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Creative process engagement and new product performance: The role of new product development speed and leadership encouragement of creativity☆,☆☆

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ABSTRACT

The purpose of this paper is to investigate the processes underlying the relationship between creativity processes and new product performance. Drawing on the literature of new product development (NPD) and organizational creativity, we hypothesize that NPD speed mediates the relationship between creativity processes and new product performance and that encouragement by leadership moderates this mediating model. Using a sample of 245 companies in China, we found that (1) not all components of creativity processes related positively to new product performance. Specifically, information search and encoding (ISE) and idea and alternative generation (IG) are respectively and positively related to new product performance, but problem identification (PI) is not. (2) NPD speed fully mediates the influence of PI and ISE on new product performance, but it only partially mediates the relationship between IG and new product performance. (3) Encouragement by leadership positively moderates the relationship of PI and NPD speed, as well as the relationship of ISE and NPD speed; however, it does not significantly moderate the relationship between IG and NPD speed. The implications of these findings and directions for future research in NPD performance are discussed.

1. Introduction

To remain competitive, firms need to provide a constant stream of new products and quickly deliver innovative products to the market while controlling costs (Allocca & Kessler, 2006; Carbonell & Rodriguez, 2006; Farid, Hakimian, Ismail, & Nair, 2017; Goktan & Miles, 2012). New product development (NPD) literature has focused on the NPD process, which starts from generating new ideas to commercializing new products, and proclaimed that new product innovativeness and NPD speed (the pace of progress that a firm displays in this process) are unequivocally important to new product performance (Chen, Reilly, & Lynn, 2012; Kessler & Bierly, 2002; Knockaert & Spithoven, 2014). However, the influences on NPD performance are quite complex. The relationship between new product innovativeness and NPD speed still has room for development (Kessler & Bierly, 2002; Wu, Liu, & Zhang, 2016). For example, are different tasks in the process of engaging creativity, which is crucial for new product innovativeness, equally associated with NPD speed? If not, how exactly do firms manage the NPD process by balancing creativity and speed to increase new product performance?

Moreover, while firms from emerging markets have become strong rivals in global competition (Deng & Yang, 2015; Tsai & Hsu, 2014), existing studies of the determinants affecting NPD speed have largely focused on the context of developed markets (e.g., Chen et al., 2012; Heirman & Clarysse, 2007; Kessler & Chakrabarti, 1999). Therefore, this study focusing on the antecedents and processes underlying NPD speed and new product performance of firms from emerging markets will enable us to better understand the competitive advantages of these firms (Tsai, Baugh, Fang, & Lin, 2014).

The ideas on which innovation is based come from creativity in organizations (Goldsby, Kreiser, Kuratko, Bishop, & Hornsby, 2018; Shalley, Zhou, & Oldman, 2004). Although employee creativity is considered an important source of organizational innovation, little research is systematically investigated regarding the underlying relationships between employee creativity processes, NPD speed and new product performance (Leenders, Engelen, & Kratzer, 2007; Morgan, Anokhin, Song, & Chistyakova, 2018; Sun, Xu, & Shang, 2012).

One such promising area of creativity processes is creative process

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engagement (CPE), the cognitive processes that employees involve or engage in producing creative outcomes (Amabile, 1983; Gilson & Shalley, 2004), which mainly includes three components: (1) problem identification (PI); (2) information search and encoding (ISE); and (3) idea and alternative generation (IG) (Zhang & Bartol, 2010). While the three components of CPE are often assumed to be sequential, it is argued in practice that they could occur simultaneously or overlap to speed up the NPD process. Consequently, examining separate components of CPE allows us to better specify the relationship between NPD innovativeness and speed (e.g., whether and how each component of CPE is differently associated with NPD speed) as well as the idiosyncratic impact of separate components of CPE on NPD speed and new product performance.

Additionally, prior literature has argued that leaders play an important role in NPD innovation activities (e.g., Dunne, Aaron, Mcdowell, Urban, & Geho, 2016; Felekoglu & Moultrie, 2014; Rosing, Frese, & Bausch, 2011) by shaping employees' shared perception of their work context, which in turn influences creativity (Nisula & Kianto, 2018). Separating components of CPE allows us to scrutinize whether the effect on new product performance of leadership encouragement of creativity (LEC) is constant across the components of CPE.

This study seeks to provide new insights into *whether* and *how* CPE's three components affect respectively (1) NPD speed and (2) new product performance. Drawing on the literature of NPD and organizational creativity, we propose a conceptual model (Fig. 1), positing that firms from emerging markets engaging heavily in each component of CPE improves NPD speed and thus increases new product performance. Moreover, LEC of firms from emerging markets is a critical moderator enhancing the strength of links between each component of CPE and NPD speed. We collected data from 245 companies from high-tech industries in eastern China. High-tech industries were chosen because they are under constant pressure to produce new products to satisfy rapid demands from markets (Park, 2005), which fits our research purpose. China is chosen as a prominent example for emerging economies recognized as an active player in global competition (Deng & Yang, 2015; Luo & Tung, 2007).

This study provides the following contributions. Firstly, this study provides a comprehensive model that connects the research of creativity and NPD, illustrating the importance of the three CPE components as antecedents of new product performance. By splitting CPE into PI, ISE, and IG, the study provides a closer examination of the effects of each component of CPE on new product performance.

