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Research paper

The fit between market learning and organizational capabilities for management innovation

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ABSTRACT

This paper examines how market learning (both explorative and exploitative) interacts with organizational capabilities (technological capabilities and marketing capabilities) to affect management innovation. Drawing upon data from a sample of 272 firms each of which contributed two key informants to the study (resulting in a total of 544 respondents), we find that both exploratory and exploitative market learning have a positive effect on management innovation. The effects of exploratory and exploitative market learning on management innovation are contingent on technological and marketing capabilities. Specifically, technological capabilities enhance the positive effect of exploratory market learning and weaken the positive effect of exploitative market learning on management innovation. Marketing capabilities enhance the positive effect of exploitative market learning and weaken the positive effect of exploratory market learning on management innovation. This study contributes to the literature by integrating organizational learning theory with the absorptive capacity perspective to explain management innovation.

1. Introduction

To maintain sustainable competitive advantage and create new value in a competitive landscape, firms should rely on technology-related innovation but also innovation in non-technological areas (Anzola-Román, Bayona-Sáez, & García-Marco, 2018; Černe, Jaklič, & Škerlavaj, 2013; Geldes, Felzensztein, & Palacios-Fenech, 2017; Vaccaro, Jansen, Van Den Bosch, & Volberda, 2012). For instance, scholars indicate that a fundamental reason for the success of GE, DuPont, and P&G is their superior achievements in *management innovation*, i.e., the generation and implementation of a specific management practice, process, structure, or technique (Birkinshaw, Hamel, & Mol, 2008). Management innovation may help firms enhance the efficiency of resource allocation, guiding them to set directions, make decisions, and improve their management processes (Kim, Kim, & Foss, 2016), which in turn may help them stand out in their industries (Hamel, 2006).

Management innovation often requires knowledge that does not exist within organizational boundaries, which encourages firms to search for external sources of knowledge and acquire the knowledge new to them (Mol & Birkinshaw, 2009). External sources of knowledge may play an important role in firm innovation because they provide distinctive legitimacy and expertise to the various phases of the innovation process (Bertrand & Wald, 2018; Birkinshaw et al., 2008). This is particularly true when external sources of knowledge are correlated with the process of management innovation (Abrahamson, 1996; Staw & Epstein, 2000). External knowledge acquired through market learning is thus by and large beneficial to the success of management innovation (Camisón & Villar-López, 2011; Simao & Franco, 2018; Tsai, 2018). Market learning involves the use of information and knowledge from outside a firm's boundaries (Kim & andAtuahene-Gima, 2010). We believe that market learning is an important source of external knowledge that assists in fostering management innovation, which creates opportunities that expose firms to a much broader set of management approaches and methods (March, 1991). In the extant literature, scholars usually focus on two forms of market learning: exploratory and exploitative (Levinthal & March, 1993; Li, Peng, & Macaulay, 2013; March, 1991). Exploratory market learning involves the use of heterogeneous knowledge pertaining to factors that lie beyond a firm's previous scope of experience and activities, and promoting the generation of creative ideas and multifarious knowledge that is relevant to innovation. In contrast, exploitative market learning involves the use of information within the neighbourhood of the firm's current expertise and experience (Kim & andAtuahene-Gima, 2010).

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Since these two forms of market learning may lead to distinct types of knowledge about markets, customers, and competitors (Li, Peng, & Macaulay, 2013), we believe they may have different effects on the occurrence of management innovation.

Organizational learning theory suggests that firms will encounter two major challenges when firms using external knowledge: how to access valuable knowledge and how to apply acquired knowledge for innovation (Kuo, Wu, & Lin, 2019; Zhang, Shu, Jiang, & Malter, 2010). External knowledge is considered to be harnessed by different firms, but many firms still struggle to manage external knowledge (Flor, Cooper, & Oltra, 2018). Absorptive capacity literature suggests that expanding the knowledge base of firms increases the efficiency in acquiring, applying, and integrating external knowledge with existing knowledge base (Cohen & Levinthal, 1990; Najafi-Tavani, Najafi-Tavani, Naude, Oghazi, & Zeynaloo, 2018; Winkelbach & Walter, 2015; Zhou & Wu, 2010). It is thus crucial for firms to developing organizational capabilities, including technological capabilities and marketing capabilities, to effectively identify, acquire, integrate, and internalize valuable knowledge from external sources (Wilden & Gudergan, 2015). Technological capabilities reflect a firm's ability to develop and use substantial technological resources and capabilities (Moorman & Slotegraaf, 1999; Zhou & Wu, 2010). Firms that successfully embed such capabilities into organizational routines over time may develop new technical knowledge, combine it with existing technology, and design superior products and services (Moorman & Slotegraaf, 1999; Song, Droge, Hanvanich, & Calantone, 2005). Marketing capabilities reflect a firm's ability to generate and disseminate information and respond effectively to current and potential customer needs (Dutta, Narasimhan, & Rajiv, 1999; Su, Peng, Shen, & Xiao, 2013; Vorhies, Morgan, & Autry, 2009). Such capabilities enable firms to sense and meet market demand and create durable relationships with customers, channel members, and suppliers through such activities as advertising and promotion, pricing, personal sales, product communication, and market information management (Narasimhan, Dutta, & Rajiv, 2006; Song et al., 2005; Vorhies & Morgan, 2005). We thus propose that firms with strong technological and marketing capabilities have a broader knowledge base that may help it more easily understand and apply the external knowledge to implement management innovation. The research that technological capabilities and marketing capabilities will circumscribe or amplify the effects of market learning on management innovation should therefore be investigated.

