The Impact of Ambidexterity of Market Orientation on New Product

Performance: Evidence from Chinese Manufacturers

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Abstract:

In this paper, the theoretical paradigm of organizational ambidexterity is extended into the research field of market orientation. The ambidexterity of market orientation is unpacked into balance dimension and combined dimension, and the impact of two kinds of market orientation ambidexterity and their interaction on product innovation performance as well as the moderating effect of environment dynamics are empirically examined. Based on a questionnaire survey of 227

manufacturing firms in mainland China, our research results show that ① Some firms can achieve

ambidexterity of market orientation; ② Firms achieving high level in both balance dimension (BD) and combined dimension (CD) of market orientation ambidexterity tend to adopt differentiation strategy and be market leaders and foreign-investment enterprises; ③ BD of market orientation

ambidexterity has significant positive impact on new product performance; ④ CD of ambidexterity has significant effect on new product performance when analyzed separately, but the significant effect disappears when BD enters the model; ⑤ Simultaneous pursuit of BD and CD of ambidexterity can improve new product performance; Environmental dynamics positively moderate the relationship between ambidexterity of market orientation and new product performance. We conclude by discussing our contributions, the implications, and possible future extensions.

Keywords:

Responsive market orientation; Proactive market orientation; Organizational ambidexterity; New product performance

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1. Introduction

In recent years, globalization, severe competition and the rapid development of technology are characteristics widely spread in most competitive environments. In the context of the new competitive challenges, the average life expectancy of firms is increasingly being shortened. The case in China is even worse. It is reported that the average life is only 4.2 years for overall firms and 2.9 years for private companies. Only 3% among 6000 high-tech firms in Zhongguancun Science Park¹ can survive over 8 years. In spite of these high failure rates, some firms do survive and prosper over long periods of time. The above-mentioned phenomenon has aroused a rich debate about a fundamental question: Can organizations adapt and change—and if so, how does this occur? In the research on organizational change, some scholars have proposed the theoretical paradigm of organizational ambidexterity, which argues that organizations should learn to exploit current competencies and explore new competencies simultaneously (eg. March, 1991; Raisch et al., 2009). Such a strategic thinking approach provides potential source for competitive advantage and, at the same time, presents great challenge for firms' paradox management capabilities.

In the marketing discipline, the concept of market orientation has been viewed as a cornerstone of modern marketing thought, for any firm that is able to enhance its market orientation level will better understand customers' expressed and latent needs, provide unique customer value compared with their rivals, and finally achieve sustainable competitive advantage. In the last two decades, this construct is a frequently studied research subject in marketing literature. Most scholars have put forward the proposition that market orientation can help improve product innovation. Chinese scholars also have turned their attention to this hot topic since 2000. In fact, market orientation has already become critical strategic mindset for most successful Chinese firms such as Haier and Huawei, which are now experiencing great pressure of competition caused by government deregulation, transformation to market economy and competitive challenges from foreign companies in the context of globalization. Therefore, reflecting market orientation strategy of Chinese firms has become a subject of great academic and practical importance.

The recent marketing literature has proposed the dual dimension perspective of market

¹ Zhongguancun Science Park is one of China's first state-level high-tech industrial development zones.

orientation, which suggests that market orientation (MO) includes responsive MO (RMO) and proactive MO (PMO). RMO belongs to the domain of exploitation, while PMO is a kind of exploratory activity (Baker and Sinkula, 2007). Exploratory and exploitation activities have quiet different features and antecedents, and they need different organizational culture, structure and system, human resources, operational processes and implementation approaches. Therefore, trade-off between RMO and PMO has become a rational choice of many Chinese firms because of their limited resources. However, recent theories of organizational adaption, organizational ambidexterity and market orientation suggest that it is both possible and necessary for organizations to think and act paradoxically. From the speech by Ruimin Zhang, CEO of Haier, that "Haier aims at satisfying and creating customers' needs" and the corporation mission of Intel, that is "to meet and exceed the expectations of our customers", we can feel the painless endeavors of many leading companies to pursue ambidexterity of market orientation. Here, ambidexterity of market orientation is defined as the simultaneous execution of both RMO and PMO. Regrettably, there are few researches empirically probing into the issue of ambidexterity of two types of market orientation.

In this context, the purpose of our study is to empirically examine the following four questions: (1) Are there any firms that are ambidextrous in both proactive and responsive market orientation? (2) If yes, what are the differences between ambidextrous firms and other firms? (3) Does ambidexterity of market orientation lead to superior new product performance? (4) Does environment dynamism moderate the impact of ambidexterity of market orientation upon new product performance? Searching for the answers to these questions can greatly contribute to the literature and management practice of organizational ambidexterity, market orientation and product innovation.

The paper is organized as follows. We begin with the relevant literature review of organizational ambidexterity and market orientation in Section 2, then explain the conceptual framework as well as research hypotheses in Section 3 and Section 4 respectively. Section 5 introduces the research methodology. The findings are displayed in Section 6. Finally, the conclusions and future research directions are provided in Section 7 and Section 8.

2. Literature Review

Our research captures the theoretical domains of both organizational ambidexterity and market orientation.

2.1 Organizational ambidexterity: from trade-off between exploitation and exploration to paradoxical thinking

Organizational ambidexterity is currently taking shape as a research paradigm in organizational theory (Raisch et al., 2009). Prior literature have increasingly argued that successful firms are ambidextrous – they generate competitive advantages through revolutionary and evolutionary change (Tushman and O'Reilly, 1996), adaptability and alignment (Gibson and Birkinshaw, 2004), or simultaneously pursuing exploratory and exploitative innovation (Benner and Tushman, 2003).

Although studies have highlighted the benefits of balancing high levels of exploratory and exploitative activities (Gibson and Birkinshaw, 2004; He and Wong, 2004), simultaneously pursuing both activities appears to be complex and difficult to achieve (Benner and Tushman, 2003). Exploration and exploitation may require fundamentally different and inconsistent architectures and competencies that can create paradoxical challenges. To be more specific, exploration refers to search, variation, and experimentation that result from decentralization, loose cultures, and less formalized processes. Exploitation, on the contrary, captures refinement, efficiency, and improvement that succeed by reducing variance and increasing control and formalization (March, 1991). These two kinds of activities compete for limited organizational resources and, what's more, firms tend to be lost into "success trap" of exploitation or "failure trap" of exploration.

Whereas earlier studies often regard these trade-offs as insurmountable (eg. McGill et al., 1992), more recent research has acknowledged the necessity and possibility of simultaneously employing exploitation and exploration (eg. Gupta et al., 2006). Following this assertion, recent researches on organizational ambidexterity focus on two issues: (1) the impact of organizational ambidexterity on business performance, as well as potential mediating and moderating variables; (2) a range of organizational solutions to support ambidexterity, including structural ambidexterity (eg. Mom et al., 2009), contextual ambidexterity (eg. Gibson and Birkinshaw,

2004) and leadership-based ambidexterity (eg. Beckman, 2006; Lubatkin et al., 2006).

2.2 Responsive MO and proactive MO: from unidimensional to dual dimensional perspective of market orientation

In marketing literature, researchers have shown an increasing interest in market orientation, which is conceptualized from different perspective, including management decision (Shapiro, 1988), corporate culture (Narver and Slater, 1990), market intelligence (Kohli and Jaworski, 1990), corporate strategy (Ruekert, 1992), organizational skills (Day, 1994), customer orientation (Deshpande et al., 1993) and stakeholder view (Matsuno et al., 2005). Relevant researches focus on four topics, including the conceptualization issue, measurement issue, modeling issue and implementation issue (Erik and Stoelhorst, 2008). Among them, probing into the antecedents and consequences (including financial performance, employee outcome, customer outcome, innovation and organizational learning) of market orientation as well as the mediating and moderating variables are the hottest themes. Typical questions include: what are the benefits of market orientation? When will high level of market orientation bring about more benefits? What determinants impact the degree of market orientation?