Secondly, this study shows *how* CPE influences new product performance. Specifically, we identify the mechanism (NPD speed) that serves as a critical mediator in the CPE-to-new product performance relationship. The three CPE components respectively increase NPD speed, thus resulting in positive new product performance. Thirdly, this study identifies *when* the relationships vary between CPE and NPD speed. Further scrutiny of the moderating role of LEC advances understanding of the boundary conditions under which the three separate links of each component of CPE to NPD speed increase. Lastly, this study contributes to the literature of NPD in firms from emerging markets by identifying and providing empirical support for the critical determinants of NPD speed and performance.

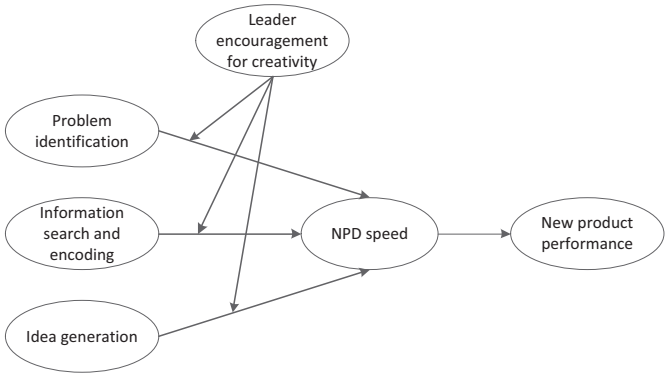

Fig. 1. The conceptual model.

2. Theory and hypotheses development

This study adopts a micro view of studying NPD speed, which investigates how structures, processes, and employees in companies influence the NPD process and performance (Markman, Gianiodis, Phan, & Balkin, 2005; Morgan et al., 2018). Following Kessler and Chakrabarti (1999) and Carbonell and Rodriguez (2006), we examine two types of new product performance: goal attainment and market advantages. Specifically, goal attainment is an internally driven measure, which includes cost reduction, product quality improvement, and profitability. Market advantages include sales and market share expansion.

NPD speed represents how quickly an idea moves from conception to a product in the marketplace (Chen et al., 2012, pg 18). It involves the set of cross-functional activities that start from identifying new product ideas or market opportunities to production, sale, and delivery of a product (Menon, Chowdhury, & Lukas, 2002). Prior studies indicated that NPD speed is a significant new product advantage, which exerts a substantial positive influence on new product performance (e.g., Allocca & Kessler, 2006; Chen et al., 2012; Kessler, Bierly, & Gopalakrishnan, 2000). For example, Carbonell and Rodriguez (2006) argued that a company that pushes innovative products to targeting market ahead of schedule would obtain positive financial performance. Similarly, Goktan and Miles (2012) concluded that the company producing innovative products in a shorter cycle-time would demonstrate greater sales and more profits.

Despite the perceived importance of NPD speed, pitfalls occur when pursuing a time-based strategy. For example, quick innovations can drive out more profitable break-through types (Farid et al., 2017), and key information-gathering steps may be skipped (Zirger & Hartley, 1996). Empirical evidence has produced inconsistent and conflicting results with respect to the benefits of NPD speed. Some studies show that NPD speed is positively associated with new product performance (Kessler & Bierly, 2002), while other studies indicate a lack of association (Meyer & Utterback, 1995). Possible explanations for these conflicting findings are two: firstly, prior studies have often ignored the role of creativity in the early stage of the NPD process and how creativity interacts with NPD speed to affect new product performance; secondly, prior studies have often treated creativity as a single construct (Nisula & Kianto, 2018), assuming that different tasks in the process of creativity are equally associated with NPD speed and new product performance. This single or combined view of creativity might lead to incomplete or misleading conclusions about the relationship between NPD speed and new product performance (Wu et al., 2016). Overall, the relationships among creativity, NPD speed, and new product performance need further scrutiny.

CPE, an important precursor to creativity, refers to employee involvement or engagement in creativity-relevant cognitive processes (Amabile, 1983) that mostly account for the activities leading to innovative outcomes (Gilson & Shalley, 2004; Henker, Sonnentag, & Unger, 2015). Zhang and Bartol (2010) argued that CPE included different tasks such as problem identification (PI), information search and encoding (ISE), and idea and alternative generation (IG). Although CPE has an important influence on new product performance because it offers the initial elements toward creativity in NPD activities (Mumford, 2000; Shalley et al., 2004; Unsworth & Clegg, 2010), the discussion of CPE and creativity has largely remained in the individual level or team level. The discussion of CPE at the firm level and its relationship with NPD speed is overlooked in NPD literature.

When a firm actively involves in identifying creative problems,

collecting innovative information as much as possible, and generating novel ideas and alternatives deliberately, the later stages of the NPD process, which includes cross-functional communication and coordination among manufacturing and marketing departments to enable products to enter markets earlier, are likely to be accelerated smoothly (Reiter-Palmon & Illies, 2004). In so doing, NPD speed of the entire process is getting fast, not slowing down. Consequently, this firm would enjoy an increase in products' competitive advantage. NPD speed is thus a critical mediator between CPE and new product performance (Swink & Song, 2007).

Nevertheless, most studies have often treated CPE as a single construct (e.g., Zhang & Bartol, 2010; Zhou & Pan, 2015). The relationships among CPE, NPD speed, and new product performance are not yet systematically investigated (Leenders et al., 2007; Park et al., 2009; Sun et al., 2012). Accordingly, this study takes a component-level approach of CPE at the firm level to provide a closer examination into the effect of CPE on NPD speed and new product performance. When firms from emerging markets have become strong rivals in global competition, studying the relationships among CPE, NPD speed, and new product performance would be beneficial for understanding the nature of these firms' competitive advantages in NPD innovation.