The purpose of this study is to shed new light on market learning and organizational capabilities that facilitate management innovation. We posit that while both exploratory and exploitative market learning may drive successful management innovation, their impacts may depend on technological capabilities and marketing capabilities, making two contributions to the literature. First, by integrating organizational learning theory with management innovation (Mol & Birkinshaw, 2009), we shed light on management innovation by investigating market learning as a key antecedent. As an important external knowledge source, effective market learning creates opportunities for acquiring management knowledge and breaking inertia in the management innovation process. Second, we link organizational learning theory with the absorptive capacity perspective by examining the interaction effects of market learning and organizational capabilities on management innovation. On the one hand, we support the view that effects of organizational learning are contingent on the firm's capabilities (Muehlfeld, Sahib, & Van Witteloostuijn, 2012). On the other hand, absorptive capacity theory emphasizes that the generation and implementation of innovation always benefits from sufficient absorptive capacity (Camisón & Villar-López, 2011; Xue & Zhang, 2018). Our research extends the absorptive capacity perspective by indicating that this premise is only partially true. Specifically, firms that pursue exploratory market learning are more capable of developing management innovation in the presence of higher technological capabilities, while firms that are engaged in exploitative market learning are more capable of developing management innovation in the presence of higher marketing capabilities. These results suggest the importance of an appropriate fit between distinct forms of market learning and different types of organizational capabilities. Our study thus provides a more nuanced understanding of how market learning and organizational capabilities jointly affect management innovation.

2. Theoretic background

2.1. Management innovation

In the extant literature, management innovation is argued to be very ambiguous and hard to replicate, and hence is more likely to lead to sustainable competitive advantage (Lin, Su, & Higgins, 2016). Management innovation constitutes the rules and routines by which work gets done inside an organization's boundaries (Birkinshaw et al., 2008). The typical and most famous examples of management innovation include the industrial research laboratory at GE, the capital-budgeting techniques of Dupont, total quality management (TQM), just-in-time production, quality circle, cost accounting, and 360-degree feedback (Damanpour & Aravind, 2012). Generally speaking, firms can achieve management innovation by changing organizational structures, processes, and information technology (IT) applications. Specifically, changes in organizational structures (e.g., from hierarchical to horizontal structures) can increase the productivity of labour in the production process. Changes in organizational processes (e.g., just-in-time inventory and lean production) can reduce the amount of capital needed to support in-progress work (Edquist, Hommen, & McKelvey, 2001). In service industries, the integration of IT into operation processes reflects the use of new knowledge management methods and office automation to make managerial processes and systems more efficient (Walker, Chen, & Aravind, 2015).

2.2. Market learning and management innovation

Mol and Birkinshaw (2014) introduce three forms of external involvement, each of which potentially affects the process of management innovation. Among which, external knowledge sourcing suggests that firms can imitate the related practices in other organizations and contexts, which is argued to affect management innovation (Hecker & Ganter, 2013; Mol & Birkinshaw, 2009). Following this logic, market learning serves as a key driver of management innovation in two ways. Firstly, market learning provides managerial benchmarks by which firms evaluate themselves. Effective market learning helps them address such problems or identify managerial gaps they need to fill to realize a given managerial innovation (Hamdoun, Jabbour, & Othman, 2018). Secondly, market learning creates opportunities for acquiring a range of managerial experience and knowledge (Zhou & Li, 2010). Through market learning, firms assimilate managerial knowledge from outside their boundaries.

In extant literature, Mol and Birkinshaw (2009) provide evidence that the knowledge acquired from market and professional sources can facilitate effective management innovation. For example, knowledge from customers encourages firms to adopt new management practices, whereas knowledge from suppliers pushes management innovation down the value chain, and consultants directly provide the knowledge needed to promote management innovation (Guler, Guillén, & Macpherson, 2002). Liao (2018) examine the relationship between leadership, organizational learning, and management innovation in Taiwan's financial and IT industries. They also find that external knowledge has a positive impact on management innovation. External knowledge provides a potential change opportunity for breaking inertia and management innovation (Carboni & Russu, 2018). With meta-analysis, Khosravi, Newton, and Rezvani (2019) show that organizational learning is positively related to management innovation. Sample from 159 industrial companies in Spain, Camisón and Villar-López

(2011) indicated that external knowledge favoured the development of organizational innovation. Based on the 34 interviews and secondary data from the integrated project teams in UK, Roehricha et al. (2019) found that close relationships with the external change agent help teams to integrate different knowledge and realize the management innovation. Based on the Korean manufacturing firms, Kim and Lui (2015) showed that market network is positively related to organizational innovation. In a word, the previous research investigated the impact of the external knowledge on management innovation across different levels.

Organizational learning theory asserts, we have noted, that firms engage in two forms of market learning: exploratory and exploitative (Kim & andAtuahene-Gima, 2010; Levinthal & March, 1993; March, 1991). Exploratory market learning involves learning entirely new aspects of process development. Exploratory market learning activities are characterized by searching, variation, risk-taking, experimentation, play, flexibility, and discovery (March, 1991). In contrast, exploitative market learning focuses on "the refinement and extension of existing competencies, technologies, and paradigms exhibiting returns which are positive, proximate, and predictable" (March, 1991: 85). Exploitative marketing learning helps firms acquire knowledge and skills that are familiar to them and consistent with their current accumulation of experience. Since exploratory market learning and exploitative market learning may focus on distinct kinds of managerial practices (Lin & Ho, 2016), they are likely to affect management innovation differentially. Specifically, both forms of market learning require a firm to choose between alternative or competing organizational structures, processes, and routines, which may lead to distinct managerial changes and adaptations (Kim & andAtuahene-Gima, 2010; Li, Wei, Zhao, Zhang, & Liu, 2013). We argue therefore that the two forms of market learning generate management innovation, but in different ways.

