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# Network orientation, organisational improvisation and innovation: An empirical examination

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## Abstract

In today's highly competitive world market, businesses can hardly maintain their competitiveness without strong innovation abilities. In the past, many Chinese enterprises have enjoyed success through imitation. But to continue to succeed in a global marketplace, they must develop ambidextrous innovation abilities. The resource-based theory eloquently posits that competitive advantage is associated with different and heterogeneous resources. To obtain such resources, firms must establish an external network to acquire necessary knowledge and skills. In this paper, we develop a theoretical model linking network orientation, organisational improvisation, ambidexterity and competitive tension. We postulate that organisational improvisation has a mediating effect and competitive tension is a moderator. Empirical results ( $N = 340$ ) show that (1) network orientation leads to both exploratory and exploitative innovations, (2) the above effect is mediated by organisational improvisation and (3) competitive tension positively moderates the effect between network orientation and organisational improvisation.

## KEYWORDS

ambidexterity, competitive tension, network orientation, organisational improvisation

## 1 | INTRODUCTION

There is little doubt that China has been an economic miracle. For the past several decades, many Chinese firms rise to the status of an international competitor. However, it is generally agreed that innovation is not the

strong suite for most Chinese firms. The lack of innovation ability has profound implications. At the national level, it restricts China's ability to transform and upgrade her industries and technologies. At the firm level, Chinese firms need to constantly innovate to maintain competitive advantage. Not surprisingly, the Chinese government has actively promoted policies to encourage innovation.

For long-term, sustainable growth of any firm, innovation is a key driver. In today's world, the only constant theme is change. Changes require firms to constant look at their current technologies and abilities to determine

Empirical data for this research are collected through survey of entrepreneurs. For privacy reasons, the data cannot be made publicly available. However, anonymised data can be shared from authors upon request. Not to be reproduced or quoted without written permission from the authors.

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what they need to do next. Dewar and Dutton (1986) stated that an organisation's innovation ability can be classified into either exploitative or exploratory. Exploitative innovations are those leveraging existing knowledge and resources, usually with a nature of small, step-by-step or incremental. Exploitative innovations often lead to an optimisation or improvement of existing products and services. Such products and services are usually offered in a rather stable environment. Improvement is helpful to a firm maintaining a short-term competitive advantage. In contrast, exploratory innovations are novel in nature. They are associated with breakthroughs and are risky in nature. Firms need to utilise new knowledge and resources to achieve exploratory innovations, which often can radically change the competitive landscape, leading to brand new products and services for new markets (Chandy & Tellis 2000). Exploratory innovations are crucial to any firm's long-term prosperity.

Clearly, firms need to coordinate and balance the two types of innovation capabilities. This balancing act has been called organisational ambidexterity in both the literature and practices. Scholars have well recognised the value of ambidexterity and studied the subject from a variety of perspectives, including organisational learning, organisational change, technological innovation and strategic management. Acquiring external resources is key to a firm's successful innovation as well as developing ambidexterity (Xi et al., 2017). Per the network theory, a firm's competitive advantage is largely associated with its external network connection. In the current information era, establishing and maintaining external relationships and networks is crucial to a firm's growth. In this regard, the concept of network orientation has become increasingly important to modern firms. Research on network orientation, though, is unfortunately scant. Particularly, there is a limited understanding on how network orientation affects ambidexterity.

While acquiring external resources is vital, it is equally important, if not more, to effectively utilise such resources. Organisational improvisation is such a mechanism that firms adopt to integrate external resources for effective utilisation, which then transform into performance (Cheng et al., 2019). Organisational improvisation means a creative way of allocating and deploying both internal and external resources for tasks such as innovation. Since firms do not live in vacuum, their organisational improvisation is often influenced by the network with which they operate. Logically, a strong network orientation is conducive to firms for organisational improvisation. With a strong network, firms can expect easy and smooth commercial exchanges, real-time access of market information, enabling them to be more effective in resources acquisition and utilisation in an uncertain

environment (Dong & Zhou, 2015). To date, research studies on the relationship between network orientation and organisational improvisation are scarce. It is an important gap in the literature that begs to be bridged.

This study aims to address the gap. By synthesising several overarching theories, we developed a theoretical model that links network orientation, organisational improvisation and ambidexterity. Then we collected empirical data from ... Through a survey conducted in Northeast China. We used regression to evaluate the proposed model. Empirical results supported the research hypotheses.

## 2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 2.1 | Organisational ambidexterity

Organisational ambidexterity is an important concept in the literature of innovations. Sometimes it is also referred to as organisational duality. The essence of the concept is that there are two types of innovations: exploratory versus exploitation. They are so different that it warrants to have different organisational structures, approaches and management structures to manage them. Modern firms need both type of innovations to succeed in competition. They need to be good at both fronts, hence the term ambidextrous.