Much research has examined the role of leadership support in fostering employee creativity (e.g., Shalley & Gilson, 2004; Tierney, Farmer, & Graen, 1999) because leaders play a critical role in eliciting desirable employee behaviors. Although it has been shown that leaders influence employee behavior through signaling expected or normative behaviors (e.g., Felekoglu & Moultrie, 2014; Sattayaraksa & Boon-itt, 2016), little is known about whether the effect of leadership is constant across the three components of CPE and NPD outcomes. Below, we further formulate theoretical propositions for empirical examination.

2.1. Three components of CPE and new product performance

According to Zhang and Bartol (2010), CPE involves several activities, starting with PI, which is considered the work to define what innovation problems are in NPD projects. To resolve the innovation issue, employees need to decompose such problems, identify relevant procedures, and recognize restrictions (Mirtalaie, Hussain, Chang, & Hussain, 2017; Reiter-Palmon & Illies, 2004). When firms undertake innovations, employees in the R&D section or relevant departments are encouraged to modify innovative goals, procedures, and restrictions relevant for the solution of innovative problems in producing new products (Chuang, Morgan, & Robson, 2015). Reiter-Palmon, Mumford, Boes, and Runco (1997) thus suggested that efforts spent on PI had a positive relation to the quality and originality of the innovative solution. Consequently, the more effort of engaging in identifying innovative problems, the higher the new product performance.

Firms from emerging markets are relatively weak in R&D as opposed to firms from developed markets (Aulakh, 2007); therefore, their engagement of identifying new innovation might be limited or ineffective. As a result, the positive link between PI and new product performance likely would not be supported in the setting of emerging markets. However, Zhou (2006) found that Chinese firms have better new product performance when they undertake innovation strategies that focus on PI. Therefore, we argue that firms from emerging markets who engage actively in PI to stay in the new product competition are likely to receive positive outcomes in new product performance. Based on the above arguments, we propose the following hypothesis.

Hypothesis 1a. Problem identification is positively related to new product performance.

The second component of CPE is ISE, which includes collecting information (i.e., latest market knowledge or advanced technologies) and processing relevant information (Mumford, 2000; Zhang & Bartol, 2010). Reiter-Palmon and Illies (2004) argued that ISE involves both the consideration of already existing concepts and development of new concepts by using information from memory and external sources. Developing a new concept via encoding the diverse information from both external sources and memories would increase the quantity and quality of creativity problem solutions, which promotes new product performance (Illies & Reiter-Palmon, 2004). Briefly, high engagement of ISE could be conducive to new product performance. Despite the fact that firms from emerging markets are relatively weak in R&D, Cheng and Yang (2017) found that Chinese firms with strong technological innovation ability in searching and integrating information/resources are likely to have positive performance. Thus, we argue that firms from emerging markets who engage actively in ISE would be likely to receive positive outcomes to stay in the new product competition. We propose the following hypothesis.

Hypothesis 1b. Information search and encoding is positively related to new product performance.

The third component of CPE is IG, which involves combining or reorganizing gathered information, exploring applications and implications of new understanding, and developing a set of new ideas to market (Mumford, 2000). Therefore, with the help of PI and ISE, organizations develop a deliberate creative construct or a promising approach to innovative planning of new products (Chuang et al., 2015; Unsworth & Clegg, 2010). When a new innovative notion from IG is proposed, organizations would better understand the applications and implications, which ultimately lead to successful new product performance (Tan, Lau, & Lee, 2017). We thus argue that IG has a positive relationship with new product performance. Despite the fact that firms from emerging markets are relatively weak in R&D, Yao, Yang, Fisher, Ma, and Fang (2013) found that Chinese firms could access knowledge and learn from their partners to generate novel ideas to enhance new product performance. Therefore, we speculate that firms from emerging markets who engage actively in IG would receive positive outcomes of new product innovation.

Hypothesis 1c. Idea generation is positively related to new product performance.

2.2. The mediating role of NPD speed

In addition to providing new products with high creativity, firms face the need to quickly deliver creative products to the market (Allocca & Kessler, 2006; Carbonell & Rodriguez, 2006; Goktan & Miles, 2012). NPD speed represents a firm's ability to accelerate the activities and tasks that occur in the NPD process starting from innovating new products to commercializing them (Chen et al., 2012; Kessler et al., 2000), such as idea generation, cross-functional communication and coordination among multiple departments (Ulrich & Eppinger, 2012). When firms are able to speed up the NPD process, they can quickly replace their out-of-date products (Chen et al., 2012), better satisfying market demands (Goktan & Miles, 2012; McNally, Akdeniz, & Calantone, 2011) and enjoying positive new product performance. While both CPE and NPD speed affect new product performance, CPE also plays a critical role in shaping NPD speed (Swink & Song, 2007) because it is the initial part of the entire NPD process. Given that, we argue that the impact of CPE on new product performance will be indirect via its impact on NPD speed.