Positive market orientation-business performance relationship is frequently hypothesized and empirically supported in many studies (eg. Kohli and Jaworski, 1990; Slater and Narver, 1994). Still, some researchers disagree with such argument. Christensen and Bower (1996) argue that being market oriented may lead firms to listen too carefully to their customer's existing needs. In addition, some scholars also have echoed this position pertaining to the net benefits of market orientation, and indicated that market orientation may divert from innovativeness (Berthon et al., 1999), or may lead managers to interpret the world only through current customers' eye (Hamel and Prahalad, 1994). In replying to the charges on market orientation, researchers debate that a too constricted perspective of market orientation may be a possible reason to criticize on the performance impact of market orientation. They divide the market-orientation construct into two complementary approaches: the responsive and the proactive (Narver et al., 2004). In the case of responsive market orientation, the company puts its effort into discovering and understanding the current and expressed needs of its customers. In contrast, the focus of proactive market orientation is on customers' latent needs, of which they might yet be unaware (Narver et al., 2004). The same suggestion of dual dimension conceptualization of market orientation is embedded in the works of Jaworski et al. (2000), Hills and Sarin (2003) and Kumar et al. (2000), who use the concepts of market-driven and market-driving activity when describing the same phenomenon.

The research on responsive MO and proactive MO primarily focus on the following issues: their conceptualization and difference (eg. Jaworski et al., 2000; Narver et al., 2004); the measurement of proactive MO (eg. Narver et al., 2004); description of proactive market oriented behaviors (eg, Kumar et al., 2000; Hills and Sarin, 2003); the impact of responsive MO and proactive MO on business performance (eg. Atuahene-Gima, 2005; Voola and O'Cass, 2010). It is generally believed that responsive MO promotes incremental innovation and adaptive learning, while proactive MO facilitates adaptive innovation and generative learning. Both kinds of MO can significantly improve organizational performance (eg. Atuahene-Gima, 2005; Voola and O'Cass, 2010).

2.3 The research gap in current literature

Two major research gaps can be identified in current literature.

Firstly, researchers working in various literature streams have contributed to the discussion on organizational ambidexterity. However, the antecedents and consequences of balance between exploitation and exploration have been discussed mainly in limited contexts such as organizational learning, technological innovation, organizational adaptation, strategic management, and organizational design. No existing research has explicitly applied an ambidexterity perspective to the research field of market orientation to date, which limits the theoretical coverage and managerial relevance of organizational ambidexterity theory.

Secondly, several recent empirical researches on proactive MO and responsive MO have explored their different roles in new product success (eg. Narver et al., 2004; Atuahene-Gima et al., 2005; Tsai et al., 2008; Li et al., 2008). However, few studies have reflected the relationship and interplay between proactive and responsive market orientations. There exist quiet contrary assertions that believe that the two dimensions of MO are: (1) as substitutes of each other (i.e., a company engages in either one) (Carpenter et al., 2000); (2) as complementary (that is, a company can exhibit both simultaneously) (Jaworski et al., 2000); (3) as consecutive behaviors (that is, RMO switches to

become PMO or vice versa) (Kumar et al., 2002); or (4) as two extreme positions on a continuum (Johnson et al., 2003). Most of these arguments exist in conceptual research paper, and no empirical research has explicitly probed into simultaneous implementation issue of proactive and responsive MO. Only Atuahene-Gima et al. (2005) examine, in their empirical study, the interaction effect of responsive and proactive market orientations upon new product program performance. But their findings indicate a negative interaction effect, not supporting the idea of ambidexterity in the domain of market orientation.

In this context, by expanding ambidexterity theory into the research field of market orientation, this study tries to add to the emergent dialogue on both research streams.

3. Conceptual Model

3.1 Rationality of integrating MO study into the theoretical paradigm of organizational ambidexterity

3.1.1 RMO-PMO can be regarded as exploitative-exploratory activities

Although the theoretical paradigm of organizational ambidexterity has not been explicitly extended into the research stream of marketing strategy, conceptual and operationalized definitions from many scholars contain market and customer factors, which implies that responsive MO and proactive MO should correspond to broader domain of exploitation and exploration respectively.

As for the conceptual definition, Jayanthi and Sinha(1998)describe the purpose of exploration as meeting future market demand, and exploitation as meeting current market demand. Danneels (2002) argues that exploration is to develop new technology to serve new customers, and exploitation is to strengthen existing technology to serve existing customers. Mom et al. (2007) believe that exploration activities include searching for new possibilities with respect to product, service, process or markets, while exploitation activities include serving existing customers with existing product/services. Jansen et al. (2006) define exploration and exploitation with respect to searching new or existing knowledge on customers/markets. Sidhu et al. (2007) redefine exploration

and exploitation as greater or lesser amounts of supply-side, demand-side, and geographic search in domains external to the organization to gather new knowledge elements and discover fresh opportunities. They believe both exploitation and exploration contain three dimensions: technology dimension (supply-side); market dimension (demand-side) and spatial side. Markedly, this stream of research has laid more emphasis on supply-side search and less on demand-side and geographic search. However, they say that in the marketing literature, there is a long tradition of demand-side or customer-centered search (Day, 1994, Kohli and Jaworski, 1990).

As for the operationalized definition, McGrath (2001) uses a multi-scale to measure exploration and exploitation. It emphasizes the search for new knowledge in technology and market. The measurements of exploration and exploitation developed by Sidhu et al. (2007) contain customer orientation and competitor orientation, two traditional dimensions of market orientation. Cegarra-Navarro and Dewhust (2007) use scale to measure exploration and exploitation based on classical measurements, developed by Kohli et al. (1993), of market intelligence generation and market intelligence response.

In the marketing literature, some researchers directly point out the corresponding relationship between "RMO vs PMO" and "exploitation vs exploration". For instance, Tsai et al. (2008) believe that, from the perspective of organizational learning (Levinthal and March, 1993; March, 1991), the RMO is characterized by proximity, refinement, efficiency, and implementation that reflect exploitation; PMO is characterized by discovery, variation, innovation, and risk-taking which reflect exploration. The former deepens existing competence; the latter broadens existing competence.

In view of above arguments, the market orientation construct should be reconsidered in the context of exploitation and exploration framework.

3.1.2 Ambidexterity of market orientation: strategic paradox in balancing RMO and PMO

The idea that market orientation may impact negatively on product innovation derives, partially, from a too-narrow understanding of what market orientation means. Some scholars suggest that market oriented firms may focus too strongly on the expressed needs of customers (Hamel and Prahalad, 1994; Christensen and Bower, 1996). When this focus is not complemented by a proactive element or orientation, it can limit the effectiveness of market orientation.

Although highly successful firms are expected to be able to be both market-driven and to drive markets (Jaworski et al., 2000), many authors argue that balancing proactive MO and responsive MO will create tension within the organization. Kumar et al. (2000) display a table which shows the difference of market driven and market driving in terms of marketing strategy, segmentation strategy, marketing mix strategies. Schindehutte et al. (2008) further compare these two orientations in terms of firm's behavior, objective, strategy, capabilities, culture, value-creating resources, organizational learning capability, innovation, source of competitive advantage and performance outcomes. The conceptual research by Johnson et al. (2003) believe that proactive MO and responsive MO are exclusive with each other. Finally, the empirical study of Atuahene-Gima et al.(2005) shows that the interaction effect of RMO and PMO upon new product performance is negative.

However, organizational adaptability, organizational ambidexterity and market orientation researchers suggest that firms should and also are capable of balancing the two seemingly contrary orientations. Despite much difference between PMO and RMO, the two can be complementary and correlated in some cases, for they both focus on customer needs, value creation and long-term profitability. Following Gibson and Birkinshaw (2004), Rothaermel and Alexandre (2009) extend the ambidexterity construct more broadly to describe a firm's ability to simultaneously balance different activities in a trade-off situation. The ambidexterity of MO, as the simultaneous balancing proactive and responsive MO, should be included in the domain of organizational ambidexterity. This understanding justifies the application of organizational ambidexterity theory in the research of market orientation.



Figure 1 relationship between organizational ambidexterity paradigm and domain of market orientation

The corresponding relationships between responsive market orientation and exploitation, proactive market orientation and exploration, as well as ambidexterity of market orientation and general organizational ambidexterity are indicated in Figure 1.

3.2 Conceptual framework of this research

This study aims to explore answers to the following four questions: Firstly, the re-conceptualizations of market orientation demonstrate that it should also be addressed as a two dimensional concept. Then, are there any different forms of market orientation among organizations based on proactive and responsive dimensions? Can some firms really achieve ambidexterity of MO? Secondly, assuming that different forms of market orientation will be identified, the logical next question is "What are the factors that discriminate between different forms of market orientation?" Thirdly, can ambidexterity of MO positively impact firms' new product performance? And fourth question is whether environmental turbulence plays moderating role in the link between ambidexterity of MO and new product success.