Exploratory innovation is the type of activities that are characterised as highly risky, uncertain but can potentially lead to groundbreaking advancement. Exploratory innovation is often conducted when firms need to develop new products, enter into new markets. Such innovations require firms to not be bound by existing knowledge and processes but to be open to creative ideas and tolerant to errors in the process. Exploratory innovation often leads to radical changes. Such changes, once successfully implemented, will lead to a formidable competitive advantage that competitors can hardly catch up in a long time period. In other words, exploratory innovation forms the basis for a firm's long-term competitiveness and sustainability. In contrast, exploitative innovation is usually incremental in nature. It focuses on incremental improvement. Firms usually use exploitative innovation to make small improvements to existing products. The risk of such innovation is generally low. Projects are often small in scale, and they can be completed in a short time span. These projects usually can be completed on time with clearly defined objectives achieved. Such projects can help firms solidify existing market position and are often a good indicator for a firm's short-term performance.

## 2.2 | Network orientation

The concept of network orientation first appeared in psychology research. Psychologists define network orientation as a belief, tendency and attitude to deal with life problems through network relations (Tolsdorf, 1976). Network orientation is an important method for individuals to solve certain psychological problems. Sorenson et al. (2008) extended the concept of network orientation to the field of management. They redefine network orientation as the tendency, expectation and attitude of an entrepreneur or entrepreneurial organisation to build and maintain network relationships for problem solving. We followed their definition in this study.

Network orientation is a complex concept with multiple dimensions. According to Sorenson et al. (2008), the role of network orientation can be analysed from the perspective of conflict resolution. They identified three dimensions: cooperation, network construction and network opening. In another study, Sorenson and Ren (2011) suggested three similar but slightly different dimensions: open management, relationship attention and cooperation. Unlike in the fields of psychology and sociology, network orientation is a rather new concept in the field of management. Different definitions exist, and a universally accepted identification of the dimensions of network orientation is yet to appear. In this study, we adopted the dimensions identified by Sorenson et al. (2008).

## 2.3 | Organisational improvisation

The word “improvisation” is often used in performances such as jazz and drama, referring to the act of creating or performing spontaneously or without preparation. Once extended in the field of management, the word is typically associated with actions that are creative, taken without prior planning or regulation. Moorman and Miner (1998) defined improvisation as “the concentration of creation and execution in time.” Others criticised this definition as one-sided and argued for defining the concept from other perspectives than time. Weick (1993) contended that improvisation is not just about length of time, but it is a process. To him, improvisation is an on-the-spot invented method and strategy to replace old ineffective processes. Vera and Crossan (2005) supported the same notion to further argue that organisational improvisation is a process that tries to achieve organisational goals in a creative and spontaneous manner. Pavlou and El Sawy (2010) stated that organisational improvisation is about utilising an organisation's existing resources, reconfigure them to create new operational capability.

This is particularly relevant in an environment that is characterised by uncertainty or even turbulent, where innovation is of utter importance. Taken all these together, organisational improvisation is a behaviour characterised as unplanned, spontaneous and creative. Organisational improvisation is manifested as making use of existing resources to respond to unexpected situations or to solve problems creatively on the spot to improve organisational efficiency.

## 2.4 | Competitive tension

According to the dynamic competition theory, competition is a dynamic market process other than a static market result. In any market, profit-seeking behaviours will break the stable status quo; hence, some scholars have asserted that a market will never reach an equilibrium, because equilibrium can only be achieved absenting competition. Competitive tension is a type of “power” that potentially transforms the relationship between market players from static to dynamic competition (Chen et al., 2007). They argue that competitive tension is a type of cumulative pressure that changes the relationship between two parties into a dynamic engagement; that is, both parties will take open competitive actions and confrontation. Therefore, competitive tension can be viewed as a threat or a sense of pressure brought by competitors. Once the threat posed by a competitor exceeds a firm's threshold value, the firm must take certain counter actions. As a result, the stable status quo is abandoned and parties exercise offence or counter-offence actions, leading to a tension between each other. Therefore, dynamic competition will replace market equilibrium as the common phenomenon among firms (Zhang et al., 2017). In this study, we followed this stream of research to define competitive tension as follows: Competitors continue to exert pressure onto their opponents, which can erupt into open competitive actions and confrontations.

## 2.5 | Hypotheses development

Resource-based view (RBV) is a well-recognised management theory that explains how firms can achieve competitive advantage (Barney, 1991). The core argument of RBV is that the way firms utilise resources determines how competitive they can be. When firms have accumulated heterogenous and inimitable resources, they can enjoy a formidable competitive advantage over competitors.

In today's global world, no firm is self-sufficient. All firms must exchange resources with their

environment. The development of information technology makes social networks an important channel for firms to acquire resources. Lazzarotti et al. (2017) studied the duality of innovation behaviours in organisations to find that the strength of corporate relationships and relationship value have a significant impact on organisational ambidexterity. Clearly, those firms who can make full utilisation of their social network resources can enjoy a positive effect. With a strong network orientation, firms will see the importance of constructing and maintaining network relationships. They will also be good at using the resources acquired.