In order to explore the concept of CPE further, we will examine its three separate components. PI is a critical element of CPE that directly affects NPD speed because it establishes a forum for iterative learning (Kessler & Chakrabarti, 1999). After deconstructing problems and identifying relevant procedures and obstacles resulting from innovative activities, firms would make clear what goals of new products are and have little disagreement in the later stage of the NPD process, which thus would speed up the innovation process (Mirtalaie et al., 2017; Morgan et al., 2018). Although firms engaging in PI would take some time defining a new goal, high engagement of PI would eliminate

potential barriers or conflicts appearing from further coordinating activities across multiple functional departments in the later stages of the NPD process. Therefore, high engagement of PI would improve the understanding of innovative new products as a whole, which in turn could accelerate NPD speed (Chen et al., 2012; Heirman & Clarysse, 2007) and increase new product performance.

Despite the fact that firms from emerging markets are considered weak in R&D as opposed to firms from developed markets (Aulakh, 2007), to stay competitive in global competition in innovation, those firms who actively engage in PI would increase their speed of NPD and their performance in innovating new products. We thus argue that the relationship between PI and new product performance is positively mediated by NPD speed for firms from emerging markets.

Hypothesis 2a. NPD speed positively mediates the relationship between problem identification and new product performance.

When firms actively engage in ISE, they would devote resources to search and integrate both internal and external knowledge of new product innovation, resulting in thorough information for creativity solutions that satisfy market demands (Morgan et al., 2018). Although high engagement of ISE would be time-consuming in collecting and encoding data, thorough information would enable firms to confidently identify solutions and effectively communicate with other departments later in the NPD process (Sleeswijk, Van, & Stappers, 2007), indicating that NPD speed of the entire process might be shortened and new product performance would increase (Carbonell & Rodriguez, 2006).

On the contrary, firms with low engagement of ISE would be likely to produce limited information for creativity solutions that might not fully clarify the obscure ideas, leading to an increase in the time spent on resolving conflicts or obstacles of communicating and coordinating activities across different departments in the later stages of the NPD process. As a result, firms with low engagement of ISE would slow down their NPD speed and decrease their new product performance.

To stay competitive in global innovation, firms from emerging markets that actively engage in ISE would first experience an increase in their speed of NPD and then an increase in their performance of innovating new products. Therefore, we argue that the relationship between ISE and new product performance is positively mediated by NPD speed for firms from emerging markets firms. We hypothesize the following.

Hypothesis 2b. NPD speed positively mediates the relationship between information search and encoding and new product performance.

Compared to PI and ISE, IG faces direct pressure to produce creative ideas for new products or solutions. As mentioned earlier, creative IG involves combining or reorganizing gathered information, exploring applications and implications of new understanding, and developing a set of new ideas to market (Mumford, 2000). Therefore, compared to firms with low engagement of IG, firms actively engaging in IG would allocate more resources to explore and evaluate new ideas, resulting in generating better ideas for creativity solutions in terms of both quantity and quality that satisfy market demands.

Although exploring and testing various ideas are time-consuming, we argue that those results of clear and well-thought ideas for creativity solutions would effectively streamline the entire NPD process by eliminating inconsistencies or conflicts among different departments (Harris, Li, Boswell, Zhang, & Xie, 2014) and reducing the concern for market uncertainty (Lin, Tu, Chen, & Huang, 2013). In other words, effective IG would enable a NPD department or team to cooperate efficiently with other departments (e.g., production or marketing), which promotes NPD speed and increases new product performance. Consequently, high engagement of IG would improve high NPD speed by shortening the entire NPD process, and then result in an increase in new product performance.

When firms from emerging markets are generally weak in R&D, it is likely that high engagement of IG by firms from emerging markets would take some time exploring and evaluating novel products or solutions. Consequently, firms from emerging markets that engage actively in IG would likely increase new product performance via deteriorating NPD speed. Nevertheless, considering that firms from emerging markets such as China are well-known for quickly responding to new demands (Yao et al., 2013), we argue that the relationship between IG and new product performance is positively mediated by NPD speed for firms from emerging markets firms. Hence, we hypothesize the following.

Hypothesis 2c. NPD speed positively mediates the relationship between idea generation and new product performance.

2.3. The moderating role of leadership encouragement of creativity

Though CPE involves mainly cognitive processes such as PI, ISE, and IG (Zhang & Bartol, 2010), these processes are not carried out in a vacuum (Zhou & Pan, 2015). To understand fully the relationships between CPE and NPD speed and performance, we take into account the social context that may enhance or impede them. Specifically, we argue that encouragement by leaders or leadership (e.g., Dunne et al., 2016) plays a critical role in fostering the links among CPE, NPD speed, and new product performance.

Leadership encouragement of creativity (LEC) is defined as the extent of a leader's emphasis on employees being creative and actively engaging in the process that might lead to innovation outcomes, such as leadership articulating the need for creative outcomes, spelling out the firm values, and calling attention to the effectiveness of engaging in creativity (Tierney et al., 1999; Zhang & Bartol, 2010). The role of LEC in the NPD setting is likely to prime employees' attention, inspire their confidence, and facilitate their effort toward creativity (Mumford, Scott, Gaddis, & Strange, 2002; Tan et al., 2017; Wang, Fang, Qureshi, & Janssen, 2015). When a leader enables his subordinates to understand the importance of creativity in their jobs (Gu, Tang, & Jiang, 2015), those employees are more prone to be active in new product innovation. Empirically, Gong, Huang, and Farh (2009) have found that a good leader who assigned innovation goals effectively would enhance subordinates' enthusiasm on creativity and enhance their innovative activities.

