H3b, and H3c were confirmed.

Table 5 Regression analysis results

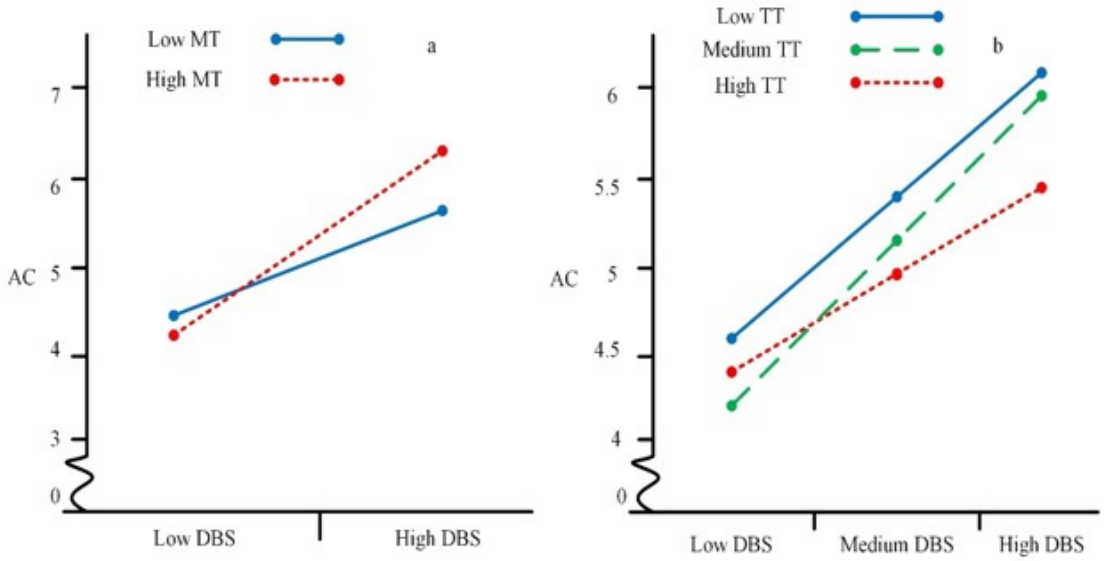
Variable	AC			EO				AR				RE			
Model	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
Constant	5.311	1.594	5.134	5.870	3.586	3.647	3.151	5.554	3.214	3.031	2.639	6.546	4.443	4.492	4.039
Type	-0.020	0.012	0.027	-0.006	0.014	0.003	0.011	0.017	0.038	0.027	0.033	0.021	0.039	0.029	0.036
	(-0.063)	(-0.048)	(-0.046)	(-0.053)	(-0.047)	(-0.046)	(-0.045)	(-0.059)	(-0.053)	(-0.051)	(-0.050)	(-0.045)	(-0.039)	(-0.038)	(-0.037)
Scale	-0.041	-0.011	-0.008	-0.075	-0.057	-0.058	-0.054	-0.001	0.018	0.019	0.022	-0.009	0.009	0.007	0.011
	(-0.051)	(-0.039)	(-0.037)	(-0.043)	(-0.038)	(-0.037)	(-0.036)	(-0.047)	(-0.043)	(-0.041)	(-0.041)	(-0.036)	(-0.031)	(-0.031)	(-0.030)
Year	0.022	-0.020	-0.061	-0.006	-0.031	-0.015	-0.026	0.007	-0.020	-0.003	-0.012	0.014	-0.010	0.005	-0.005
	(-0.06)	(-0.046)	(-0.044)	(-0.051)	(-0.045)	(-0.044)	(-0.043)	(-0.057)	(-0.051)	(-0.049)	(-0.048)	(-0.043)	(-0.037)	(-0.036)	(-0.035)
Location	-0.094	0.031	0.051	-0.038	0.039	0.001	0.030	-0.097	-0.018	-0.052	-0.029	-0.084*	-0.013	-0.048	-0.021
	(-0.057)	(-0.044)	(-0.042)	(-0.048)	(-0.043)	(-0.042)	(-0.041)	(-0.053)	(-0.049)	(-0.046)	(-0.046)	(-0.041)	(-0.036)	(-0.034)	(-0.034)
CI	0.025	0.026	0.006	-0.084	-0.083*	-0.094*	-0.090*	-0.128*	-0.127**	-0.140**	-0.137**	-0.114**	-0.114**	-0.124***	-0.120***