A strong network orientation helps firms build, utilise and develop their own network resources. We thus argue that a firm's network orientation will promote organisational ambidexterity. First, network orientation helps exploitative innovation. A firm can obtain information and resources through the establishment and expansion of its social networks. Information from social networks can help the firm better understand market requirements, hence providing good guidance to its incremental innovation process. The firm may also benefit from industrial best practices that can make its incremental innovation activities more effective. Second, a strong network orientation also contributes to exploratory innovation within a firm. A firm with a strong network orientation is usually forward-thinking and sensitive to external environment and changes. Particularly, when such a firm is operating in an uncertain or even turbulent environment, the firm likely will use its strong social network to find innovative ways to solve problems. The firm may use other firms in its network as references to address problems from different angles. As a result, the firm may be able to seize opportunities earlier than competitors and to contain any negative impact brought by changes. In their study, Mu and Di Benedetto (2011) showed that firms with a strong network orientation leveraged their external network relationships to acquire valuable resources and information, which provided a strong support to new product development, particularly rapid product prototyping. With a strong network orientation, new knowledge dissemination within a firm will be more effective and faster. It will help create an environment that is conducive to communications and interactions with external entities. As a result, the firm will enjoy the benefit of quickly acquiring new knowledge and skills, discovering new innovation opportunities (Zeng et al., 2017). Therefore, we postulate two research hypotheses:

**H1.** *Network orientation has a positive impact on exploratory innovation.*

**H2.** *Network orientation has a positive impact on exploitative innovation.*

RBV posits that unique competitive advantage comes from scarce, valuable and inimitable resources. To any firm, resources are always limited. It is even more difficult to develop all the knowledge and abilities by the firm itself. In today's highly interlinked world, the connections to the external network become even more important in helping a firm acquire or develop resources. With the support from network orientation, firms become better able to identify and capitalise on valuable new opportunities.

What matters more is the ability to materialise opportunities. Since a lot of such opportunities are new, organisational improvisation is crucial to success. Firms need to leverage their existing materials and resources to support improvisation activities. Realisation of improvisation requires access to resources from external environment. Vera and Crossan (2005) showed that the ability to acquire external knowledge is positively related to organisational improvisation. Following their line of thinking, we posit that open-minded firms who pay attention to their social network will have a strong ability to identify opportunities, as well as to obtain resources needed for improvisation.

A stronger network orientation supports better organisational improvisation. Social networks are of great significance to modern firms in terms of resource allocation in improvisation (Wales et al., 2013). In a continuously changing and complex market environment, resources from well-developed external network not only can help firms shorten the time needed to collect information but also enables them to respond quickly to sudden changes, making the improvisation effort more effective. With a more effective improvisation process, firms can seize opportunities with ease.

Meanwhile, since firms that are more network oriented often have better knowledge and visibility about changes and trends, they can do a better job in analysing the information obtained, hence may be more inspired to make breakthroughs in dealing with new challenges. This is exactly the essence of organisational improvisation. Finally, network orientation provides firms with the necessary perspective to deal with risks and uncertainties. Firms usually can better assess the type of problems and determine possible solution range. In other words, firms are able to deliver immediate and creative responses to changes. We summarise the above as research hypothesis H3.

**H3.** *Network orientation has a positive impact on organisational improvisation.*

Next, we examine the relationship between organisational improvisation and organisational ambidexterity, that is, the two types of innovations. First of all, organisational improvisation is usually brought to light when there are difficult problems to be solved. Such problems do not fit into a firm's conventional processes and existing practices and usually are situated in an environment with imperfect information, yet an immediate response is required. Vera and Crossan (2005) showed that team improvisation does lead to good performance. It must be recognised that improvisation means a transition from existing cognitive states to reconstructing new organisational routines. Old habitual thinking and organisational memories need to be abandoned for a new knowledge and behaviour framework. External knowledge will certainly help create such a new framework, which typically requires adjusting and modifying the original strategic plan and generating new strategic channels (Hmieleski & Baron, 2008). Exploitative innovation can certainly benefit from such improvisations.

Organisational improvisation likely has even greater impact on exploratory innovation. Guo et al. (2017) and Li (2013) argued that organisational improvisation is a change-driven innovation behaviour. It is a capability closer to exploration than exploitation. Organisational improvisation is more likely to have a positive impact on breakthrough innovation. With strong organisational improvisation, firms can re-integrate and leverage existing resources and knowledge to effectively shorten the time gap from planning to execution. Firms can take immediate and effective actions to adapt to rapid changes. In summary, we state the above as research Hypotheses H4 and H5.