2.3. Absorptive capacity and management innovation

To realize management innovation, firms must fulfil two requirements: generating or acquiring knowledge that enable firms to discover the innovation opportunities, and utilizing the knowledge through resource synthesis (Mol and Birkinshaw, 2014). External sources of knowledge are a pivotal element in the success of management innovation (Guler et al., 2002). However, mere exposure to external knowledge is not sufficient to internalize it successfully. Two firms exposed to the same amount of external knowledge might not derive equal benefits, because they have not equally the level of organizational capabilities to identify and exploit such knowledge (Giuliani & Bell, 2005; Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010).

Lane and Lubatkin (1998) suggested that absorptive capacity is the most substantial determinant of knowledge transfer and innovation outcomes. As absorptive capacity covers prior knowledge (Cohen & Levinthal, 1990), it may help firms acquire new market knowledge that can contribute to developing management innovation. Extant empirical research in this area has considered a bundle of technological capabilities primarily as a proxy for a stock of prior knowledge. Scholars suggest that developing strong technological capabilities is associated with higher return on innovation (Tortoriello, 2015). Technological capabilities concern new product development, manufacturing processes, technology development, and they forecast technological change in an industry (Song, Di Benedetto, & Nason, 2007). Similarly, Tzokas, Kim, and Akbar (2015) indicate that marketing capabilities can also represent a form of absorptive capacity. Marketing capabilities reflect the ability to generate and disseminate information and carry out appropriate responses to current and future customer needs and competitive situations (Moorman & Slotegraaf, 1999). Strong marketing capabilities help firm acquire knowledge about customers and competitors as well as advanced capabilities for segmenting and targeting markets (Vorhies et al., 2009). By helping firms identify customer requirements, marketing capabilities essentially involve a constant search for new market knowledge (Berkhout, Hartmann, & Trott, 2010), which encourages firms to select strategies that match these needs by adopting or improving design, production, and distribution processes.

In other words, technological capabilities and marketing capabilities are critical resources that are beneficial to leveraging market learning to engage in management innovation. We propose that the value of distinct forms of market learning in fostering management innovation depends on the strength or quality of the technological and marketing capabilities. This establishes a sound rationale for further exploring interactions between market learning and organizational capabilities in the context of management innovation. We will show that the two types of capabilities may have differential moderating effects on the market learning and management innovation relationship.

In previous research, scholars investigated the moderating effect of absorptive capacity during the processes of product innovation. Drawing on a database of 127 science-to-industry R&D projects in technology-based markets, Winkelbach and Walter (2015) found that the impact of complex technological knowledge on value creation is enhanced at high levels of both prior knowledge and absorptive capabilities. This finding suggests that the level of collaboration with different partners can enhance firms' innovation capabilities only if the focal firms have developed the capacity to scan and acquire external knowledge (Najafi-Tavani et al., 2018). In this study, we try to analyze the moderating effect of absorptive capacity in the process of management innovation.

3. Hypotheses development

3.1. The direct effect of market learning on management innovation

Damanpour and Aravind (2012) described three major stages of management innovation: awareness, adoption, and implementation. Exploratory market learning may have impacts on all the three stages. First, exploratory market learning can trigger changes in management innovation awareness (Kor & Mesko, 2013). Exploratory market learning requires firms to engage in the pursuit of new market information going beyond the current managerial knowledge domain (Levinthal & March, 1993). In so doing, firms will be better able to identify new management practices and processes, leading to their management innovation cognition. Changes in managerial cognition will in turn help firms overcome cognitive myopia by challenging traditional management practices and routines. Second, exploratory market learning can facilitate firms to adopt management innovation. Exploratory market learning helps firms to engage in extensive environmental scanning and adopt innovative management tools and techniques, which have been implemented by other firms (Liao, 2018). In this sense, explorative market learning helps firms confirm the legitimacy of management innovation. In fact, explorative market learning enlarges the pool of experience and the range of management processes and mechanisms, which assists in the firms' decision processes of management innovation. Finally, exploratory market learning can lead to the successful implementation of management innovation. To ensure successful implementation, firms also reach beyond their boundaries to learn from the experiences of competitors, suppliers, and experts (Mol and Birkinshaw, 2014). Learning from these external knowledge sources and feedback from external stakeholders result in a series of corrective actions and organizational changes. By doing so, firms may develop new management procedures and processes which facilitate the understanding of how external knowledge integrated into internal innovative efforts (Laursen & Salter, 2006), leading to a higher possibility of successful implementation of management innovation.

H1a. *Explorative market learning is positively related to management innovation.*

Through effective exploitative market learning, firms also can realize management innovation. First, exploitative market learning can trigger changes in management innovation awareness. Exploitative market learning emphasizes the market information that has already been acquired and is currently available to firms (March, 1991). Through engaging extensively in exploitative market learning, firms will be better able to identify threats and opportunities, which may lead to the management innovation cognition (Kor & Mesko, 2013). Second, exploitative market learning can enhance firms' decision efficiency on management innovation. Damanpour, Sanchez-Henriquez, and Chiu (2018) suggest that learning existing knowledge from potential suppliers, competitors, industry consultants, and early adopters can enrich the quality of innovation decisions. Exploitative market learning from these stakeholders leads to more effective decisions on how to allocate resources which focus on the decision efficiency of management innovation adoption. Finally, exploitative market learning can enhance the implementation efficiency of management innovation. By focusing on the best use of the existing knowledge within a firm's current domain of managerial experience, exploitative market learning will save on the management innovation costs (Christmann, 2000). This characteristic of exploitative market learning also can improve the operational and transactional efficiencies, facilitating the implementation of management innovation.