As for the third and fourth questions, the relevant conceptual framework is illustrated in the Figure 2. Following He and Wong (2004) and Cao et al. (2009), we unpack ambidexterity of MO into balance dimension and combined dimension. The research hypotheses are proposed and explained in detail in section 4.



Figure 2 Conceptual Framework of This Research

4. Research Hypotheses

There exists broad consensus on conceptual definition of organizational ambidexterity, which refers to engaging in both exploration and exploitation (eg. He and Wong, 2004; Lubatkin et al., 2006; Tushman and O'Reilly, 1996). However, there is some disagreement and considerable ambiguity regarding the operationalized definition. He and Wong (2004) point out that authors measure the ambidexterity of organization in two ways. One is the product of the scores in exploration and exploitation. The other is the difference between these two scores. These two different ways of measuring ambidexterity correspond to two types of strategic fit----"fit as moderating" and "fit as matching"----in the strategy literature (Venkatraman, 1989). The former focuses on the absolute magnitude of a firm's exploratory and exploitative activities, the latter considers their relative magnitude. However, He and Wong (2004) focus primarily on which measure to use to operationalize ambidexterity, rather than on the underlying conceptualization of ambidexterity. Based on their study, Cao et al. (2009) believe these two measures have meaningful implications and then explicitly unpack the construct into two distinct but related dimensions, which they term as balance dimension (BD) of ambidexterity and the combined dimension (CD) of ambidexterity. Balance dimension refers to the balance and relative magnitude between exploration and exploitation, while combined dimension pertains to their combined magnitude. Based on Cao et al.'s re-conceptualization of organizational ambidexterity, we identify balance dimension and

combined dimension of market orientation ambidexterity, and explore their independent and joint effects upon new product performance.

4.1 Ambidexterity of market orientation and new product performance

March (1991) and his followers suggest that exploration and exploitation compete for the company's resources and orientation, so trade-offs between them are seen as unavoidable. Based on this understanding, achieving an appropriate balance between exploration and exploitation is central to the construct of organizational ambidexterity. We believe that balance dimension of ambidexterity of market orientation will help structural control of innovation risks and finally improve new product performance.

To be more specific, overly emphasis on responsive market orientation hinders a firm's innovativeness (Berthon et al., 1999), confuses a firm's processes (MacDonald, 1995), and results in narrow-minded research and development activities (Frosch, 1996). When customer demands and market conditions are changing rapidly, firms will not be able to react quickly for successful technologies emerging beyond the boundaries of attention may be undetected (Christensen and Bower, 1996). The existing competencies serving the present customers can quickly become outdated and firm will be stuck in tyranny of the served market (Hamel and Prahalad, 1994), which impedes the effectiveness of product innovation. This argument is supported by March's (1991) view that a firm that focuses too much on exploitation is unlikely to be effective at catering to the needs of the market because it is unlikely to uncover novel ideas and strategies. On the contrary, overly emphasis on proactive market orientation will increase the cost and risk involved in product innovation, for focusing on unfamiliar intelligence and market domain beyond current experience and knowledge will lower the efficiency of product innovation (Levinthal and March, 1993). This argument is supported by March's (1991) view that a firm focusing too much on exploration suffers the costs of experimentation without gaining many of its benefits because it exhibits too many new and risky ideas and too little refinement of its resources.

In addition, according to Li et al. (2008), both types of market orientation provide different managerial efforts to develop and foster different types of innovation competencies. In other words, proactive market orientation has more impact on exploratory innovations than responsive market

orientation; in contrast, being responsive market-oriented has more effect on exploitative innovations than being proactive market-orientated. Therefore, imbalance between proactive and responsive MO will lead to imbalance between exploratory and exploitative innovations. Organizational ambidexterity literature in the field of product innovation indicates that such an imbalance will negatively impact the innovation performance (He and Wong, 2004).

Based on above-mentioned logic, we reason that the failure to achieve a close balance between proactive and responsive MO can leave a firm susceptible to either the risk of obsolesce or the risk of failure to appropriate. Therefore, we suppose:

H_{1a}: Balance dimension (BD) of ambidexterity of market orientation positively impacts new product performance.

Other scholars believe that exploration and exploitation are not necessarily in fundamental competition. On the contrary, if managed properly, they may take place in complementary domains (e.g., technologies and markets) that do not necessarily compete, for the same resources (eg. Gupta et al., 2006). We extend this idea into the filed of market orientation, and suggest that combined dimension of MO will benefit new product performance, for the proactive MO and responsive MO can in fact be supportive of and help leverage the effects of the other. This idea is consistent with the claim by Atuahene-Gima et al. (2005) that "an implicit assumption with the two-dimensional conceptualization of MO is that proactive MO is complementary to responsive market orientation" as well as the observation of Jaworski et al. (2000) that "highly successful firms are able to be both market driven and market driving".

Firstly, higher degree of responsive MO can help company better understand the current customers' expressed demands and be familiar with the resources that can be employed to satisfy those demands. Based on this understanding, current knowledge and resources can be reorganized, which is critical basis for proactive MO. For example, Burgelman (1994) describes how Intel's understanding of present market trends enabled its managers to better interpret customers' future demands and identify an early competitive advantage in the microprocessor industry.

Secondly, in some cases, successful proactive MO can provide the direction and help improve the efficiency of responsive MO activity of the firm. The exploratory analysis of the case of De Beers in

China indicates strong support for the notion put forward by Kumar et al. (2000) that firms may be market driven in the early stages of market development but then subsequently adjust their approach to one that is partly or even wholly market driven (Harris and Cai, 2002). A critical conclusion is that appropriate proactive MO can enhance the role of responsive MO in business performance (including innovation performance) for it set the new direction and market positioning of responsive MO activities.

Thirdly, both types of market oriented activities can share market intelligence gathered by one another, which will enhance customer satisfaction, improve sales volume and finally generate significant scale economy of market-oriented product innovation programs.

Hence, we suppose:

H_{1b}: Combined dimension (CD) of ambidexterity of market orientation positively impacts new product performance.

4.2 Joint effect of BD and CD

We believe balance dimension and combined dimension of ambidexterity of MO has a synergistic effect on new product performance.

On one hand, if combined dimension of MO ambidexterity is high, balance dimension of MO ambidexterity, which means matching between higher level of responsive and proactive MO, will better satisfy both expressed and latent customers' demand by innovating the offerings. Therefore, the CD of MO ambidexterity positively moderates the relationship between BD of MO ambidexterity and new product performance.

On the other hand, Cao et al. (2009) suggest that at a high level of BD, the leverage potential between exploration and exploitation will be more pronounced than when they are highly unbalanced. Extending this reasoning, we believe that BD of MO ambidexterity will play positive moderating role in the CD of MO ambidexterity and new product performance link. To be more specific, when the level of responsive MO is much higher than that of proactive MO (one situation of low BD), companies pay more attention to understanding and satisfying explicit customers' demands. Unfortunately, competitors can easily learn those expressed market demands, and then provide similar products to customers. Therefore, customers can hardly identify difference of value

propositions between competitive offerings (Narver et al., 2004) and new product performance will be lowered. When the level of proactive MO is significantly higher than responsive MO (another situation of low BD), newly acquired market knowledge can hardly be sufficiently assimilated and processed through existing knowledge and resources (Zahra and George, 2002), which will restrain the product innovation activities based on proactive market orientation. In either situation, the mutual leverage effect of responsive and proactive MO is limited.

Hence, we suppose:

H₂: The interaction of BD and CD of ambidexterity of market orientation positively impacts new product performance.

4.3 Moderating effect of environmental dynamics

Finally, let us examine the moderating effect of environment factors in the ambidexterity of MO and new product performance link. The concept of "fit" is a central theme in the field of strategic management (Venkatraman, 1989). It is based on contingency theory which says that organizations will adapt their internal organizational structure to fit their environment (Donaldson, 2001). As to environmental factors, we focus on environment dynamism, which is composed of three dimensions: technological turbulence, market turbulence and competitive hostility. That is, environmental dynamism describes the rate of change and the unpredictability of change in a firm's external environment, including competitors moving earlier to the market, changing technologies, shifting consumer demands or needs.