**H4.** *Organisational improvisation has a positive impact on exploitative innovation.*

**H5.** *Organisational improvisation has a positive impact on exploratory innovation.*

We further postulate that the relationship between network orientation and organisational improvisation is moderated by competitive tension. Chen (2007) define competitive tension as an adverse relationship between competitors that may trigger them to take actions against each other. When competitive tension reaches a certain level, market equilibrium is no longer viable, and competition becomes the main relationship among competing firms. Conceivably, if the competition is less intense, firms may become more comfortable with the current status and are less willing to break the status quo. In other words, the pressure to seek help for innovative thinking and solving problems is not high enough to

warrant highly creative methods, which, by their nature, is a disruption to the current organisational routines. Firms may be less motivated to improvise, to react quickly for certain opportunities. This is exactly what is described as organisational inertia. However, under severe competitive pressure, firms will do the opposite. They will be more inclined to take improvisations. Chen and Miller (2012) showed that a firm can create competitive asymmetry by actions that are difficult to respond by competitors. Under severe competitive tension, firms must act quickly to avoid missing rare opportunities or even being eliminated from competition. The relationship between network orientation to organisational improvisation hence will be stronger in strength. In other words, competitive tension moderates the relationship between network orientation and organisational improvisation. We state this as the research Hypothesis H6.

**H6.** *Competitive tension positively moderates the relationship between network orientation and organisational improvisation.*

What the above hypothesis described is a mediation model. Network orientation has positive impact on organisational ambidexterity. Organisational improvisation is a mediator in this relationship. Network orientation has both direct and indirect effects on organisational ambidexterity, with the indirect effect mediated through organisational improvisation. We state these as research Hypotheses H7 and H8 and illustrate all theoretical relationships in Figure 1.

**H7.** *Organisational improvisation mediates the relationship between network orientation and exploitative innovation.*

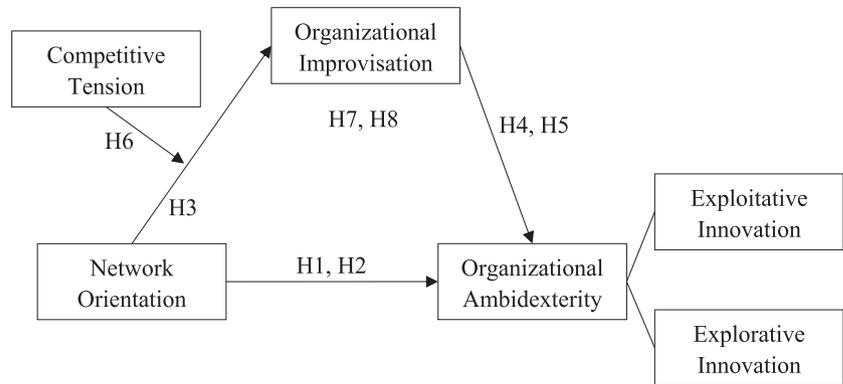
**H8.** *Organisational improvisation mediates the relationship between network orientation and exploratory innovation.*

## 3 | EMPIRICAL RESEARCH DESIGN

### 3.1 | Survey design

To empirically test the proposed theoretical model, we collected data through a survey. The survey respondents are entrepreneurs in major cities (Changchun, Dalian, Shenyang and Harbin) of three northeastern provinces in China. Data were collected through face-to-face interviews. Researchers explained the survey question items

FIGURE 1 Theoretical model with research hypotheses



to each respondent to avoid any potential misunderstandings, while refrained from giving any hints that might influence a respondent's answer. We also conducted interviews with government officials responsible for the administration of development zones in each city. This effort helped triangulate the validity of survey responses. As a result, the quality of collected data was assessed to be of high quality.

### 3.2 | Data collection

We selected those firms with less than 8 years of history. Zahra and Bogner (2000) considered 8 years to distinguish new from established firms. We conducted a pilot study before administering the formal survey. We compiled the survey questionnaire and invited six doctoral students to test. We wanted to determine how much time it would need to complete the survey and to assess whether there is any ambiguity in the questionnaire. We then randomly distributed 150 questionnaires and received 102 valid responses. Results from this pilot study showed that the quality of the questionnaire is satisfying except for a few items. The expression of those items was judged to be vague. We revised the wording of those items under the supervision of three professors to reach the final version of the questionnaire.

Data collection started in June 2020 and ended in November 2020. Firms invited to the survey are from major cities in the three northeastern provinces of China. As stated above, only new firms are invited to the survey. A total of 480 questionnaires were distributed, and 350 responses were collected. We eliminated 10 invalid responses for reasons such as incomplete answers. The final sample size is 340. The effective response rate is a highly respectable 70.83%. Such a high response rate supports the relevance of this research study and lends confidence to research findings. Table 1 provides the descriptive statistics of the sample.

### 3.3 | Measurement instrument

A valid measurement instrument is crucial to empirical research success. Existing scales should be used whenever possible. In this study, for network orientation, we adopted the scale by Jin et al. (2017). Network orientation is measured in three dimensions: network cooperation, network attention and network openness for research. The scale includes 12 questions, with four for each dimension. For network cooperation, example questions include “Firms often exchange information to solve problems” and “Frequent communication within the company to better identify problems.” For network attention, example questions include “Firms often pay attention to information obtained from external parties” and “Firms attach great importance to the opinions and ideas of external parties and adopt them reasonably.” Finally, for network openness, example questions include “The internal management of the firm is flexible and the communication atmosphere is relaxed and harmonious” and “Companies constantly evaluate employees' concerns and ideas.” Empirical results show that the scale is reliable. Cronbach's Alpha value for network orientation is 0.877, exceeding the 0.7 cut-off value. The composite reliability (CR) measure is 0.9658. Factor loadings for the three dimensions range from 0.771 to 0.893.