	(-0.053)	(-0.040)	(-0.039)	(-0.045)	(-0.039)	(-0.039)	(-0.038)	(-0.050)	(-0.045)	(-0.043)	(-0.042)	(-0.038)	(-0.033)	(-0.032)	(-0.034)
LI	0.002	-0.028	-0.016	-0.028	-0.045	-0.028	-0.038	0.027	0.009	0.026	0.019	-0.135***	-0.152***	-0.136***	-0.145***
	(-0.049)	(-0.037)	(-0.036)	(-0.041)	(-0.036)	(-0.036)	(-0.035)	(-0.046)	(-0.041)	(-0.040)	(-0.039)	(-0.035)	(-0.030)	(-0.029)	(-0.029)
DBS		0.690***	0.788***		0.424***		0.236***		0.434***		0.186**		0.390***		0.215***
		(-0.048)	(-0.059)		(-0.047)		(-0.059)		(-0.053)		(-0.066)		(-0.038)		(-0.028)
AC						0.419***	0.273***			0.475***	0.360***			0.387***	0.254***
						(-0.044)	(-0.056)			(-0.048)	(-0.063)			(-0.036)	(-0.046)
MT			0.110*												
			(-0.046)												
MT × DBS			0.184**												
			(-0.053)												
TT			-0.163**												
			(-0.054)												
TT2			0.013												
			(-0.047)												
TT × DBS			-0.055												
			(-0.059)												
TT2 × DBS			-0.165**												
			(-0.058)												
R^2	0.015	0.435	0.506	0.030	0.251	0.270	0.309	0.031	0.218	0.281	0.301	0.121	0.356	0.379	0.42
ΔR^2	0.015	0.420	0.491	0.030	0.220	0.240	0.058	0.031	0.187	0.250	0.082	0.121	0.235	0.258	0.064
F	0.730	31.041***	21.724***	1.476	13.466***	14.891***	15.700***	1.503	11.253***	15.753***	15.112***	6.494***	22.297***	24.568***	25.424***