Some scholars in the research field of organizational adaptability believe that ambidextrous organization can be more likely to survive the external environmental shift. Environmental dynamism increases uncertainty and leads to organizational contexts characterized by stress, anxiety and risk (Waldman et al., 2001). To achieve correspondence with the changing business environment, there needs to be a focus on a firm's capability to renew all or part of its managerial competences and to create radically new competences (Teece et al., 1997). A recurring theme in a variety of organizational literatures is that successful organizations in a dynamic environment are ambidextrous—aligned and efficient in their management of today's business demands, while also adaptive enough to changes in the environment that they will still be around tomorrow (Tushman

and O'Reilly, 1996). Recent research have also found that the likelihood of ambidexterity is higher in more dynamic environments (Raisch, 2008), leading us to suggest that the need for organizations to achieve ambidexterity is positively correlated with the dynamism of the respective environment (Rothaermel and Alexandre, 2009). Other studies have found similar effects: the more dynamic the firm's environment, the higher the likelihood of ambidexterity (e.g., McGrath, 2001; Siggelkow and Rivkin, 2005). These empirical findings reflect the environmental conditions under which dynamic capabilities are most valuable (Teece, 2007) and reinforce the importance of ambidexterity as a dynamic capability.

Next, we provide further arguments for how higher levels of environmental dynamism amplify the hypothesized relationships between ambidexterity of MO and new product performance. In terms of driving product innovation, proactive MO is more risky but profitable (if successful) compared with responsive MO. Environmental dynamism increases the uncertainty as well as the potential risks and profits involved in product innovation (especially proactive MO based product innovation). In a relatively stable and certain environment, low level of BD of MO ambidexterity will not significantly reduce the product innovation performance, because of smaller opportunity costs of too low level of proactive MO or smaller potential risks of too high level of proactive MO. As the result, the structural risks arising from the imbalance of proactive and responsive MO can be more easily controlled by firms. Conversely, in the face of turbulent and uncertain environment, balance between proactive and responsive MO is more beneficial, for the risks and profits of product innovation based on proactive MO are increasing, and match between proactive MO and responsive MO is necessary to avoid risk of obsolescence or the risk of failure to appropriate. Therefore, we believe:

 H_{3a} : Environmental dynamism positively moderates the relationship between BD of MO ambidexterity and new product performance.

Finally, we believe the CD of ambidexterity of MO can benefit firms more significantly in rapidly changing market environment. For the complimentary and synergistic effect between proactive and responsive MO will increase the effectiveness and efficiency of each other, and both proactive and responsive MO will positively improve new product performance in the more turbulent environment (eg. Atuahene-Gima et al., 2005). Therefore, we suggest:

 H_{3b} : Environmental dynamism positively moderates the relationship between CD of MO ambidexterity and new product performance.

5. Research method

5.1 Sampling and data collection

To test our research hypotheses, we examine manufacturing firms located in three major cities (Beijing, Wuhan and Shanghai) in mainland China. To collect the data, a questionnaire is developed and administered on-site to respondents by trained interviewers. A sample of 1000 companies located in Beijing, Wuhan and Shanghai is randomly selected from a company catalog published by CMP (China Machine Press) in 2008. The sample firm should meet the following three qualifications. First, it should be a manufacturing firm. Second, it should have existed for at least three years, for we would inquire about the new product performance in past three years in the questionnaire. In addition, a newly-found company is perhaps not in a relatively stable development stage and the causal link among the constructs in question has not been fully manifested. Third, it should have autonomy in decision making of production, R&D and marketing. These firms span diverse manufacturing industries, which increases the generalizability of our findings. For each firm, a senior manager is chosen as the key informant because our field interviews reveal that these managers are highly familiar with new product development and marketing strategy of his/her firm. Senior managers first are contacted by telephone to solicit their cooperation. The respondents are informed of the confidentiality of their responses and the academic purpose of the project. Respondents also are promised a summary report of the survey. Oral agreements to participate are obtained from 356 firms, and successful interviews are conducted onsite with managers from 261 firms. After eliminating surveys with excessive missing data or contradictory answers, we are left with 227 complete responses, representing a response rate of 22.7%. A comparison between the respondent and non-respondent firms indicate there are no significant differences in terms of key firm characteristics (e.g., firm ownership, firm size, industry types, locations), so non-response bias is not a likely threat for our hypotheses analyses.

5.2 Measures

Existing measures were used or adapted to suit the purposes of this study. All purified measures were five-point Likert scales anchored by "strongly disagree" and "strongly agree" or "very poor" and "very good".

Ambidexterity of MO. Responsive MO and proactive MO are measured by the scales originally developed by Narver et al. (2004) and purified by our research. Based on the result of CFA, items with low loading coefficients are deleted and finally we obtain five-item scales for both constructs.

To operationalize BD, we follow the treatment by He and Hong (2004), Milton and Westphal (2005), Hogan et al. (2007) and Cao et al. (2009) and use the absolute difference between PMO and RMO. The absolute difference varies from 0.01 to 4.46. To facilitate interpretation, we reverse this measure by subtracting the difference score from 5 so that a higher value indicates greater BD.

Following He and Wong (2004), Gibson and Birkinshaw (2004), Atuahene-Gima et al. (2005) and Cao et al. (2009), we multiply exploration and exploitation to operationalize CD. We mean-centered the exploration and exploitation scales before obtaining their product to mitigate the potential for multicollinearity.

New product performance. The four-item scale developed by Baker and Sinkula (1999) is used to measure new product performance. It measures the timeliness, speed, uniqueness and overall success rate of new product introduction.

Environmental dynamism. Three dimensions of environmental dynamism including technological turbulence, market turbulence and competitive intensity are measured using widely used scales derived from Jaworski and Kohli (1993).

Control variables. The firm size and age are treated as control variables in our moderated regression model. Firm age is assessed by asking the number of years since the firm was founded and firm size is indicated by the number of employees.

Other variables. Other background variables are also included in the questionnaire, for the purpose of examining product type, market structure, competitive strategy, market position and ownership of the sampled firms.

6. Results

6.1 The sample description

The sampled firms operate in a variety of sectors, including machinery and equipment, food, building and construction materials, automotive, furniture, chemicals, electronics and electrical appliances and metal products. Among them, 43.2% are large companies, 22.5% are median-sized companies and 34.3% are small firms. 42% of firms produce consumer goods, and 58% produce industrial products. As for the competitive position, 44.0% are leaders, 28.9% are challengers, 25.3% are followers and 1.8% are niches. As for the ownership, 34.4% are state owned enterprises, 28.2% are private firms, 31.7% are foreign-investment companies, and 5.7% are collective firms.

6.2 Reliabilities and validities of measurement scales

6.2.1 environmental dynamics scales

 Table 1
 Means, S.D., correlations, reliability and discriminant validity estimates of environmental dynamism scale

	mean	S.D.	(1)	(2)	(3)	α	CR	AVE
(1) Technological turbulence	3.411	1.017	0.816 ^a			0.850	0.855	0.666
(2) Market turbulence	3.364	0.909	0.525^{**b}	0.729		0.806	0.814	0.532
(3) Competitive intensity	3.411	0.950	0.364**	0.501**	0.691	0.779	0.781	0.477

a: Diagonal elements (in bold) represent the square root of the AVE

b: Off-diagonal elements (included in the lower triangle of the matrix) represent the standardized correlations among constructs;

**: correlations are significant at the 0.01 level (2-tailed)

We assess the reliability and validity of measurement scales of environmental dynamism through second-order confirmatory factor analysis (CFA). Table 1 shows the means, standard deviations, correlations, reliability estimates such as Cronbach's α , composite reliabilities (CR), average variances extracted (AVE), as well as discriminant validity estimates of three sub-constructs. No two-way correlations are above the 0.65 threshold, suggesting that our estimations are not likely to be biased by multicollinearity problems (Cao et al., 2009). Table 2 reports the results of confirmatory factor analysis including loadings and fit indices for all the measurements.

First, the Cronbach's alpha coefficients (ranging from 0.779 to 0.850) and the composite reliabilities (CRs) (ranging from 0.781 to 0.855) of the measurements for three dimensions of environmental dynamism presented in Table 1 indicate that each exceeds the accepted reliability

threshold of 0.70. In addition, all the average variances extracted (AVE) are either greater than or close to 0.50 cutoff (ranging from 0.477 to 0.666). Thus, the measures demonstrate adequate reliability.