We used the scale by Vera and Crossan (2005) for the organisational improvisation scale. Some wording revisions were performed to suit the Chinese firm environment (Li et al., 2011). These revisions by no means have altered the meaning of the original scale; hence, no validity threat was detected. The final scale had seven items:

1. Employees are agile in the process of performing tasks.
2. Our firm can immediately respond to unexpected problems at work.
3. Our firm can handle unexpected things on the spot.
4. Our firm can identify opportunities beneficial to the development of new work processes.

TABLE 1 Demographics of the sample ( $N = 340$ )

Variable	Values	Frequency	Percentage (%)
Education level	Junior high school and below	16	4.71%
	High school	36	10.59%
	Undergraduate	77	22.65%
	Graduate and above	211	62.05%
Industry	Financial industry	57	16.76%
	Other manufacturing	46	13.53%
	Automobile and parts manufacturing	41	12.06%
	Computer service software	37	10.89%
	Other industries	159	46.76%
Firm age	Less than 1 year	41	12.06%
	1–3 years	62	18.24%
	3–5 years	85	25.00%
	5–8 years	152	44.70%
Number of employees	≤20	56	16.48%
	21–50	86	25.29%
	51–100	104	30.59%
	100–200	71	20.88%
	>200	23	6.76%

5. Our firm try new ways to solve problems.
6. Our employees show originality in their work.
7. Our employees come up with new ideas at work in a risky way.

The scale is highly reliable as the Cronbach's alpha value is 0.849. The CR value is 0.8774. Factor loadings range from 0.651 to 0.822.

Organisational ambidexterity is measured in two dimensions: Exploitative innovation, and exploratory innovation. We adopted two separate scales frequently used in China: Jansen et al. (2006) and He and Wong (2004). Both scales had four items. For exploitative innovation, example items include “Continuously improve the quality of existing products or services” and “Constantly improve the flexibility of current products or services.” For explorative innovation, example items include “Continuously launch a new generation of products or services” and “Frequently increase the types of products or services.” Cronbach's alpha value for exploratory innovation is 0.852. The CR value is 0.8579. Factor loadings for each item range from 0.712 to 0.833. For exploitative innovation, Cronbach's alpha is 0.785; the CR value is 0.8309. Factor loadings range from 0.685 to 0.789.

For competitive tension, we adopted the scale by Chen et al. (2007). The scale has five items, for example, “Our firm will quickly interpret the purpose and impact

of a certain competitive action taken by a company in the same industry” and “Our firm will respond quickly to competitive actions in the same industry.” Cronbach's Alpha for this scale is a high 0.920. The CR value is also high at 0.9239. Factor loading values for each item are in the range of 0.780 to 0.896.

We used four control variables in this study: Education level of a respondent, industry in which a firm operates, firm age and firm size as measured by the number of employees. We chose these control variables because they may have certain effect on the relationship of interest. For example, education level might affect a respondent's social capital. The industry and firm age can affect the firm's social network status. Firm size is often used as a control variable.

#### 4 | EMPIRICAL RESULTS

Before performing regression analysis, we first assessed common method bias. Specifically, common rater bias is a threat to many survey research studies. Harman's single factor analysis is the commonly used method. We used SPSS 27 to perform an unrotated exploratory factor analysis on all measurement items. Results show that a total of seven factors emerged with eigenvalue greater than one. The first factor explained 23.56% of the total variance,

TABLE 2 Descriptive statistics (N = 340)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
Education level	3.42	0.86	1								
Industry	9.07	4.43	0.328**	1							
Firm age	3.02	1.06	-0.190**	0.041	1						
Firm size	2.76	1.16	-0.056	-0.098	0.261**	1					
Network orientation	5.03	0.88	-0.087	-0.038	0.007	0.145**	1				
Organisational improvisation	4.91	0.88	-0.099	-0.043	-0.144**	0.165**	0.204**	1			
Competitive tension	5.32	1.11	0.029	-0.038	-0.072	0.039	0.087	0.329**	1		
Exploratory innovation	5.01	0.89	-0.062	-0.018	-0.077	0.166**	0.288**	0.324**	0.399**	1	
Exploitative innovation	5.28	0.99	-0.192**	-0.069	0.024	0.181**	0.384**	0.209**	0.160**	0.307**	1

\*p < 0.05. \*\*p < 0.01.