H1b. *Exploitative market learning is positively related to management innovation.*

3.2. The moderating effects of organizational capabilities

We posit that the positive effect of exploratory market learning on management innovation may benefit from higher technological capabilities. First, firms with superior technological capabilities have more opportunities to identify available knowledge when they adopt exploratory marketing learning. With a higher level of technological capabilities, firms become more skilled at engaging in explorative learning for acquiring external new knowledge (Renko, Carsrud, & Brännback, 2009). Second, a high level of technological capabilities encourages firms to assimilate and apply the acquired exploratory knowledge, since firms engaging in exploratory market learning may need organizational autonomy and flexibility (Levinthal & March, 1993). Firms with superior technological capabilities mainly rely on the organic and flexible organizational structures, which may help them easily acquire external knowledge for fostering management innovation. These structures, processes, and routines that support technological capabilities involve the discovery of new knowledge and the accumulation of managerial practices (Tzokas, Kim, Akbar, & Al-Dajani, 2015). New knowledge can be combined with a solid existing technological knowledge, which may bring additional opportunities and insights fostering management innovation (Foss, Lyngsie, & Zahra, 2013; Lin, Chen, & Su, 2017). Therefore, firms with superior technological capabilities can easily legitimize organizational changes that facilitate effective management innovation.

H2a. *The positive relationship between exploratory market learning and management innovation is stronger for firms with high technological capabilities than for firms with low technological capabilities.*

In contrast, the positive effect of exploratory market learning on management innovation become weaker when firms have higher marketing capabilities. First, a high level of marketing capabilities inhibits firms from identifying more new knowledge when they adopt exploratory marketing learning. Marketing capabilities include current knowledge or skills about competitors, customers, market segments, and so on (Song et al., 2007) and firms with a high level of marketing capabilities tend to acquire the similar knowledge. However, exploratory market learning motivates firms to pursue knowledge variance instead of general knowledge (March, 1991). Consequently, firms with a high level of marketing capabilities may have trouble in acquiring novel knowledge related with management innovation. Second, a high level of marketing capabilities prohibits firms from assimilating and applying the exploratory knowledge because of structural and routine conflict. Firms pursuing exploratory market learning may require organizational autonomy and flexibility (Levinthal & March, 1993), whereas firms with superior marketing capabilities are likely to focus on existing routines and know-how (Kyriakopoulos, Hughes, & Hughes, 2016). This will unavoidably impede firms to assimilate and utilize the novel external knowledge when developing management innovation.

H2b. *The positive relationship between exploratory market learning and management innovation is stronger for firms with low marketing capabilities than for firms with high marketing capabilities.*

We argue that firms that engage in exploitative market learning become weaker when firms have higher technological capabilities. First, superior technological capabilities may impede firms to identify more available knowledge flows when they adopt exploitative marketing learning. Firms with strong technological capabilities may be complacent with new knowledge, which is likely to cause them to overlook similar external knowledge and resources (Zhou & Wu, 2010). Therefore, a higher level of technological capabilities may discourage the similar knowledge acquisition to enhance management innovation, which is emphasized by exploitative market learning (Kyriakopoulos & Moorman, 2004). Second, a high level of technological capabilities discourages firms to assimilate and apply the exploitative knowledge because of organizational conflict. Exploitative market learning has been found to require a culture that promotes optimization and routinization (March, 1991). As exploitative market learning leads to a decision to allocate knowledge and resources based on current routines, its focus is naturally on short-term improvement (Damanpour & Aravind, 2012). Moreover, exploitative market learning contributes to enhancing work quality and efficiency through continuous improvement (Kim & andAtuahene-Gima, 2010). Firms with superior technological capabilities, however, often violate current processes and routines, which impedes the knowledge assimilation and utilization for management innovation.

H3a. *The positive relationship between exploitative market learning and management innovation is stronger for firms with low technological capabilities than for firms with high technological capabilities.*

In contrast, firms that engage in exploitative market learning may benefit from higher marketing capabilities when developing management innovation. First, with superior marketing capabilities, firms may have more opportunities to identify available knowledge when they adopt exploitative marketing learning. Firms with superior marketing capabilities may be competent at assimilating market knowledge in similar fields due to positive feedback between existing capabilities and market learning (Krasnikov & Jayachandran, 2008). Such a self-reinforcing mechanism helps firms efficiently integrate external knowledge into their existing knowledge bases for management innovation (Kyriakopoulos et al., 2016). Furthermore, superior marketing capabilities enable firms to keep close relationships with external stakeholders such as customers and competitors, which then enable them to imitate advanced and fashionable managerial practices (Birkinshaw et al., 2008). Therefore, firms with higher marketing capabilities are more prone to engage in exploitative market learning to favour the introduction of new business practices such as generating customer and competitor databases of best practices, lessons, and knowledge. The availability of such a database can make them easier to implement novel business practices (Mol & Birkinshaw, 2009). Second, a high level of marketing capabilities encourages firms to assimilate and apply the knowledge because of structural and routine consistency. Organizational processes of assimilation and application require related routines and similar knowledge to refine managerial practices (Dutta et al.,

1999). With a high level of marketing capabilities, firms may save on the costs of integrating familiar market knowledge or performing market experimentation quickly (Levinthal & March, 1993; March, 1991). Firms accumulate experience in integrating knowledge, which may lead to the design and adaptation of new organizational structures. Thus, the fit between exploitative market learning and marketing capabilities may be a factor that drives the introduction of new management methods and practices.