When employees who actively engage in PI by decomposing and identifying innovation problems, high LEC from top management would reinforce the importance of innovativeness and increase employees' confidence in their work (Shalley & Zhou, 2008), resulting in positive outcomes such as acceleration in work speed and productivity. On the contrary, when employees who actively engage in PI receive low LEC, they are less likely to feel motivated at work, which might constrain or decrease their confidence in creativity. Empirically, Kessler and Chakrabarti (1999) argued that it was necessary for a leader to direct his team to resolve the problem to speed up innovative projects. As such, the positive interaction of PI and LEC would increase the speed of NPD.

Similar to firms from developed markets, firms from emerging markets showing high level of LEC would improve employees' abilities to recognize innovative problems and enhance NPD speed. We thus propose that LEC of firms from emerging markets serves as a moderator between PI and NPD speed. Hence, we hypothesize the following.

Hypothesis 3a. Leadership encouragement of creativity positively moderates the relationship between problem identification and NPD speed such that the relationship is stronger when leadership encouragement of creativity is higher.

Similarly, the work of ISE depends closely on a leader's strong support. Fredrickson (2001) argued that positive leader support would broaden the focus of employees. High LEC would thus enhance the cognitive capacity of employees to process information and increase the

flexibility of cognitive elements used for information seeking (Dunne et al., 2016). When employees who actively engage in ISE receive high LEC from top management, they are likely to feel motivated to search widely for information. On the contrary, when employees who actively engage in ISE receive low LEC, they are less likely to feel motivated, which might constrain their creativity in searching and encoding relevant information.

Meanwhile, high LEC would allow employees to complete their activities with better knowledge of other individuals' needs and constraints, thus reducing the possibility of rework (e.g., Carbonell & Rodriguez, 2006; Sethi, Smith, & Park, 2001). In so doing, high LEC would make the searching and encoding information of developing a new product more efficient and vigorous. Finally, the shared value of creativity from LEC is likely to smooth communication with other departments in the later stage of the NPD process. As such, the positive interaction of ISE and LEC would increase the speed of NPD.

In the setting of firms from emerging markets, we argue that LEC of firms serves as a moderator strengthening the relationship between ISE and NPD speed. Specifically, firms that show a high level of LEC would enhance employees' abilities to search and encode information of developing a new product and thus accelerate NPD speed. Hence, we hypothesize the following.

Hypothesis 3b. Leadership encouragement of creativity positively moderates the relationship between information search and encoding and NPD speed such that the relationship is stronger when leadership encouragement of creativity is higher.

Pinto and Prescott (1988) argued that a clearly stated mission by a leader who supports creativity enables greater focus on new idea development and subsequent successful innovation. Therefore, similar to Hypotheses 3a and 3b, we argue that the positive interaction of IG and LEC would increase the speed of NPD. When employees who actively engage in IG receive high LEC from top management, they are likely to feel focused and motivated to generate new solutions for innovation. Specifically, high LEC enhances the cognitive capacity of employees in evaluating information and generating new ideas (Dunne et al., 2016). On the contrary, when employees who actively engage in IG receive low LEC, they are likely to feel frustrated when their work gets difficult, which might constrain or decrease their creativity in solving problems and generating new ideas. Likewise, the shared value of creativity from LEC is likely to streamline various tasks involved in IG and eliminate conflicts of communication with other departments in the later stage of the NPD process. As such, the speed of NPD increases when the interaction of PI and LEC increases.

Similar to firms from developed markets, we argue that LEC of firms from emerging markets serves as a moderator between IG and NPD speed. Specifically, firms that show a high level of LEC would enhance employees' abilities to generate new ideas and thus accelerate NPD speed. Formally, we propose the following.

Hypothesis 3c. Leadership encouragement of creativity positively moderates the relationship between idea generation and NPD speed such that the relationship is stronger when leadership encouragement of creativity is higher.

3. Method

3.1. Data collection and sample description

We collected survey data of high-tech companies located in Zhejiang, Jiangsu, and Shanghai, which are leading provincial areas hosting high-tech industries in China, from late 2015 to 2016. Our unit of analysis is the entire firm. Participants included both executives and department-level managers who supervise employees that performed tasks involving the development of new ideas, methods, and approaches to attract competitive product markets. These managers came from one of the following departments: R&D, new product design process and management, or business system operation. The survey instrument was generated and implemented in the following steps. First, two independent bilingual professors were asked to translate the English-version of the questionnaire into Chinese and then back-translate into English to ensure equivalency of meaning. Next, we conducted a pretest with 20 R&D-related senior executives and managers from 20 high-tech firms in Zhejiang province to develop the questionnaire. To ensure the reliability of the adopted measurement items, we also conducted some semi-structured interviews with senior managers during our preliminary research to identify the appropriate use of words in our questionnaires.

With the help of local government agencies, we set up separate meetings with 300 companies whose executives in charge of NPD were invited. In these meetings, we briefed about the purpose of this study, explained the procedures for our surveys, and emphasized the assurance of confidentiality. To make sure that all respondents were knowledgeable informants, we also identified a department manager who was responsible for new product development within each firm. In the first stage (T_1), department managers were asked to report the degree of engagement in CPE within their department and their perception of encouragement of creativity from their top executives (the perception of LEC). Out of 300 participating companies, we received 279 useful responses, for a response rate of 93%.

In the second stage (T_2), about two months later, we invited executives of NPD from these responding firms to report their perceptions of NPD speed of their organizations. A total of 253 usable responses were returned, for a response rate of 90.7%. In the last stage (T_3), another two months later, the same group of executives was asked to evaluate new product performance of their organizations. Firm size and firm age were obtained from archival data.