TABLE 3 Regression analysis results 1 (N = 340)

Variable	Exploratory innovation			Utilisation innovation		
	M1	M2	M3	M4	M5	M6
Education level	-0.091	-0.067	-0.036	-0.199**	-0.167**	-0.154**
Industry	0.027	0.035	0.027	0.017	0.014	0.011
Firm age	-0.149**	-0.136*	-0.081	-0.064	-0.046	-0.023
Firm size	0.204***	0.164**	0.116*	0.188**	0.134*	0.114*
Network orientation		0.261***	0.219***		0.351***	0.334***
Organisational improvisation			0.246***			0.104*
R <sup>2</sup>	0.050	0.116	0.170	0.070	0.189	0.199
Adjust R <sup>2</sup>	0.039	0.103	0.155	0.059	0.177	0.184
F value	4.435**	8.788***	11.393***	6.267***	15.583**	13.762***

\*p < 0.05. \*\*p < 0.01. \*\*\*p < 0.001.

TABLE 4 Regression analysis results 2 (N = 340)

Variable	Dependent variable: Organisational improvisation			
	M7	M8	M9	M10
Education level	-0.142*	-0.127*	-0.138*	-0.127*
Industry	0.035	0.033	0.045	0.050
Firm age	-0.230***	-0.221***	-0.199***	-0.174**
Firm size	0.220***	0.194***	0.181**	0.170**
Network orientation		0.168**	0.143**	0.156**
Competitive tension			0.301***	0.302***
Network orientation × competitive tension				0.111*
R <sup>2</sup>	0.082	0.109	0.198	0.210
Adjust R <sup>2</sup>	0.071	0.096	0.184	0.193
F value	7.482***	8.208***	13.728***	12.597***

\*p < 0.05. \*\*p < 0.01. \*\*\*p < 0.001.

which is lower than the critical value of 40%, suggesting that the same-rater risk is not as large a concern. We reported the mean, standard deviation and correlation of the variables in Table 2.

We used multiple linear regression to test the hypotheses. As mentioned earlier, we included four control variables in the models. Tables 3 and 4 report the regression results. From the tables, it can be seen that models 1, 4 and 7 examine the relationship between a dependent variable and control variables. Model 2 evaluates the relationship between network orientation and exploratory innovation. The relationship is a significant positive one ( $\beta = 0.261$ ,  $p < 0.001$ ). Similarly, results from Model 5 show that network orientation is positively associated with exploitative innovation. Therefore, Hypotheses H1 and H2 are supported.

Hypotheses H4 and H5 are also supported. Models 3 and 6 looked at the relationship between organisational improvisation and exploratory versus exploitative innovation, respectively. Both models show a significant positive relationship (Model 3, exploratory innovation,  $\beta = 0.246$ ,  $p < 0.001$  and Model 6, exploitative innovation,  $\beta = 0.104$ ,  $p < 0.05$ ).

Hypothesis H3 states that network orientation has a positive impact on organisational improvisation. This is supported by Model 8. The beta coefficient value is 0.168, significant at the level of 0.05.

Hypothesis H6 evaluates the positive moderating effect of competitive tension. This is assessed by moderated regression models. In Model 9, competitive tension is included as an independent variable. Its beta coefficient value 0.301 is positively significant at  $p < 0.001$ . In Model 10, a cross product of competitive tension and network orientation is added to the model. The item has a beta coefficient value of 0.111 and positively significant at  $p < 0.05$ . Therefore, competitive tension is supported as a positive moderator.

Finally, Hypotheses H7 and H8 are about the role of organisational improvisation as a mediator. This is assessed through the well-known Baron and Kenny (1986) procedure. Models 2 and 5 are the first step. They show that there is indeed an effect from network orientation to organisational ambidexterity that can be mediated. This forms the basis for a potential mediation model. Then Model 8 shows that organisational improvisation is positively associated with network orientation, suggesting that organisational improvisation potentially is a mediator variable. Finally, Models 3 and 6 assess the magnitude of the mediating effect. With both network orientation and organisational improvisation in the model, both are still significant, but the effect of network orientation on the dependent variable has reduced in size, exactly what a mediation model should show. In the

case of exploratory innovation, the effect of network orientation reduced from 0.261 to 0.219, which is mediated by organisational improvisation. For exploitative innovation, the effect size of network orientation also reduced, from 0.351 to 0.334, supporting organisational improvisation as a mediator. In summary, research Hypotheses H7 and H8 are supported.

## 5 | CONCLUSIONS

### 5.1 | Results discussion

As the global market becomes increasingly competitive, firms need to find effective ways to participate in competition. In today's information technology era, network orientation plays an even more crucial role in successful competition. RBV clearly stated that firms must make full use of their resources to be successful. Firms hence are increasingly interested in understanding the meaning and value of networks and how they can leverage external networks to support a healthy and fast growth.

Among all the capabilities, innovation is undoubtedly of the highest priority. Innovation can set a firm far apart from its competitors. Scholars have long recognised that there are two types of innovations, exploitative and exploratory. Both are important and needed. Hence, the challenge is how firms can manage innovation well to stay on top of competition.

The challenge is exactly what motivated us to conduct this research. What is the relationship between network orientation and innovation? While there are studies looking at either network orientation or innovation, very few have linked them together. We try to bridge this important gap in the literature by proposing a theoretical model linking the two.