Notes: N = 290; Digital business strategy (DBS), absorptive capacity (AC), entrepreneurial orientation (EO), accessing relational resources (AR), relational embeddedness (RE), market turbulence (MT), technical turbulence (TT), legal inefficiency (LI), competitive intensity (CI); * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Moderating effect test

Before testing, the independent variable and moderators were processed centrally, and the interaction items were generated. Test for the moderating effect of MT: the interaction between MT and DBS had a significant positive impact on AC ($\beta = 0.184$, $p < 0.01$, M3), which indicated that MT had a positive moderating effect between DBS and AC, and H4a was confirmed. Test for the moderating effect of TT: the interaction between TT and DBS had no significant influence on AC ($\beta = -0.055$, $p > 0.05$, M3), but the interaction between DBS and the square of TT had a negative influence on AC ($\beta = -0.165$, $p < 0.01$, M3), indicating that TT played an inverted U-shaped rather than a linear moderating role between DBS and AC. Therefore, H4b was confirmed. Lastly, we drew a simple moderating effect diagram (Fig. 2).

Fig. 2 The moderating effect of MT and TT



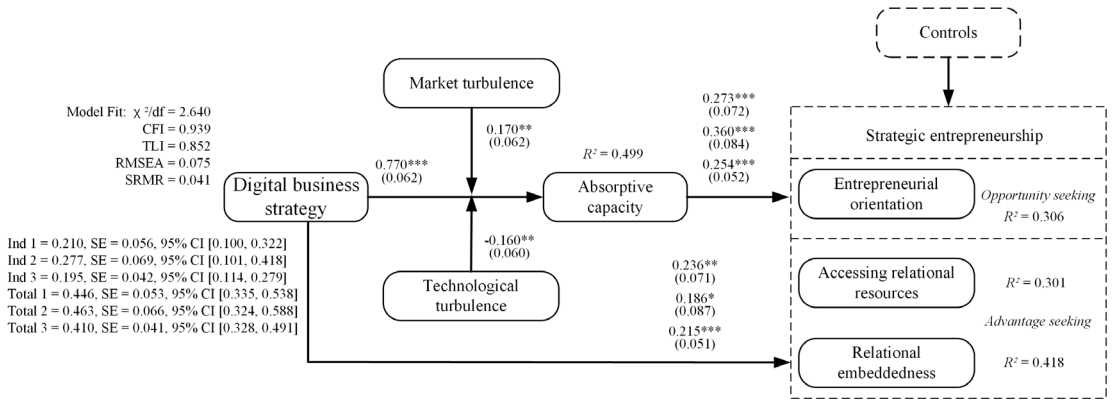
Robustness test

According to the practices in the literature (Chen & Liu, 2020), we used structural equation model (SEM) of Mplus7.4 software to check the robustness. We used bootstrap method to test the mediation effect through 5000 repeated sampling, and the confidence interval was set to 95%. The fitting index of the model ($\chi 2/df = 2.640$, CFI = 0.939, TLI = 0.852, SRMR = 0.041, RMSEA = 0.075) basically met the requirements. We found that (Figure 3) DBS had a significant positive impact on EO ($\beta = 0.236$, SE = 0.071, $p < 0.01$), AR ($\beta = 0.186$, SE = 0.087, $p < 0.05$), and RE ($\beta = 0.215$, SE = 0.051, $p < 0.001$). Therefore, H1a, H1b and H1c were confirmed. Then, DBS had a significant positive impact on AC ($\beta = 0.770$, SE = 0.062, $p < 0.001$), and H2a was confirmed. At the same time, we found that AC had a significant positive impact on EO ($\beta = 0.273$,

SE = 0.072, p < 0.001), AR (β = 0.360, SE = 0.084, p < 0.001), and RE (β = 0.254, SE = 0.052, p < 0.001). Therefore, H2b, H2c and H2d were confirmed.

We also found that digital business strategy positively affected EO (β = 0.210, SE = 0.056, 95%CI[0.100, 0.322]), AR (β = 0.277, SE = 0.069, 95%CI[0.149, 0.418]), and RE (β = 0.195, SE = 0.042, 95%CI[0.114, 0.279]) through AC. It proved that AC played a mediating role between DBS and the three dimensions of strategic entrepreneurship (EO, AR, RE). Therefore, H3a, H3b and H3c were verified again. In addition, MT had a positive moderating effect (β = 0.170, SE = 0.062, p < 0.01) and TT had an inverted U-shaped moderating effect (β = -0.160, SE = 0.060, p < 0.01), so H4a and H4b were verified again. In conclusion, this study passed the robustness test (Fig. 3).

Fig. 3 The robustness test



Discussion

Conclusions

Based on dynamic capability theory, we link digital business strategy, absorptive capacity, market turbulence, technological turbulence, and strategic entrepreneurship and draw the following conclusions through empirical research. First, digital business strategy promotes firms' strategic entrepreneurship. Specifically, digital business strategy realizes digital technology integration and innovation and provides firms with the latest entrepreneurial resources and opportunities, which are conducive to the entrepreneurial orientation of firms. In addition, the network effect of digital business strategy provides firms with opportunities to connect multiple platform participants. These opportunities allow firms to freely build social relationships to access relational resources efficiently. In addition, as digital business strategy is characterized by collaboration and sharing, firms must carry out in-depth communication and cooperation based on mutual trust and reciprocity to achieve win–win results, which will lay a good foundation for their relational embeddedness. Second, absorptive capacity has a mediating