A unique feature of our research design is the collection of variables from different sources, which enhances data accuracy significantly by reducing the random error and common method variance associated with individual response data (Van Bruggen, Lilien, & Kacker, 2002). We received 245 useful responses, for a response rate of 96.8%. Among all respondents, average organizational tenure of respondents was 5.11 years.

In addition to procedural remedies, we took statistical remedies to control for common method bias. Specifically, we conducted Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) of all questionnaire-based variables, none of which accounted for a majority of the covariance. Therefore, we determined that common method bias was unlikely to be a serious concern in our study.

3.2. Variables and measures

Unless otherwise indicated, all variables were measured by participant responses to questions on a five-item Likert-type scale of 1 = *strongly disagree* to 5 = *strongly agree* or 1 = *never* to 5 = *very frequently*. The specific measures are described below, along with the results of calculation of Cronbach's alpha coefficients for the various measures. After that, all the constructs in this study were measured through an overall scale score averaged by relating items in the following statistical analysis.

3.2.1. Dependent variables

3.2.1.1. New product performance. We adopted the five-item scale of new product performance derived from Langerak, Hultink, and Robben (2004), which reflects financial and market-related new product performance. Respondents were asked to indicate how well the new product has performed on each of the performance indicators such as “met sales growth goals”, “met market share goals”, or “met profitability goals”. The reliability of this measure is 0.89.

3.2.2. Independent variables

3.2.2.1. Problem identification (PI). To capture how frequently employee working at creative projects was engaged in PI, we adopted the same scales used in previous research (e.g., Zhang & Bartol, 2010). Sample items included: "In your department, to what extent do your employees spend time in trying to understand the nature of the problem" and "In your department, to what extent do your employees decompose a difficult problem/assignment into parts to obtain greater understanding." The reliability of this measure is 0.81.

3.2.2.2. Information search and encoding (ISE). The three-item scale developed by Zhang and Bartol (2010) was used to measure how frequently employees working at creative projects were engaged in ISE. Sample items included: "In your department, to what extent do your employees search for information from multiple sources (e.g., personal memories, others' experience, documentation, Internet, etc.)", and "In your department, to what extent do your employees retain a large amount of detailed information in their area of expertise for future use." The reliability of this measure is 0.74.

3.2.2.3. Idea generation (IG). The five-item scale developed by Zhang and Bartol (2010) was adopted to measure how frequently employees working at creative projects was engaged in generating ideas. Sample items included: "In your department, to what extent do your employees consider diverse sources of information in generating new ideas" and "In your department, to what extent do your employees look for connections with solution used in diverse areas." The reliability of this measure is 0.84.

3.2.2.4. NPD speed. We adopted Lukas and Menoh (2004)'s four-item NPD speed scale, which has demonstrated strong reliability in previous research. Sample items included: "It did not take as long for our employees to come up with the new product idea" and "The final version of the new product was ready to be launched much earlier." The reliability of this measure is 0.78.

3.2.2.5. Leadership encouragement of creativity (LEC). To capture the extent of LEC, we used the six-item scale developed by Scott and Bruce (1994). Sample items included: "Top executives encourage, emphasize, or reinforce creativity of employees," "Top executives allow employees to try to solve the same problems in different ways," and "Top executives always provide adequate resources devoted to creativity of employees." The reliability of this scale is 0.86.

3.2.3. Control variables

One demographic variable, *organizational tenure*, measured as the number of years that a respondent had been in the company, was considered as it was significantly related to firm performance (e.g., Carbonell & Rodriguez, 2006; Goktan & Miles, 2012; Shalley et al., 2004). In addition, we controlled three firm characteristics that were considered important contributors to firm outcomes (e.g., Mu, Gang, & Maclachlan, 2009; Zhou, Gao, & Zhao, 2016). *Firm age* was measured as the number of years since the firm was founded. *Firm size* was measured through constructing logarithms of the number of employees. *Firm ownership* was a dichotomous variable coded as "0" for state-owned enterprises and "1" for non-state-owned enterprises.

3.3. Measurement and model properties

To determine whether distinctions among the three CPE components were valid, we followed Henker et al. (2015) and performed a confirmatory factor analysis (CFA) using AMOS19.0. Convention suggested that a value over 0.90 for the comparative fit index (CFI), incremental of fit index (IFI), and Tucker-Lewis Index (TLI), and a value below 0.08 for the root mean square error of approximation (RMSEA) indicate a good fit between the proposed model and the observed data (Bagozzi & Yi, 1988). As shown in Table 1, the model fit indexes revealed that the three-factor model fitted the data best: ($\chi^2(41) = 67.026$, $p < 0.01$; RMSEA = 0.050; CFI = 0.974; IFI = 0.975; TLI = 0.959). It is confirmed that significant distinctions exist among PI, ISE, and IG. CPE is a first-order three-factor construct in this study. We also conducted an overall confirmatory measurement model including all constructs. The fit indexes for the model are good, which indicates good fit: $\chi^2(41) = 67.026$, $p < 0.01$; RMSEA = 0.050; CFI = 0.974; IFI = 0.975; TLI = 0.959.

Table 1
Results of confirmatory factor analysis for creative process engagement.