Based on a rather comprehensive review of the extant literature, we postulate that a positive relationship between network orientation and innovation (both types) exists. We further argue that organisational improvisation is a mediator in this relationship, and competitive tension positively moderates the relationship between network orientation and organisational improvisation.

The proposed theoretical model is then empirically tested using survey data collected from Chinese entrepreneurs in major cities of three northeastern provinces. We followed the standard protocols in empirical research design and analyses. Empirical results supported all eight research hypotheses, hence making a significant contribution to the literature.

While network orientation has been quite thoroughly studied, to the best of our knowledge, this might be the first study to link its effect to innovation. Specifically, our

model includes organisational improvisation as a mediator. This insight contributes to a novel understanding of how network orientation affects either exploitative or exploratory innovation. The model reveals that some effect is mediated by organisational improvisation. This result is generally in line with the literature, but the details have never been clearly articulated before.

The moderating effect of competitive tension is also a new insight that may contribute to further and deeper theoretical understanding. A higher level of competitive tension enhances the effect of network orientation on organisation improvisation. This result, again, is intuitive sense-making. However, intuition does not equate to science. Our rigorous empirical result helps formalise the understanding, hence is a significant contribution.

## 5.2 | Managerial implications

The insights from this study not only bridge an important gap in the literature but also can benefit managers. It is relevant to modern firms who want to participate in global competition. In fact, firms today cannot opt to be away from global competition. Innovation is crucial to competitive advantage. In China, the government has formulated policies to encourage firms to be more innovative. Firms desperately need insights to become more innovative.

The first take away from this study is the role of organisational improvisation. It is, to a certain extent, a prerequisite for a firm's continued survival and growth in an uncertain environment. With organisational improvisation, firms are able to promote both exploitative and exploratory innovation. Practically, this means firms need to adopt certain practices that improve their ability to improvise. Such practices may include employee training, organisational process development and many more. Only with an elevated level of organisational improvisation can firms successfully face a challenging environment and problems.

This study also suggests that managers need to be more attentive to network orientation. While network orientation is generally considered a good thing, few studies have quantified its effect on innovation and particularly how the effect works its way. Results from this study suggest that firms need to be highly network oriented. They need to focus on social network development, be sensitive to what is happening, collect information as it happens and be ready for collaboration with external parties. With such efforts, firms will unlikely miss important opportunities. More importantly, a high level of network orientation will lay a solid

foundation for organisation improvisation and eventually lead to both exploitative and exploratory innovation.

Finally, competitive tension is a good friend to modern firms. Sometimes this insight can be counter intuitive. Firms generally like to operate in a stable environment. A high level of competitive tension usually means chaos and uncertainty. It is generally a disruption to established organisational routines. However, a high level of competitive tension is like a catalyst to organisational changes. Firms will see that it increases the level of organisational improvisation, which ultimately will improve their innovation performance. Therefore, firms are suggested to be open to competitive tension. In fact, firms should embrace the pressure and leverage it for good purposes.

## 5.3 | Limits and future research directions

Like any empirical studies, this study has some limits. First, the data used in empirical testing are cross-sectional in nature. We all know that in order to truly prove causality, longitudinal data are required. Future studies may attempt to replicate this study in a longitudinal setting. Second, data were collected from Chinese entrepreneurs. This by itself is not necessarily a limit. But it does pose a threat to the generalisability of research findings from this study. We are confident that the findings should be generalisable to other settings. But some replication studies in a Western firm settings might be a plausible idea.

In addition to what has been mentioned above, this study can be extended in multiple other ways. For one, we observed a difference in effect size across exploitative and exploratory innovation. For example, organisational improvisation is confirmed to be a mediator. But its mediating effect has a quite sizable difference between exploitative and exploratory innovation. There is a much larger mediating effect for exploratory innovation. In hindsight, this makes complete sense because organisational improvisation is creative in nature, in line with exploratory innovation. Future studies may want to look deeper into the relationship and further uncover how big the difference is and what causes such differences. After all, understanding how innovation success can be managed is of utter importance in today's business environment. It may also be a plausible idea to look at other moderating variables than competitive tension.