effect between digital business strategy and strategic entrepreneurship of firms. Although digital business strategy provides firms with substantial knowledge and resources, it also relies on the ability to transform knowledge into actions (Jantunen, 2005). Absorptive capacity is a dynamic capability that plays a key role in identifying, acquiring, digesting, and applying resources. It can provide an impetus for firms to implement strategic entrepreneurship, thereby forming competitive advantages. Third, market turbulence has a positive moderating effect between digital business strategy and absorptive capacity, whereas technological turbulence has an inverted U-shaped moderating effect. When market turbulence is low, firms can implement or improve their market strategies according to the existing market information, instead of spending too much cost and energy to build digital business strategy. However, as market turbulence increases, market demand becomes unpredictable. In this case, firms need to develop digital business strategy to increase absorptive capacity so that they can continuously access critical market information. When the technological turbulence is low, the existing technologies can meet the technical requirements of the firms. However, when the technological turbulence is very high, the technologies change rapidly and become obsolete easily. On the contrary, absorptive capacity has the characteristics of path-dependence and time-accumulation, thereby making most of the technologies absorbed by firms obsolete. Hence, investments in digital business strategy will lead to the greatest return when technological turbulence is at a moderate level. The reason is that firms need to rely on the absorptive capacity to learn and apply new technologies in response to the moderate technological turbulence. Moreover, they do not have to worry too much about the risk of absorbing outdated technologies.

Theoretical implications

This study provides important theoretical implications in several ways. First, the link between digital business strategy and strategic entrepreneurship has expanded and enriched the literature on digital capabilities and strategic entrepreneurship. Existing relevant literature on digital business strategy was mostly reflected in organizational achievements, such as firm performance, innovation, value creation, and strategic development (Mithas et al., 2013; Khin & Ho, 2020; Karimi & Walter, 2021; VanZeebroeck et al., 2023). Studies on specific behaviors before the generation of organizational achievements are limited. Strategic entrepreneurship has the interactive connotation of taking entrepreneurial actions from a strategic perspective and taking strategic actions from an entrepreneurial perspective, including two specific behaviors, opportunity seeking and advantage seeking. In reality, strategic entrepreneurship is one of the basic driving factors of firms' competitive advantages, profitability, survival, and growth (Ireland et al., 2001). Therefore, this study on the relationship between digital business strategy and strategic entrepreneurial behaviors may provide a better insight into the internal logic of firms' development. Second, from the perspective of dynamic capability theory, absorptive capacity is introduced as an intermediary variable to open the black box that digital business strategy affects strategic entrepreneurship. Dynamic capabilities occupy a central position in the field of entrepreneurship research characterized

by dynamics and strategic management research on seeking competitive advantages (Teece, 2016). Therefore, dynamic capabilities provide a logical basis for explaining strategic entrepreneurship. In addition, Mithas et al. (2013) pointed out that future studies on digital business strategy should consider more dynamic capabilities to analyze the potential intermediary mechanisms of the digital business strategy. Therefore, this study takes a specific dynamic capability, that is, absorptive capacity, as an intermediary variable between digital business strategy and strategic entrepreneurship. In this way, this study not only responds to the call of Mithas et al. (2013) but can also better explain the specific transformation process from digital business strategy to strategic entrepreneurship. Third, market turbulence and technological turbulence are introduced as the moderating variables to expand the boundary conditions between digital business strategy and absorptive capacity. With the change in the economic model and the acceleration of firm transformation, firms need to consider environmental factors when carrying out strategic behaviors (Li & Atuahene-Gima, 2001). Current studies on absorptive capacity mostly take individual factors as boundary conditions but lack the consideration of the overall external environment. In the present study, we draw the conclusions that digital business strategy has different effects on absorptive capacity under the conditions of market and technological turbulence. To some extent, the conclusions are conducive to clarifying different boundary conditions between digital business strategy and absorptive capacity. They will help to enrich the research on boundary conditions of absorptive capacity.