Models	X^2	DF	RMSEA	CFI	IFI	TLI
Three-factor model	67.026	41	0.050	0.974	0.975	0.959
Two-factor model[a]	155.992	43	0.103	0.889	0.891	0.829
Two-factor model[b]	243.660	43	0.137	0.802	0.807	0.696
Two-factor model[c]	290.595	43	0.152	0.756	0.761	0.625
One-factor model	365.004	44	0.148	0.684	0.690	0.525

Note: $N = 245$.
[a] *ISE* and *IG* are combined.
[b] *PI* and *ISE* are combined.
[c] *PI* and *IG* are combined.

In terms of testing discriminant validity, we compared two nested models for each pair of latent constructs in which we either allow the correlation between two constructs to be free or restrict the correlation to 1. The chi-square statistic is significantly lower ($p < 0.05$) in the unconstrained model than in the constrained model for all constructs. The average variance extracted by each latent construct is greater than its shared variance. Therefore, we conclude that our measures are valid and reliable.

4. Analysis and results

We performed two types of statistical analyses in this study. First, to examine the mediating role of *NPD speed*, we adopted Anderson and Gerbing's (1988) analytical strategy to test the hypothesized model by using structural equation modeling (SEM). Secondly, we adopted hierarchical multiple regression to examine the role of *LEC* as a moderator of the relationships among the three CPE components and *NPD speed*. Following the procedure proposed by Muller, Judd, and Yzerbyt (2005), we entered all interaction variables which were mean-centered to reduce multicollinearity (Aiken & West, 1991).

Table 2 provides the means, standard deviations, correlations, and scale reliabilities for the variables of this study. As shown in Table 2, all variables have good reliabilities (all > 0.7). For the correlations of all variables, the independent variables are not highly correlated with each other in bivariate relationships, except the 0.522 correlation between *ISE* and *IG*. To assess whether multicollinearity is a major concern, we examined variance inflation factor (VIF) scores (Belsley, Kuh, & Welsch, 1980) and found no violation.

We proceeded with SEM analyses to test the main and mediating effects. Firstly, a linear regression analysis was used to test the direct effect from *PI*, *ISE*, and *IG* on *new product performance*. As shown in Fig. 2, PI had a non-significant influence on new product performance ($r = 0.041$, $p > 0.05$), thus Hypothesis 1a was not supported. *ISE* was positively associated with *new product performance* ($r = 0.134$, $p < 0.05$), which supported Hypothesis 1b. Similarly, *IG* had a positive relation with *new product performance* ($r = 0.258$, $p < 0.01$), which supports Hypothesis 1c. Therefore, in the setting of Chinese firms, not all components of CPE are positively related to new product performance. Chinese firms will enjoy positive new product performance when they actively engage in searching/encoding information and generating ideas. Nevertheless, we did not find supporting evidence that Chinese firms will enjoy positive new product performance when they actively engage in identifying problems for new innovation.

Table 2
Means, standard deviations, and correlations for all variables.

Variables	M	SD	1	2	3	4	5	6	7	8	9	10
1. Organizational tenure	5.11	2.87										
2. Firm age	15.87	6.58	−0063									
3. Firm size	21.04	4.58	0.059	−0.184**								
4. Ownership	0.67	0.47	−0.018	0.037	0.035							
5. Problem identification(*PI*)	3.15	0.84	0.096	0.002	0.048	−0.014	**(0.81)**					
6. Information search and encoding(*ISE*)	3.40	0.76	0.016	0.002	−0.006	0.005	0.314**	***(0.74)***				
7. Idea generation(*IG*)	3.13	0.69	0.173**	−0.048	−0.030	0.051	0.249**	0.522**	***(0.84)***			
8. NPD speed	3.38	0.69	0.169**	−0.086	−0.057	−0.046	0.290**	0.284**	0.273**	***(0.78)***		
9. Leadership encouragement of creativity(*LEC*)	3.45	0.68	0.107	0.007	−0.045	−0.064	−0.007	0.138*	0.336**	0118	***(0.86)***	
10. New product performance	3.61	0.68	0.080	−0.026	0.127*	0.076	0.146*	0.140*	0.201**	0.250**	0.111	***(0.89)***

** $p \leq 0.01$.
* $p \leq 0.05$ (2-tailed).

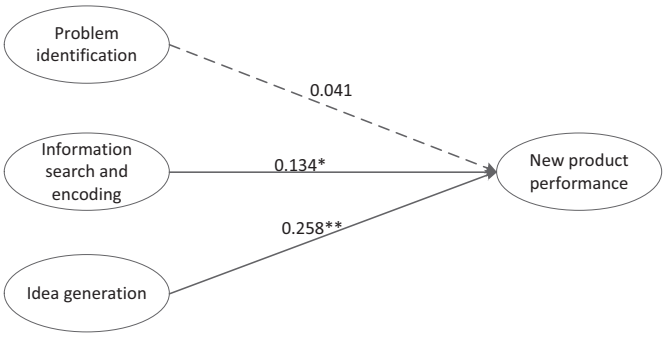

Fig. 2. The main effect model.

After that, we used the hypothetical model to explore the mediating effect of NPD speed. Fig. 3 exhibits the hypothetical model with path coefficients. *PI*, *ISE,* and *IG* all positively related with *NPD speed* ($r = 0.230$, $p < 0.01$; $r = 0.220$, $p < 0.05$; $r = 0.287$, $p < 0.01$), and *NPD speed* was positively associated with *new product performance* ($r = 0.249$, $p < 0.01$). We thus confirmed Hypotheses 2a, 2b, and 2c, which respectively predicted that NPD speed plays a role in mediating the relationships between PI, ISE, IG, and new product performance.