Second, as presented in Table 2, a second-order CFA yields a model that fits the data well with NNFI, CFI and IFI all exceeding 0.90 and RMSEA below 0.08 (chi-square/df =2.09, NNFI=0.97, CFI=0.97, GFI=0.94, IFI=0.96, RMSEA=0.069). All first-order loadings ranging from 0.55 to 0.87 and second-order loadings ranging from 0.63 to 0.99 are significant at the one-percent significance level. Therefore, convergent validity of the measurement scales is acceptable.

Finally, discriminant validity in the scales was assessed by comparing the square root of AVE associated with each construct to the correlations among constructs. As shown in Table 1, diagonal elements represent the square root of the AVE, whereas the off-diagonal elements represent the correlations among constructs. In order to claim discriminant validity, diagonal elements should be larger than any other corresponding row or column entry. According to the results, each construct sufficiently differ from other constructs and, therefore, the discriminant validity of each construct is established.

			Second-order	first-order
Second-order	First-order	Observed verifieles	loading	loading
latent variables	latent variables	Observed variables	coefficients	coefficients
			(t-value)	(t-value)
		1. The technology in our industry is changing rapidly.		0.72 (-)
		2. Technological changes provide big opportunities in		0.95(14.79)
	technological	our industry.	0.64	0.83(14.78)
	turbulence	3. A large number of new product ideas have been made	(7.14)	
		possible through technological breakthroughs in our		0.87 (15.40)
Environmental		industry.		
dynamism		1. In our kind of business, customer's product		0.94()
(Jaworski &		preferences change quite a bit over time.		0.84 (-)
Kohli, 1993)		2. Our customers tend to look for new product all the		0.95 (14.05)
	market	time.	0.99	0.83 (14.93)
	turbulence	3. We are witnessing demand for our products and	(10.12)	0.62 (0.00)
		services from customers who never bought them before.		0.03 (9.90)
		4. New customers tend to have product-related needs		0.55 (9.26)
		that are different from those of our existing customers.		0.33 (8.30)

Table 2Measures and second order CFA results ofmeasurement scale for environmental dynamism

	1. Competition in our industry is cutthroat.		0.65 (-)
	2. There are many "promotion wars" in our industry.	0.62	0.72 (11.20)
intensity	3. Anything that one competitor can offer, others can	0.05 (6.47)	0.77(12.27)
	match readily.	(0.47)	0.77 (12.27)
	4. Price competition is a hallmark of our industry.		0.60 (0.96)

X²=85.70, df=41, X²/df=2.09, RMSEA=0.069, NNFI=0.97, CFI=0.97, GFI=0.94, IFI=0.96; RMR=0.078 6.2.2 scales of market orientation and new product performance

Than we assess the reliability and validity of other measurement scales through first-order confirmatory factor analysis (CFA).

First, as shown in Table 3, the constructs' Cronbach's alpha coefficient (ranging from 0.797 to 0.876) and the composite reliabilities (CRs) (ranging from 0.809 to 0.877) indicate that each exceeds the accepted reliability threshold of 0.70. In addition, all the average variances extracted (AVE) are either greater than or close to 0.50 cutoff (ranging from 0.574 to 0.598). Thus, the measures demonstrate adequate reliability.

Second, existing measures in extant literature are used or adapted to suit the purposes of this study and go through a careful discussion and pilot study among researchers and EMBA students, so their content validity can be guaranteed.

Table 3 Means, standard deviations, correlations, reliability estimates and discriminantvalidity estimates of all measures

	(1)	(2)	(3)	(4)	mean	S.D.	α	CR	AVE
(1) responsive MO	0.767 ^a				3.509	0.819	0.876	0.877	0.589
(2) proactive MO	0.488^{**b}	0.758			3.272	0.861	0.869	0.870	0.574
(3) environmental dynamism	0.316**	0.376**	0.773		3.396	0.768	0.863	0.812	0.598
(4) new product performance	0.443**	0.427**	0.497^{**}	0.769	3.336	0.810	0.797	0.809	0.591

a: Diagonal elements (in bold) represent the square root of the AVE

b: Off-diagonal elements (included in the lower triangle of the matrix) represent the standardized correlations among constructs;

**: correlations are significant at the 0.01 level (2-tailed)

Third, a first-order CFA yields a model that fits the data well with NNFI, CFI and IFI all exceeding 0.90 and RMSEA below 0.08 (chi-square/df =2.33, NNFI=0.97, CFI=0.97, GFI=0.98, IFI=0.97, RMSEA=0.0659). All item loadings ranging from 0.62 to 0.85 are significant at the one-percent significance level (as presented in Table 4).Therefore, convergent validity of all measurement scales is acceptable.

Latent variables	Observed variables	λ	t
	1. Our business objectives are driven primarily by customer satisfaction.	0.78	13.52
	2. We constantly monitor our level of commitment and orientation to serving customer needs.	0.83	14.64
responsive MO (Narver et al., 2004)	3. Our strategy for competitive advantage is based on our understanding of customers needs.	0.72	11.96
	4. We measure customer satisfaction systematically and frequently.	0.78	13.54
	5. We have routine or regular measures of customer service.	0.72	12.09
	1. We help customers anticipate developments in the markets.	0.77	13.27
	2. We continuously try to discover additional needs of our customers of which they are unaware.	0.78	13.32
proactive MO	3. We incorporate solutions to unarticulated customer needs in our new products and services.	0.85	15.14
(Narver et al., 2004)	4. We brainstorm on how customers use our products/services to discover new customer needs.	0.62	9.84
	5. We search for opportunities in areas where customers have a difficulty expressing their needs.	0.75	12.77
	For your business unit's principal served market segment over the past three		
new product	years.		
performance	1. First to market with new application.	0.82	14.16
(Baker and Sinkula,	2. New product introduction rate relative to average industry level.	0.76	12.78
1999)	3. New product success rate relative to average industry level.	0.71	11.45
	4. Degree of product differentiation.	0.70	11.34

Table 4 Measures and CFA results of measurement scales

X²=144.40, df=62, X²/df =2.33, RMSEA=0.069, NNFI=0.97, CFI=0.97, GFI=0.98, IFI=0.97, RMR=0.047

Finally, as shown in Table 3, diagonal elements are larger than any other corresponding row or column entry, therefore the discriminant validity of each construct is established.

Since the correlation between proactive and responsive MO is not low (0.488), as shown in Figure 3, discriminant validity of the RMO and PMO scales is further assessed by comparing two models: one in which the correlation between two constructs is constrained to equal one, and another in which the correlation is free to vary. A significantly lower chi-square value for the unconstrained model provides support for discriminant validity. x^2 (chi-square value difference between unconstrained and constrained models) is much larger than the critical value (x^2 _{unconstrained} model=127.56; x^2 _{constrained} model=240.40; x^2 =112.84; x^2 (1) _{critical value} = 6.63 at the one percent significance level), indicating acceptable discriminant validity for RMO and PMO constructs.

6.3 Clustering of sampled firms based on two dimensions of MO

Here, we try to answer the first question "What different forms of market orientation are found among organizations"? As there is no indication in the literature of likely differences in form based on dimensions of MO, the data are subjected to cluster analysis, with the objective of identifying groups of companies where the form of market orientation in each group is different. SPSS k-means cluster procedure is adopted, using the composite score of RMO and PMO as the input variables. K-means cluster requires the specification of the number of clusters before the analysis. Therefore, two-, three-, four- and five-cluster solutions are examined. K-means cluster does not produce agglomeration schedules to identify the best solution, but generates measures of distances between the cluster centers. These results suggest a four cluster solution, and its robustness is tested by using one-way analysis of variance, which indicates that the cluster means of each market orientation variable are found to be significantly different.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	(n=19; 8.4%)	(n=66; 29.1%)	(n=95; 41.8%)	(n=47; 20.7%)
Proactive MO	2.37	4.25	3.26	2.09
Responsive MO	4.28	4.25	3.22	2.43

Table 5PMO and RMO levels of four clusters

The different forms of market orientation among the clusters are given in table 5, which shows, for each cluster, the mean scores of two dimensions of market orientation. The profile of each cluster is discussed below.