Managerial implications

Firms should attach importance to the construction of digital business strategy and focus on improving digital business strategy. First, firms should cultivate their own digital corporate culture and values and then scientifically set up phased digital strategic goals and plans. In addition, firms should pay attention to the development and maintenance of relational resources to empower their digital construction. The options include building their digital business strategy or actively participating in digital platform cooperations, carrying out industry–university–research collaboration, introducing digital technologies and talents, and others. Improving digital business strategy in a short time is not easy. Firms should cultivate dynamic capabilities to cope with the changes brought by the external environment and achieve a spiral rise in the long run.

Firms should improve absorptive capacity to transform external knowledge and resources into competitive advantages. Firms should also actively strengthen the connection with external stakeholders (e.g., customers, scientific research institutions, and business partners). Then, they should carry out in-depth cooperation and high-quality relational embeddedness based on trust and reciprocity to increase the opportunities to acquire the latest knowledge and resources. In addition, the rules and atmosphere of knowledge sharing need to be established within the firms to promote the digestion and integration of new knowledge. Most importantly, firms should integrate motivation into the process of knowledge application. For example, they can implement a reward system for product research and development, incorporate innovation performance

into performance appraisal and promotion of employees, and create a working atmosphere that encourages trials and errors.

Firms should always pay attention to the external market and technological trends and dynamically adjust their business strategies. When market turbulence is low, firms can build learning groups to gradually improve the overall grasp of market information. When market turbulence is high, firms should not only pay attention to the cultivation of digital business strategy but also increase the development and maintenance of marketing channels and recruit or train more talents to absorb more market information. When technological turbulence is low, firms can maintain their development by keeping the existing technologies. When technological turbulence is moderate, the investment in technologies produces the greatest benefit. Therefore, firms should increase their investment in digital business strategy and increase the research and development of digital technologies. For example, they can introduce the latest technologies at home and abroad, build innovative incubators, and support employee intrapreneurship. When technological turbulence is high, firms can grasp the dynamic trend of technologies through increasing communication with partners and regularly observing the new direction of the industry.

Limitations and future research

Although this study has made some implications, some limitations still exist. First, the data used in this study were collected from April 2020 to November 2021. The data from a one-year interval cannot strictly be used to evaluate the long-term causal relationship between variables. Therefore, future research can extend the timeline and collect new data through a longitudinal survey. In addition, for the questionnaire survey, avoiding respondent bias is difficult, and objective second-hand data can help verify the results. Second, we use the dynamic capability theory to explain the mechanism that digital business strategy affects strategic entrepreneurship through absorptive capacity in uncertain environments (market and technological turbulence). Although the perspective works, it may not be unique. We believe that other perspectives, such as social network theory, strategic choice theory, or diffusion of innovations theory, can help us provide more new insights for understanding the relationship between digital business strategy and strategic entrepreneurship. Third, future research should develop the current theoretical framework in this study to determine its applicability in other economies. Our sample is mainly from an emerging economy (China). Although our data can explain the relationship between digital business strategy and strategic entrepreneurship in emerging economies, whether it can be extended to developed economies is unknown. Therefore, we propose that future research could test the proposed theoretical framework in developed economies and compare the conclusions with ours. Finally, as for the boundary conditions of digital business strategy and absorptive capacity, except for market and technological turbulence, many other possible variables have not been taken into account, such as the alliance network location (Gulati, 1999) and organizational routines (Feldman & Pentland, 2003). In the future, we should consider more boundary variables so that the research conclusions will have higher authenticity and wider applicability.

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