H3b. *The positive relationship between exploitative market learning and management innovation is stronger for firms with high marketing capabilities than for firms with low marketing capabilities.*

4. Methodology

4.1. Sample and data collection

We use surveys of firms in China to test our hypotheses. We choose Chinese firms to populate our sample for three reasons. First, China has become the largest emerging economy (in terms of GDP), the context of which is not only representative of but also generalizable to other emerging economies (Peng, 2004; Wang, Li, & Jiang, 2019). Second, previous research suggests that allying with a complementary partner has been an increasingly widespread practice in emerging economies such as China (Hitt, Dacin, Levitas, Arregle, & Borza, 2000). Third, research also shows that firms should run under formal and informal institutions by managing markets and governments (Gao, Shu, Jiang, Gao, & Page, 2017; Li, Peng, & Macaulay, 2013). These empirical realities enable us to test our model based on the Chinese context.

We first developed the English-language questionnaire on the basis of our literature review, and then employed a back-translation method to translate the responses from English to Chinese. To ensure the content and face validity as well as the clarity of the measures in the Chinese context, we conducted twenty in-depth interviews with senior managers of ten local firms. We asked these respondents to answer all the questionnaire items and provide feedback about the questionnaire's design and wording. On the basis of their responses, we revised a few items to enhance clarity and finalized the instrument.

Using provincial governments' directories, we randomly selected 1500 firms from China. We collected the data through on-site interviews. This face-to-face procedure allowed us to assess respondents' suitability for the study, to increase the overall response rate, and to allow respondents to ask for clarifications. To limit common method bias, we collected data for the variables from two informants in each firm (such as the chairman, CEO, general manager, or vice general manager), carefully chosen for their formal organizational positions and their knowledge about the core issues being studied. The sampled firms operated mainly in energy, chemicals, machinery, electronics, and IT, among other manufacturing industries.

Inter-rater reliability was also checked to confirm that the two respondents in each pair shared similar views of key constructs. ICC (1) is used in this study. Matched pairs of the first and second respondents are built, and each indicator is analyzed separately. The values of ICC(1) were between 0.26 and 0.43 for management innovation, between 0.48 and 0.66 for technological capabilities, between 0.35 and 0.48 for marketing capabilities, between 0.40 and 0.49 for explorative market learning, and between 0.73 and 0.86 for exploitative market learning, suggesting sufficient inter-rater reliability (Bliese, 2000). After matching key informants and deleting surveys with missing data, we obtained the final sample of 272 firms (544 respondents).

We assessed nonresponse bias by testing possible differences between respondents and nonrespondents. We also assessed nonresponse bias by testing possible differences between early respondents and late respondents after the data were collected (Armstrong & Overton, 1977). We compared characteristics such as firm age, size, and ownership. The results of one-way analysis of ANOVA show no statistically significant differences between respondents regarding any of the subsidiary information, which suggests nonresponse bias was not a significant concern.

4.2. Variables measurement

The independent, dependent, and moderator variables were all measured with a multi-item scale, and all items were randomly ordered to minimize any bias from the survey method. Each of the scale items used a 7-point Likert scale ranging from 1, “strongly disagree,” to 7, “strongly agree.” To avoid common method bias, we used the average mean of data from the two informants.

4.2.1. Market learning

Exploratory market learning and exploitative market learning are measured with 5items and 4 items, respectively. The measures reflect the extent to which the behaviours were used to obtain market information. The items were adapted from Kim and andAtuahene-Gima (2010).

4.2.2. Organizational capabilities

Technological capabilities and marketing capabilities were measured with 5 items and 4 items, respectively, reflecting the extent to which a focal firm possesses these capabilities relative to the capabilities of competitors in its industry. The measures are based on Song et al. (2005).

4.2.3. Management innovation

Management innovation was measured with 4 items that reveal the extent to which a focal firm implements innovation in management practices relative to what competitors in its industry do. We modified the measure of management innovation from Vaccaro et al. (2012). The research of Vaccaro et al. (2012) focused on the relationship between leadership behaviour and management innovation. The measurement covered three sides: management practices, management processes, and management structures. Before the formal survey, we conducted twenty in-depth interviews with senior managers of ten local firms. We asked these respondents to read all the questionnaire items and provide feedback about the questionnaire's design and wording. We adapted the wording of these items according to their feedback. We then calculated the loadings of each item based on the twenty managers' evaluation and found that three of them were smaller than 0.6. We talked with these managers regarding the reasons and they told us that the three items in the work of Vaccaro et al. (2012) may not fit with the Chinese context and less happened. Thus, we deleted three items of Vaccaro et al.'s (2012) and added a new item suggested by the respondents to enhance clarity and finalized the instrument. Three deleted items are “the policy with regard to compensation has been changed in the last three years”, “The intra- and inter-departmental communication structure within our organization is regularly restructured” and “We continuously alter certain elements of the organizational structure”. The item “We regularly implement new ways to achieve the target” has been supplemented. The final survey suggests that all the four items used in our study meet the requirements of all the reliability and validity values.