Cluster 1 is termed as "responsive market orientation" and 8.4% of total firms belong to this group. Here the emphasis is on responsive MO, as the score of RMO is the much higher than PMO within this cluster's profile, and, is the highest of all the clusters. Particular emphasis is given to satisfying customer expressed needs and to monitoring their satisfaction.

Cluster 2 is termed as "comprehensive market orientation" and 29.1% of total firms belong to this group. Companies in this cluster feature a well-developed market orientation. The means in both responsive and proactive market orientation are among the highest, compared to the other clusters and the difference of the two scores is zero. We can say that they have achieved high degree of organizational ambidexterity of market orientation for they have high degree both in balance dimension and combined dimension.

Cluster 3 is termed "middle market orientation" and 41.8% of firms are included in this cluster.

Both two dimensions of market orientation are on the average level of just above 3.

Cluster 4 is termed "undeveloped market orientation" and 20.7% of companies are included in this group. Companies in this cluster have poorly developed market orientations, as mean scores of both responsive and proactive market orientations are lowest among all four clusters.

From the findings of cluster analysis, it is obvious that indeed some manufacturers have achieved high degree of BD and CD of MO ambidexterity, which supports the idea that organizations can exploit current competencies and explore new competencies simultaneously in the field of marketing strategies (Gupta et al., 2006).

6.4 Organizational factors discriminating ambidextrous firms and other firms

 Table 6
 Profiles of the clusters

cluster	er Employee				Age	Differentiation strate			trategy		
1		1.33E4		40.25		2.67					
2		1.31E4		2	22.20		3.54		C	Cluster 2	
3	-	1.31E4		2	24.72		3.21			>	
4		6.03E3			28.09		2.71		С	luster 3	
F		0.164			1.730		11.055		alust	> 1-alua	torl
Sig.		0.921		(0.162		0.000		ciusu	ci i –cius	1014
			Prod	uct			Mai	·ket stru	cture		
cluster	Fast-movi consumer pro	ing oducts	Dur cons proc	able umer lucts	Industrial products	complete monopoly	oligopoly	Mono	opolistic petition	Comp	plete etition
1	17.6%		17.	6%	64.7%	0.0%	21.1%	52	52.6%		3%
2	31.0%		19.	0%	50.0%	6.1%	15.2%	28	28.8%		0%
3	27.3%		12.	5%	60.2%	5.3%	13.7%	34	4.7%	46.3	3%
4	16.2%		21.	6%	62.2%	2.1%	12.8%	23	3.4%	61.7	7%
Total	25.5%		16.	5%	58.0%	4.4%	14.5%	32	2.2%	48.9	9%
$X^2(df)$			5.09	3(6)		10.410(9)					
Sig.		0.532 0.318									
•			Market	position	1		(Ownersh	ip		
cluster	leaders	chall	engers	followers	nichers	SOE	private	Forei	gn-investment o		others
1	52.6%	31	.6%	10.5%	5.3%	42.1%	21.1%		36.8%		.0%
2	57.6%	25	.8%	16.7%	.0%	16.7%	31.8%		47.0%		4.5%
3	45.2%	29	.0%	24.7%	1.1%	37.9%	27.4%		26.3%		8.4%
4	19.1%	31	.9%	44.7%	4.3%	48.9%	27.7%		19.1%		4.3%
Total	44.0%	28	.9%	25.3%	1.8%	34.4%	28.2%		31.7%		5.7%

X ² (df)	25.045(9)	21.119(9)
Sig.	.003	.012

The demographics of the clusters are given in Table 6. There are no differences in firms' size, age, product type and market structure among four clusters. However, there do exist some differences in terms of competitive strategy, market position and firms' ownership. To be more specific, we observe that firms achieving both BD and CD of ambidexterity (cluster 2) in market orientation strategy tend to be market leaders and foreign-investment enterprises. Ambidexterity of market orientation may account for the critical fact that those firms can become leading ones and foreign-investment enterprises are more likely to survive the fierce competition in China. Or the whole things could be explained the other way round. That is, the leading companies and foreign-invested firms have more resources, skills and mature business philosophy to support them in pursuit of being ambidextrous in terms of market oriented activities. Another finding is that ambidextrous firms in both BD and CD tend to adopt the differentiation strategy, followed by firms with middle market orientation.

	Dependar	nt variable: new pro	oduct performance						
Dependant variable: new product performance									
Model 1	Model 2	Model 3	Model 4	Model 5					
bles									
.064(1.079)	.064(1.092	.066(1.11	.065(1.113)	.021(.398)					
)	9)							
.008(.133)	.027(.446)	.016(.261)	.027(.462)	.050(.921)					
.286(3.917)***	.330(4,453	.336(4.41	.352(4.627)***	.395(5.069)***					
)***	8)***							
.262(3.573)***	.202(2.657	.233(3.13	.196(2.572)*	009(113)					
)**	8)**							
	Model 1 oles .064(1.079) .008(.133) .286(3.917)*** .262(3.573)***	Model 1 Model 2 Des .064(1.079) .064(1.092) .008(.133) .027(.446) .286(3.917)*** .330(4,453)*** .262(3.573)*** .202(2.657)**	Model 1 Model 2 Model 3 oles .064(1.079) .064(1.092 .066(1.11) 9) .008(.133) .027(.446) .016(.261) .286(3.917)*** .330(4,453 .336(4.41)*** 8)*** .262(3.573)*** .202(2.657 .233(3.13)** 8)**	Model 1 Model 2 Model 3 Model 4 Model 1 Model 2 Model 3 Model 4 Model 2 Model 3 Model 4 Model 3 Model 4 Model 4 Model 5 .064(1.079) .064(1.092 .066(1.11 .065(1.113)) 9) .008(.133) .027(.446) .016(.261) .027(.462) .286(3.917)*** .330(4,453 .336(4.41 .352(4.627)***)*** 8)*** .262(3.573)*** .202(2.657 .233(3.13 .196(2.572)*)** 8)** .319(2.572)* .319(2.572)*					

6.5 Results of research hypotheses test

Table 7	Results of Hierarchical Regression Analysis:
Stand	lardized Regression Coefficients (T Value)

	BD		.159(2.584		.126(1.892) ⁺	009(.115)
)**			
	CD			.131(2.147	.082(1.246)	.070(1.153)
)*		
	Environmental	turbulence				.319(5.351)***
	interacti					
on						
	BD*CD					.186(2.337)*
	Environmental	turbulence *BD				.244(3,709)***
	Environmental	turbulence *CD				.132(2.018)*
	R ²	.243	.265	.259	.271	.416
Adj	usted R2	.230	.249	.242	.251	.389
	F-value	17.845***	15.976***	15.430***	13.605***	15.383***
	VIF	≤1.583	≤1.746	≤1.727	≤1.753	≤2.351

+:p <0.1; *: p<0.05; **: p<0.01 ***: p<0.001

As shown in Table 7, the five research hypotheses are tested with hierarchical regression analysis. All variance inflation factor values are well below the recommended ceiling of 10, suggesting that the likelihood of multicollinearity problems is minimal.

At the first stage of the hierarchical regression, only four control variables Company Size, Company Age, Responsive MO and Proactive MO are included (Model 1). Results from Model 1 indicate that firm scale and age explain no variation in Product Innovation Performance with these data, while PMO (b=0.286, p<0.001) and RMO (b= 0.262, p<0.001) are positively related to Product Innovation Performance.

Following He and Wong (2004) and Cao et al. (2009), who evaluate the effects of two kinds of ambidexterity variables in separate models, we add two independent variables, that is, BD and CD of MO ambidexterity separately to Model 2 and Model 3. The results show that both BD (b=0.159, p<0.05) and CD (b=0.131, p<0.05) positively impact Product Innovation Performance.

The fourth regression includes the main effects of both BD and CD. The result indicates that BD

significantly impacts product innovation performance (b=0.126, p<0.1), however, the effect of CD is not significant (b=0.082, t=1.246). Model 2, Model 3 and Model 4 provide support for H_{1a} and partial support for H_{1b} .

Finally, Model 5 adds environmental dynamism and all three hypothesized interaction terms. The results show that the impact of BD*CD interaction (b=0.186, p<0.05), BD*environmental dynamism (b=0.244, p<0.01) and CD*environmental dynamism (b=0.132, p<0.05) are significant, providing support for H₂, H_{3a} and H_{3b}.