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## REFERENCES

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99–120.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173–1182.
- Chandy, R. K., & Tellis, G. J. (2000). The incumbents curse? Incumbency, size, and radical product innovation[J]. *Journal of Marketing*, 64(3), 1–17. <https://doi.org/10.1509/jmkg.64.3.1.18033>
- Chen, M. J. (2007). Competitive dynamics research: An insider's odyssey [J]. *Asia Pacific Journal of Management*, 26(26), 5–25. <https://doi.org/10.1007/s10490-008-9110-7>
- Chen, M. J., & Miller, D. (2012). Competitive dynamics: Themes, trends, and a prospective research platform. *The Academy of Management Annals*, 6(1), 135–210.
- Chen, M. J., Su, K. H., & Tsai, W. (2007). Competitive tension: The awareness - motivation - capability perspective. *Academy of Management Journal*, 50, 101–108. <https://doi.org/10.5465/amj.2007.24162081>
- Cheng, S., Dong, B., Yang, H., & Qin, H. (2019). Organizational improvisation, resource integration and new venture performance[J]. *Southern Economics*, (3), 54–70.
- Dewar, R. D., & Dutton, J. E. (1986). The adoption of radical and incremental innovation: An empirical analysis[J]. *Management Science*, 32(11), 1422–1433. <https://doi.org/10.1287/mnsc.32.11.1422>
- Dong, B., & Zhou, X. (2015). Network orientation, entrepreneurial competence, and competitive advantage of new firms: An interactive model and implications. *Southern Economics (China)*, 33(1), 37–53.
- Guo, Q., Li, N., & Suga, L. (2017). Organizational forgetfulness, improvisational ability and breakthrough innovation[J]. *China Science and Technology Forum*, (4), 55–61.
- He, Z., & Wong, P. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis[J]. *Organization Science*, 15(4), 481–494. <https://doi.org/10.1287/orsc.1040.0078>
- Hmieleski, K. M., & Baron, R. A. (2008). Regulatory focus and new venture performance: A study of entrepreneurial opportunity exploitation under conditions of risk versus uncertainty. *Strategic Entrepreneurship Journal*, 2(4), 285–299. <https://doi.org/10.1002/sej.56>
- Jansen, J., Van Bosch, F., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators [J]. *Management Science*, 52(11), 1661–1674. <https://doi.org/10.1287/mnsc.1060.0576>
- Lazzarotti, V., Manzini, R., Nosellaa, A., & Pellegrini, L. (2017). Innovation ambidexterity of open firms: The role of internal relational social capital[J]. *Technology Analysis & Strategic Management*, 29(5), 1–14. <https://doi.org/10.1080/09537325.2016.1210119>
- Li, H. (2013). The impact of transformational leadership on employees' improvisation behavior—With psychological capital as the mediator [J]. *Journal of Central University of Finance and Economics*, 1(9), 78–84.
- Moorman, C., & Miner, A. S. (1998). The convergence of planning and execution: Improvisation in new product development[J]. *Journal of Marketing*, 62(3), 1–20. <https://doi.org/10.1177/00224299806200301>
- Mu, J. F., & Di Benedetto, C. A. (2011). Strategic orientations and new product commercialization: Mediator, moderator and interplay[J]. *R&D Management*, 41(4), 337–354. <https://doi.org/10.1111/j.1467-9310.2011.00650.x>
- Pavlou, P. A., & El Sawy, O. A. (2010). The “Third hand”: IT-enabled competitive advantage in turbulence through improvisational capabilities[J]. *Information Systems Research*, 21(3), 443–471. <https://doi.org/10.1287/isre.1100.0280>
- Sorenson, R. L., Folker, C. A., & Brigham, K. H. (2008). The collaborative network orientation: Achieving business success through collaborative relationships[J]. *Entrepreneurship Theory and Practice*, 32(4), 615–634. <https://doi.org/10.1111/j.1540-6520.2008.00245.x>
- Tolsdorf, C. C. (1976). Social networks, support, and coping: An exploratory study[J]. *Family Process*, 15(4), 407–417. <https://doi.org/10.1111/j.1545-5300.1976.00407.x>
- Vera, D., & Crossan, M. (2005). Improvisation and innovative performance in teams[J]. *Organization Science*, 16(3), 203–224. <https://doi.org/10.1287/orsc.1050.0126>
- Wales, W. J., Patel, P. C., & Parida, V. (2013). Nonlinear effects of entrepreneurial orientation on small firm performance: The moderating role of resource orchestration capabilities. *Strategic Entrepreneurship Journal*, 7(2), 93–121. <https://doi.org/10.1002/sej.1153>
- Weick, K. E. (1993). The collapse of sense making in organizations: The Mann gulch disaster[J]. *Administrative Science Quarterly*, 38(4), 628–652. <https://doi.org/10.2307/2393339>
- Xi, L., Peng, C., & Yang, H. (2017). The impact of resource patchwork on the synergy of dual innovation: The moderating effect of environmental dynamics[J]. *Technology Economics*, 4(36), 1–6.
- Zahra, S. A., & Bogner, W. C. (2000). Technology strategy and software new ventures' performance: Exploring the moderating effect of the competitive environment. *Journal of Business Venturing*, 15(2), 135–173. [https://doi.org/10.1016/S0883-9026\(98\)00009-3](https://doi.org/10.1016/S0883-9026(98)00009-3)
- Zeng, P., Huang, Z., & Xia, X. (2017). The influence of external networks on enterprise dual innovations: The moderating effect of institutional environment and the nature of enterprises. *R&D Management (China)*, 5, 113–122.
- Zhang, A., Yao, M., & Dong, B. (2017). Executive opportunity alertness, organizational change strategy and organizational performance: A moderated mediation model[J]. *Southern Economics (China)*, 11, 125–142.

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