4.2.4. Control variables

To account for the effects of extraneous variables, we included firm size, firm age, industry intensity, and industry stage as control variables. Firm size was measured as the logarithm number of a firm's total employment. We used the logarithm of the number of years from the year of establishment to measure firm age. Industrial development stage was classified as one of four stages and coded as (1) introduction, (2) growth, (3) maturity, or (4) recession. Competitive intensity was measured on a five-point scale comprising no competition, low competition, moderate competition, high competition, and full competition in a focal firm's market.

Table 1
Measurement items and validity assessment.

Constructs	Measurement items	Standardized loadings
Exploratory market learning	(1) Used market information that takes the firm beyond its current product market experiences	0.707
α = 0.872	(2) Used market information from lead users that forces the project team members to learn about new things in our markets	0.755
AVE = 0.664		
C.R = 0.908	(3) Used novel product/market ideas that may not necessarily be successful in the current markets	0.911
	(4) Used market information and ideas with no identifiable market needs	0.859
	(5) Used market information and ideas involving experimentation and high risk	0.850
Exploitative market learning	(1) Used new ideas that are consistent with our current product- market experiences	0.862
α = 0.917	(2) Emphasized using proven ideas for solutions to marketing problems	0.909
AVE = 0.802	(3) Used market information and ideas that may contribute to the firm's existing product markets	0.923
C.R = 0.942	(4) Undertook activities that help to utilize or integrate the firm's current market experiences	0.886
Technological	(1) Technological information	0.838
capabilities	(2) Forecasting technological change in the industry manufacturing processes	0.916
α = 0.929	(3) Reaction to technological development	0.889
AVE = 0.780	(4) Technological skills	0.872
C.R = 0.946	(5) New product development	0.897
Marketing capabilities	(1) Skills of customer relationship management	0.846
α = 0.905	(2) Skills of market sensing	0.903
AVE = 0.778	(3) Skills in integrating marketing activities	0.904
C.R = 0.933	(4) Skills in sales	0.873
Management innovation	(1) We regularly implement new routine for finishing the task	0.880
α = 0.868	(2) We regularly implement new ways to enhance the degree of employee's satisfying and efficiency of work procedures	0.779
AVE = 0.723	(3) We regularly implement new systems and processes	0.879
C.R = 0.913	(4) We regularly implement new way to achieve the target	0.860

4.3. Results

4.3.1. Construct validity

We evaluated the convergent validity of the constructs in this study by examining both factor loadings and the average variance extracted (AVE). As we show in Table 1, the factor loadings on each construct were above the threshold value of 0.70 recommended by Anderson and Gerbing (1988). We also show in Table 1 that all the AVE values were well above the recommended threshold level of 50% (Bagozzi & Yi, 1988).

4.3.2. Discriminant validity

Discriminant validity can be obtained when shared variance between all possible pairs of constructs is lower than the AVE for the individual constructs (Fornell & Larcker, 1981). As shown in Table 2, the diagonal elements representing the square roots of the average variance-extracted values for each of the constructs are greater than the off-diagonal elements, in additional support of discriminant validity. In Table 2 we provide descriptive statistics and correlations between the variables involved in this study.

The results of regression analyses are shown in Table 3. In Model 1, we entered control variables into the regression models. We added exploratory market learning and exploitative market learning to Model 2. We found significant positive effects of exploratory market learning ($\beta 1 = 0.262$, $p < .001$) and exploitative market learning on management innovation ($\beta 2 = 0.440$, $p < .001$), which supports H1a and H1b.To test H2 and H3, we minimized multicollinearity by using hierarchical moderated regression analysis with a mean-centering procedure for the independent and moderating variables (Aiken, West, & Reno, 1991). As shown in Model 3 of Table 3, we observed significant positive coefficients for the interaction effects of exploratory market learning and technological capabilities ($\beta = 0.165$, $p < .01$), and significant negative coefficients for the interaction effects of exploratory market learning and marketing capabilities ($\beta = -0.133$, $p < .01$), which supports H2a and H2b (Zhou & Li, 2012). We also observed significant negative coefficients for the interaction effects of exploitative market learning and technological capabilities ($\beta = -0.252$, $p < .001$), and significant positive coefficients for the interaction effects of exploitative market learning and marketing capabilities ($\beta = 0.276$, $p < .001$), which supports H3a and H3b.

To gain further insight into this result, we plotted the relationships in Fig. 1. As we show in Fig. 1a, the effect on management innovation grows more rapidly when technological capabilities improve. The result indicates that technological capabilities strengthen the positive effect of exploratory market learning on management innovation. As we show in Fig. 1b, the effects on management innovation grow more rapidly when

Table 2
Correlations and discriminant validity.

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Firm size (log)	2.739	0.822	**1**								
2. Firm age (log)	1.257	0.693	0.475*	**1**							
3. Competitive intensity	3.586	0.831	0.122*	0.340*	**1**						
4. Industry development stage	2.600	0.558	0.184**	0.105*	0.134*	**1**					
5. Exploratory market learning	4.371	0.877	−0.009	−0.092	−0.055	−0.045	**0.815**				
6. Exploitative market learning	4.950	0.873	0.062	0.065	0.121*	0.052	0.535**	**0.896**			
7. Technological capabilities	4.833	0.953	−0.030	0.203*	−0.054	−0.206**	0.442**	0.416**	**0.964**		
8. Marketing capabilities	5.000	0.981	0.020	0.152*	−0.007	−0.103	0.461**	0.515**	0.706**	**0.951**	
9. Management innovation	4.697	0.833	−0.018	0.072	0.033	−0.069	0.475**	0.545**	0.552**	0.587**	**0.850**

Diagonal elements (in bold) are square roots of the AVE values.
Off-diagonal elements are the correlations of the main variables of interest to the study.
Two-tailed test; $N = 272$.
* $p < .05$.
** $p < .01$.