7. Conclusion and implications

7.1 Conclusions

Majority of empirical studies on market orientation actually concentrate on its responsive dimension. Based on the criticism and reflection of the application of this construct in the field of product innovation, recent studies come to address the proactive dimension and explore the impact of responsive and proactive market orientation on new product performance independently as well as potential moderating variables (eg. Narver et al., 2004; Atuahene-Gima et al., 2005). Although a given organization may be basically responsively market oriented and simultaneously proactively market oriented because businesses may need to balance their current opportunities with the planning ahead of future conditions (David et al., 2008), only one study (Atuahene-Gima et al, 2005) explicitly presents the research hypothesis that proactive MO is complementary to responsive market orientation. However, the authors do not clarify the conceptualization of the interaction of proactive MO and responsive MO. In addition, their empirical study finally denies the hypothesis because of the strong negative effect of the interaction of responsive and proactive MO on new product program performance. No literature empirically examines the role of ambidexterity of responsive and proactive MO in product innovation.

On the other hand, various works have discussed the need for firms to achieve a balance between exploitation and exploration activities (Benner and Tushman, 2003; Gupta et al., 2006; Tushman and O'Reilly, 1996). However, the theoretical and empirical studies of organizational ambidexterity

primarily cover the fields of innovation management, organizational learning and organizational design, neglecting the research stream of market orientation.

In this context, based on constructs and conceptual framework of organizational ambidexterity, our study tries to define the two-dimensional ambidexterity of MO and then empirically explore the impact of balance dimension and combine dimension of ambidexterity of MO upon new product performance as well as the effect of their interaction and environmental moderator. Our research results show that ① Some firms can achieve ambidexterity of market orientation; ② Firms achieving high level in both balance dimension (BD) and combined dimension (CD) of market orientation ambidexterity tend to adopt differentiation strategy and be market leaders and foreign-investment enterprises; ③ BD of market orientation ambidexterity has significant positive impact on new product performance; ④ CD of ambidexterity has significant effect on new product performance when analyzed separately, but the significant effect disappears when BD enters the model; ⑤ Simultaneous pursuit of BD and CD of ambidexterity can improve new product performance; Environmental dynamics positively moderate the relationship between ambidexterity of market orientation and new product performance.

Our study extends organizational ambidexterity paradigm into market orientation research and comes to the findings that are consistent with ambidexterity theory. We find that responsive MO as a kind of exploitation activity and proactive MO as a kind of exploration activity are not paradox, and company should seek their equilibrium, which may benefit the new product performance. We also find that such a benefit is moderated by environmental turbulence. This study contributes to the literature theoretically by presenting a fresh perspective for the further development of MO research stream, and at the same time broadening the coverage scope of organizational ambidexterity paradigm.

7.2 Managerial implications

Some insightful managerial implications as to how to improve new product performance can be provided based on our research results.

Firstly, earlier researches often claim that organizational practices that simultaneously address

efficient exploitation and effective exploration may be impossible to achieve (e.g., McGill et al., 1992), while recent argument that successful firms are ambidextrous contributes to a general shift in organizational research from trade-off to paradoxical thinking. Researchers have increasingly come to recognize the importance of balancing seemingly contradictory tensions. In the field of market orientation, there seems not necessarily to be a trade-off between responsive MO and proactive MO, whereby one is sacrificed for the other. In our sample, ambidexterity is an asset of firms across a wide variety of ages, scales, industries, market structures, suggesting that it is likely a critical capability for many, if not all, firms. Successful firms especially those pursuing differentiation strategy, market leaders and foreign-investment enterprises are more able to simultaneously develop both balance dimension and combined dimension of MO ambidexterity. In general, this finding supports the recent focus on a paradoxical approach to management, as opposed to an "either/or" focus (Lewis, 2000).

Secondly, managements should realize the necessity and importance of achieving ambidexterity of proactive and responsive market orientation. Responsive MO can help firms obtain short-term revenue and lower risks and costs involved in new product programs, while firms with high level of proactive MO can secure long-term benefits by profoundly considering the shifts in consumers' demands, technology development and competitors' actions. In order to improve product innovation performance, managers must carefully monitor and manage the development of both responsive MO and proactive MO, and try to improve MO ambidexterity (especially the balance dimension). In addition, the purified scales of PMO and RMO with acceptable reliability and validity, together with the measures of BD and CD presented in our study can be used to help managements diagnose and evaluate the performance of MO ambidexterity implementation.

Thirdly, managers should pay special attention to the moderating effect of environment dynamism in the MO ambidexterity-new product performance link. In more turbulent environment in terms of technology advancement, customer demand and competitive intensity, firms should devote more resources in the implementation of MO ambidexterity which can improve product innovation performance more significantly.

8. Limitations and future directions

The results of this study are subject to several methodological and theoretical limitations, which provide meaningful directions for future research.

Foremost among these is the fact that some other potential relationships are not included in our model. Future study should extend the research framework to address the antecedents of MO ambidexterity such as organizational structure (Gibson and Birkinshaw, 2004), organizational context (Lewis, 2000) and top management leadership (Beckman, 2006), explore the mediating and other moderating variables in the MO ambidexterity and business performance (including innovation performance) link, and examine the dynamic implementation process of MO ambidexterity.

There are also some problems with our research method. First of all, the study used single sourcing and retrospective self-reporting. Because the key informants in firms, managing directors, who are most knowledgeable about the firm's operations, are used, key informant bias is not expected as a major limitation in this study. Nonetheless, scholars have argued that studies employing single-source methodology can be biased by artificially high intercorrelations produced by overall response tendency. Secondly, for theory-testing purposes, we conduct our study in manufacturing organizations. While we collect the data from a variety of sectors in the manufacturing industry, and thereby reach a greater source of variance, the generalizability of this study's findings to other types of organizations is still limited. Hence, future researchers may replicate and extend this study to sectors other than manufacturing. Finally, implementing market orientation especially proactive market orientation is a long-term strategic issue, which can not necessarily generate immediate outcome. Conclusions of a causal nature are limited by the cross-sectional nature of this study. Future studies should employ longitudinal data to confirm the conclusions of this study.

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References:

Atuahene-Gima, K., Slater, S.F., Olson, E.M., 2005. The contingent value of responsive and proactive market orientations for new product program performance. Journal of Product Innovation Management 22, 464-482.

Baker, W.E., Sinkula, J.M., 1999. The synergistic effect of market orientation and learning orientation on organizational performance. Journal of the Academy of Marketing Science 27(4), 411-427.

Baker, W.E., Sinkula, J.M., 2007. Does market orientation facilitate balanced innovation programs? An organizational learning perspective. Journal of Product Innovation Management 24 (4), 316-334.

Beckman, C.M., 2006. The influence of founding team company affiliations on firm behavior. Academy of Management Journal 49, 741–758.

Benner, M.J., Tushman, M.L., 2003. Exploitation, exploration, and process management: The productivity dilemma revisited. Academy of Management Review 28, 238–256.

Berthon, P., Hulbert, J., Pitt, L., 1999. To serve or create? Strategic orientations toward customers and innovation. California Management Review 42(1), 37–58.

Burgelman, R. A., 1994. Fading memories: a process theory of strategic business exit in dynamic environments. Administrative Science Quarterly 39, 24–56.

Cao Q., Gedajlovic E., Zhang H, 2009. Unpacking organizational ambidexterity: dimensions, contingencies, and synergistic effects. Organization Science 20(4), 781-796.

Carpenter, G., Glazer R., Nakamoto K., 2000. "Introduction", in Reading on Market Driving Strategies: Towards a New Theory Competitive Advantages, 2nd ed. Eds. Carpenter, G., Glazer R., and Nakamoto K. Chicago: Addison Wesley, XV–XII.

Cegarra-Navarro, J.G., Dewhust, F., 2007. Linking organizational learning and customer capital through an ambidexterity context: an empirical investigation in SMEs. The International Journal of Human Resource Management 18(10), 1720-1735.

Christensen, C.M., Bower, J.L., 1996. Customer power, strategic investment, and the failure of leading firms. Strategic Management Journal 17(3), 197-218.

Danneels, E., 2002. The dynamics of product innovation and firm competences. Strategic Management Journal 23(12), 1095-1122.

David, M.C., Molina, A., Esteban, A., 2008. Market driving in retail banking. International Journal of Bank Marketing 26(4), 260-274.

Day, G. S., 1994. The capabilities of market-driven organizations. Journal of Marketing 58, 37–52.

Denison, D. R., Hooijberg, R., Quin, R. E.,1995. Paradox and performance: toward a theory of behavioral complexity in managerial leadership. Organization Science, 6(5), 524-540.

Deshpande, R., Farley, J.U., Webster, F.E., 1993. Corporate culture, customer orientation, and innovativeness in Japanese firms: A quadrad analysis. Journal of Marketing 57(1), 23-37.

Donaldson, L., 2001. The Contingency Theory of Organizations. Sage Publications, Inc., Thousand Oaks, CA.

Erik M. van Raaij, Stoelhorst, J.W., 2008. The implementation of a market orientation: a review and integration of contributions to date. European Journal of Marketing 42, 1265-1293.

Frosch, R., 1996. The customer for R&D is always wrong! Research-Technology Management 39(6), 22-27.

Gibson, C.B., Birkinshaw, J., 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. Academy of Management Journal 47, 209-226.

Gupta, A.K., Smith, K.G., Shalley, C.E., 2006. The interplay between exploration and exploitation. Academy of Management Journal 49, 693–708.

Hamel, G., Prahalad, C.K., 1994. Competing for the future. Boston, MA: Harvard Business School Press.

Harris, L.C. and Cai, K.Y., 2002, Exploring market driving: a case study of De Beers in China, Journal of Market-Focused Management 5, 171-196.

He, Z. L., Wong, P. K., 2004. Exploration vs. exploitation: an empirical test of the ambidexterity hypothesis. Organization Science 15 (4), 481-494.

Hills S. B., Sarin, S., 2003. From market driven to market driving: an alternate paradigm for marketing in high technology industries. Journal of Marketing Theory and Practice 11(3), 13-24.

Hogan, J., Barrett, P., Hogan, R., 2007. Personality measurement, faking, and employment selection. Journal of Applied Psychology 92, 1270–1285.

Jansen, J.J.P., Van Den Bosch, F.A.J., Volberda, H.W., 2006. Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. Management Science 52(11), 1661–1674.

Jaworski, B. J., Kohli, A.K., Sahay, A., 2000. Market-driven versus driving markets. Journal of the Academy of Marketing Science 28, 45–54.

Jaworski, B.J., Kohli, A.K., 1993. Market orientation: antecedents and consequences. Journal of Marketing 57(July), 53-70.

Jayanthi, S., Sinha, K.K., 1998. Innovation implementation in high technology manufacturing : a chaos-theoretic empirical analysis. Journal of Operations Management 16(4), 471-494.

Johnson, J.L, Lee, R.P.W., Saini, A., Grohmann, B., 2003. Market-focused strategic flexibility: conceptual advances and an integrative model. Journal of the Academy of Marketing Science 31(1), 74-89.

Kohli, A.K., Jaworski, B.J., 1990. Market orientation: the construct, research propositions, and managerial implications. Journal of Marketing 54, 1-18.

Kohli, A.K., Jaworski, B.J., Kumar, A., 1993. MARKOR: a measure of market orientation. Journal of Marketing Research 30(4), 467–477.

Kumar, K., Subramanian, R., Strandholm, K., 2002. Market and efficiency-based strategic responses to environmental changes in the health care industry. Health Care Management Review 27(3), 21-31. Kumar, N., Scheer, L., Kotler, P., 2000. From market driven to market driving. European Management Journal 18 (2), 129-141.

Levinthal, D. A., March, J. G., 1993. The myopia of learning. Strategic Management Journal 14, 95–112.

Lewis, M. W., 2000. Exploring paradox: toward a more comprehensive guide. The Academy of Management Review 25(4), 760-776.

Li, C.R., Lin, C.J., Chu, C.P., 2008. The nature of market orientation and the ambidexterity of innovations. Management Decision 46(7), 1002-1026.

Lubatkin, M.H., Simsek, Z., Ling, Y., Veiga, J. F., 2006. Ambidexterity and performance in smallto medium-sized firms: the pivotal role of TMT behavioral integration. Journal of Management 32, 1–17.

Macdonald, S., 1995. Too close for comfort: the strategic implications of getting close to the customer. California Management Review 37(4), 8–27.

March, James G., 1991. Exploration and exploitation in organizational learning. Organization Science 2, 71–87.

Matsuno, K., Mentzer, J.T., Rentz, J.O., 2005. A conceptual and empirical comparison of three market orientation scales. Journal of Business Research 58(1), 1-8.

McGill, M.E., Slocum, J.W., Lei, D., 1992. Management practices in learning organizations. Organizational Dynamics 21(1), 5-18.

McGrath, R.G., 2001. Exploratory learning, innovative capacity, and managerial oversight. Academy of Management Journal 44, 118-131

Milton, L.P., Westphal, J.D., 2005. Identity confirmation networks and cooperation in work groups. Academy of Management Journal 48, 191–212.

Mom, T.J.M., van den Bosch, F.A.J., Volberda, H.W., 2007. Investigating managers' exploration and exploitation activities: the influence of top-down, bottom-up, and horizontal knowledge inflows. Journal of Management Studies 44(6), 910-931.

Mom, T.J.M., van den Bosch, F.A.J., Volberda, H.W., 2009. Understanding variation in managers' ambidexterity: investigating direct and interaction effects of formal structural and personal coordination mechanisms. Organization Science 20(4), 812-828.

Narver, J.C., Slater, S.F., 1990. The effect of market orientation on business profitability. Journal of Marketing 54(October), 20-35.

Narver, J.C., Slater, S.F., MacLachlan, D.L., 2004. Responsive and proactive market orientation and new product success. Journal of Product Innovation Management 21 (5), 334-347.

Raisch S., Birkinshaw J., Probst G., Tushman M.L., 2009. Organizational ambidexterity: balancing exploitation and exploration for sustained performance. Organization Science 20 (4), 685–695.

Raisch, S., 2008. Balanced structures: designing organizations for profitable growth. Long Range Planning 41(5), 483-508.

Rothaermel, F.T., Alexandre, M.T., 2009. Ambidexterity in technology sourcing: the moderating role of absorptive capacity. Organization Science 20, 759-782.

Ruekert, R.W., 1992. Developing a market orientation: an organization strategy perspective. International Journal of Research in Marketing 9(3), 225–246.

Schindehutte, M., Morris, M.H., Kocak, A., 2008. Understanding market-driving behavior: the role of entrepreneurship. Journal of Small Business Management 46(1), 4-26.

Shapiro, Benson P., 1988. What the hell is "market oriented?" Harvard Business Review 66 (November/December), 119-25.

Sidhu, J.S., Commandeur, H.R., Volberda, H.W., 2007. The multifaceted nature of exploration and exploitation: value of supply, demand, and spatial search for innovation. Organization Science 18, 20–40.

Siggelkow, W., Rivkin, J.W., 2005. Speed a search: designing organizations for turbulence and complexity. Organization Science 16, 101-122.

Slater, S.F., Narver, J.C., 1994. Does competitive environment moderate the market orientation-performance relationship? Journal of Marketing 58, 46-55.

Teece, D. J., 2007. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal 28(13), 1319-1350.

Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strategic Management Journal 18(7), 509-533.

Tsai K.H., Chou C. and Kuo J.H., 2008. The curvilinear relationships between responsive and proactive market orientations and new product performance: a contingent link. Industrial Marketing Management 37, 884-894.

Tushman, M. L., O'Reilly, C., 1996. Ambidextrous organizations: managing evolutionary and revolutionary change. California Management Review 38, 8-30.

Venkatraman, N., 1989. The concept of fit in strategy research: toward verbal and statistical correspondence. Academy of Management Review 14, 423-444.

Voola, R., O'Cass, A., 2010. Implementing competitive strategies: the role of responsive and proactive market orientations. European Journal of Marketing 44, 245-266.

Waldman, D.A., Ramirez, G.G., House, R.J., 2001. Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environment uncertainty. Academy of Management Journal 44(1), 134-143.

Zahra, S. A., George, G., 2002. Absorptive capacity: a review, reconceptualization, and extension. Academy of Management Review 27, 185–203.

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