Table 3
Regression models.

Dependent variable: management innovation			
Variables	Model 1	Model 2	Model 3
Firm size (log)	−0.088	−0.086^{+}	−0.088*
Firm age (log)	0.093	0.103*	0.125*
Competitive intensity	0.080	0.058	0.020
Industry development stage	−0.087	−0.090*	0.033
Exploratory market learning		0.262***	0.187**
Exploitative market learning		0.440***	0.256**
Technological capabilities			0.304***
Marketing capabilities			0.193***
Exploratory market learning × technological capabilities			0.165**
Exploratory market learning × marketing capabilities			−0.133**
Exploitative market learning × technological capabilities			−0.252***
Exploitative market learning × marketing capabilities			0.276***
R^2	0.122	0.376	0.547
Adjusted R^2	0.105	0.347	0.499
F-value	2.502*	13.018***	11.396***

Two-tailed tests.
$^{+}$ $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

marketing capabilities decline. This result indicates that marketing capabilities weaken the positive effects of exploratory market learning on management innovation. Therefore, H2a and H2b are supported.

As we show in Fig. 1c, the effect on management innovation grows more rapidly when technological capabilities decline. This result indicates that technological capabilities weaken the positive effects of exploitative market learning on management innovation. As we show in Fig. 1d, the effect on management innovation grows more rapidly when marketing capabilities improve. This result indicates that marketing capabilities strengthen the positive effects of exploitative market learning on management innovation. Therefore, H3a and H3b are supported.

4.3.3. Robustness test

To test the potential possibility of reverse causation, we followed the approach used by Cao, Gedajlovic, and Zhang (2009) and Landis and Dunlap (2000). We set management innovation as the independent variable and explorative and exploitative market learning as dependent variables, and tested for interaction between management innovation and the two organizational capabilities. None of these reverse interaction terms is significant, which suggests that reverse causality is not a big concern in this study.

5. Discussion

Useful insights into management innovation have only recently begun to emerge. By integrating organizational learning and absorptive capacity theories, this study examines how different forms of market learning affect management innovation. And contingent effects of organizational capabilities on the market learning-management innovation linkages have also been investigated. Our study contributes new insights regarding the impacts of exploratory market learning and exploitative market learning on management innovation. Moreover, we show that the effectiveness of distinct forms of market learning differentially depends on technological capabilities and marketing capabilities.

5.1. Theoretical contributions

This study contributes to the extant literature in the following ways. First, it advances current understanding of organizational learning impacting on innovation. The past research has treated knowledge as an important factor influencing product or process innovation. Unlike previous research, this study contributes to innovation theory by lifting the veil on the link between market learning and management innovation.

And this paper empirically tested the effects of market learning on management innovation. This supports the management innovation research that firms must passively acquire external knowledge to implement management innovation (Damanpour & Aravind, 2012; Mol & Birkinshaw, 2009). This extends the relationship between learning and innovation from the product innovation to management innovation. Under the industrial research background, through market network, integrated program team (IPT) or cross function integration, firms can acquire the external knowledge to promote the management innovation (Kim and Lui, 2015; Roehricha, Daviesb, Frederiksenc, & Sergeeeva, 2019; Yang & Tsai, 2019). Different from the previous research, this paper emphasizes that the relationship between learning and innovation is unilateral not bilateral relationship.

Second, absorptive capacity theory was incorporated to help explain the effects of market learning on management innovation. We contribute to the current research of absorptive capacity in different form. Absorptive capacity can be presented by technological capabilities and marketing capabilities (Cohen & Levinthal, 1990; Tortoriello, 2015; Tzokasetal, 2015), which is one of the first studies to simultaneously analyze technological capabilities and marketing capabilities as absorptive capacity. Furthermore, we provide empirical evidence that firms' capabilities for acquiring and assimilating external knowledge play a key role in the development of management innovation. Specifically, firms that engage significantly in exploratory market learning can better facilitate the management innovation only firms with higher technological capabilities. In contrast, firms are engaged in exploitative market learning, the higher level of marketing capabilities can leverage market learning for management innovation. The specific type of market learning fits with technological capabilities or marketing capabilities can generate complementary effect for management innovation.

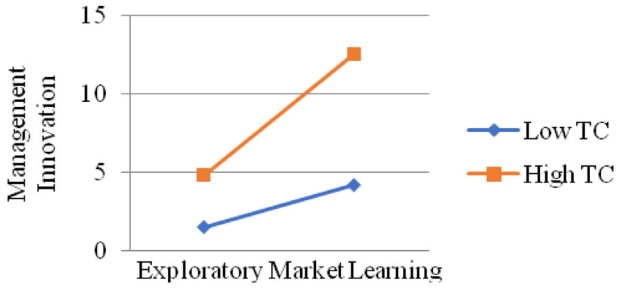
5.2. Practical implications

Based on the above findings, we extract the following managerial implications. First, in transition economies such as China, whose typical characteristic is highly uncertain environments, firms should pay more attention to undertaking management innovation that aims to influence their “soft power”. Through market learning, firms can find management gaps and obtain the required knowledge to foster management innovation. Therefore, marketing employees and managers in firms and other organizations should intentionally acquire the knowledge about either technology or management from the industrial market such as customers, competitors, suppliers, and so on.

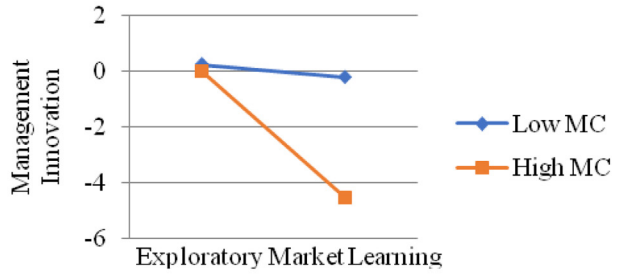
Second, while it is important to learn from external actors, managers should also focus on enhancing their internal capabilities such as absorptive capacity. This study encourages managers to consider building absorptive capacity such as technological capabilities and marketing capabilities to enhance market learning to undertake management innovation. Furthermore, managers know how to choose an appropriate type of absorptive capacity for management innovation. Management innovation will be more successful if exploratory market learning is complemented by technological capabilities or when exploitative market learning is bundled with marketing capabilities.

Furthermore, managers cannot ignore the influence of absorptive capacity on the process of market learning influencing management innovation. When technological capabilities are in sufficiently high

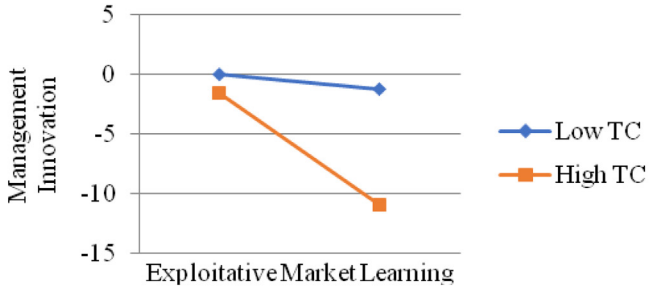
(1a) Moderating Effects of Technological Capabilities (TC) on the Relationship between Exploratory Market Learning and Management Innovation



(1b) Moderating Effects of Marketing Capabilities (MC) on the Relationship between Exploratory Market Learning and Management Innovation



(1c) Moderating Effects of Technological Capabilities (TC) on the Relationship between Exploitative Market Learning and Management Innovation



(1d) Moderating Effects of Marketing Capabilities (MC) on the Relationship between Exploitative Market Learning and Management Innovation

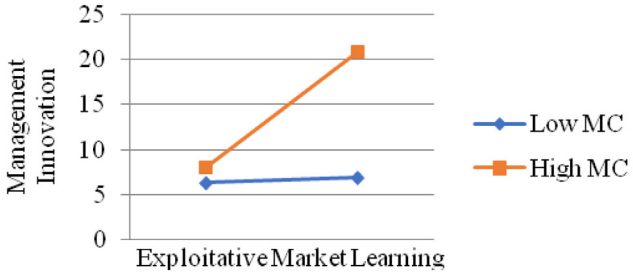


Fig. 1. Moderating effects of organizational capabilities on the relationships between market learning and management innovation.

level, the exploratory market learning may have more positive impact on management innovation. In contrast, when marketing capabilities are in sufficiently high level, the exploitative market learning may have more positive impact on management innovation. Managers should cultivate strong technological or market capabilities that help firms to assimilate and apply the external knowledge (Najafi-Tavani et al., 2018; Winkelbach & Walter, 2015). However, different from the previous research, this study also tested the negative moderating effect of

technological or marketing capabilities, which is the counter-intuitive. Our study supports this perspective that having the appropriate internal capabilities is a prerequisite for leverage the external learning for innovation, which extended that context-dependent view of absorptive capacity (Szulanski, 1996; Wu, 2014).

Our findings also offer practical implications for policy makers. Governments could indirectly improve firms' management innovation by creating more opportunities for communication between firms. For instance, central and local governments can encourage firms to build industrial organization or alliances, and organize various types of forums. These efforts can make firms understand the advanced management practices and realize the importance of management innovation. Obviously, the communication also brings about more management innovation of firms.

5.3. Limitations and future directions

Despite its contributions, this study is subject to several limitations. First, this research does not investigate the interactive effects of the two forms of market learning under study. Future research may continue to investigate whether technological or marketing capabilities help firms to manage ambidextrous market learning as an antecedent to management innovation.

Second, future research should compare types of management innovation that require exploratory searching for more in-depth learning to produce more novel management tools and techniques with those that benefit from exploitative searching based on existing ideas to refine management processes and systems (Damanpour & Aravind, 2012).

Third, several factors such as knowledge integration and combination capabilities may play a mediating role between market learning and management innovation. Therefore, the mediating effects of these variables could be tested.

Finally, marketing learning is related to the open innovation context. Hence, in the future research, research on open innovation and management innovation theory should be integrated. Future studies can thus investigate the relationships, for example, between knowledge breadth (depth) and management innovation.

6. Conclusion

This study aims to answer the question how market learning and organizational capabilities interact to impact management innovation. We find that exploitative market learning and exploratory market learning fit in different ways with technological capabilities and marketing capabilities to promote management innovation. Specifically, exploitative market learning and exploratory market learning both have positive effects on management innovation. More importantly, firms that engage in exploratory market learning benefit from high technological capabilities when undertaking management innovation, whereas those that engage in exploitative market learning benefit from high marketing capabilities when undertaking management innovation. We hope that our study triggers future research that will examine capabilities-based explanations of management innovation.

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