Because the main relationship between *IG* and *new product performance* still received positive support ($r = 0.192$, $p < 0.05$), *NPD speed* has a partially mediating effect between *IG* and *new product performance*. For Chinese firms that actively engage in IG, they would increase new product performance directly or indirectly via NPD speed. Meanwhile, the positive relationship between *PI* and *new product performance* was no longer significant ($r = -0.006$, $p > 0.05$), neither was the relationship between ISE and new product performance ($r = -0.010$, $p > 0.05$), indicating that *NPD speed* had a fully mediating effect between *PI* and *new product performance* and between *ISE* and *new product performance*. Therefore, for Chinese firms that actively engage in PI and ISE, they would only increase new product performance indirectly via NPD speed.

We took the following steps to test the validity of the moderating effect: control variables were first entered into the regression equation, and then the independent variables were added, followed by the moderator and interaction terms between independent variables and the moderator (Muller et al., 2005). As shown in Table 3, the interaction term between *LEC* and *PI* was positively associated with *NPD speed* ($r = 0.140$, $p < 0.05$) and so was the interaction term between *LEC* and *ISE* ($r = 0.125$, $p < 0.05$), but not the interaction term between *LEC* and *IG* ($r = 0.087$, $p > 0.05$). Accordingly, both Hypothesis 4a and 4b were supported. *LEC* interacted significantly with *PI* and *ISE* to increase *NPD speed*. Hypothesis 4c, which argued that *LEC* interacts significantly with *IG* to influence *NPD speed*, was not supported. We thus conclude that the effect on new product performance of leadership encouragement of creativity is not constant across three components of CPE. Chinese firms that actively engage in PI and ISE would have better NPD speed when their LEC is higher than when it is lower. However, we did not find significant evidence to support that Chinese firms who actively engage in IG would have better NPD speed when their LEC is higher than when it is lower.

To plot the significant interactive effect, we adopted Aiken and West's (1991) procedure that computed slopes by taking one standard deviation above and below the mean of the moderator. Figs. 4 and 5 exhibit that the relationships between independent variables (*PI*, *ISE*) and *NPD speed* were positive for firms with either high or low levels of *LEC*, but the positive relationship was stronger for firms with high levels of *LEC*. Therefore, these findings indicate that firms with stronger LEC are likely to display the highest level of NPD speed when they actively engage in identifying problem and searching/encoding information.

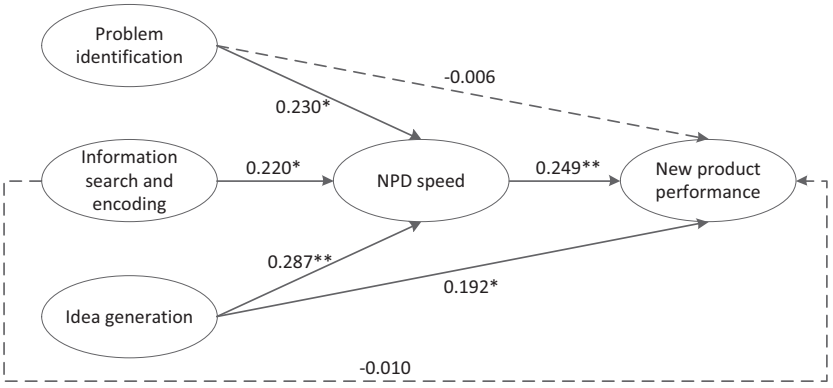

Fig. 3. The mediating effect model.

Table 3
Regression results of moderating effects of leadership encouragement of creativity.

Control Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Control variables							
Organizational tenure	0.066	0.059	0.046	0.051	0.047	0.050	0.051
Firm age	−0.004	0.012	0.005	0.005	0.002	0.004	0.005
Firm size	0.130*	0.126	0.108	0.110	0.097	0.109	0.102
Ownership	0.066	0.068	0.068	0.059	0.064	0.064	0.064
Independent Variables							
Problem identification (*PI*)		0.290**	0.298**				
Information search and encoding (*ISE*)				0.286**	0.280**		
Idea generation (*IG*)						0.296**	0.288**
Moderator							
Leadership encouragement of creativity (*LEC*)			0.110		0.099		0.046
Interaction							
PI ∗ *LEC*			0.140*				
ISE ∗ *LEC*					0.125*		
IG ∗ *LEC*							0.087
R^2	0.033	0.092	0.127	0.089	0.112	0.094	0.102
F	1607	4.039*	4.287**	3.882*	3.729**	4.105*	3.349*
ΔR^2	0.033	0.082	0.034	0.079	0.023	0.084	0.008
ΔF	1.607	21.557**	4.657*	20.623**	3.066*	21.945**	1.074

** $p < 0.01$.
* $p < 0.05$ (2-tailed).

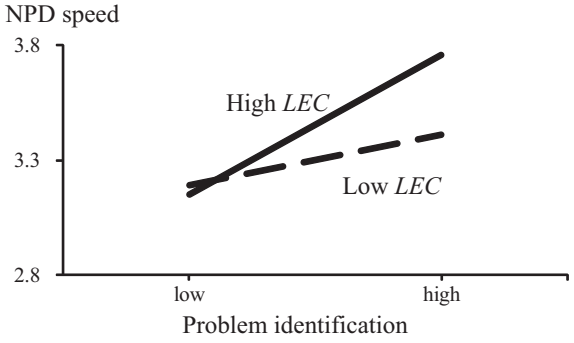

Fig. 4. The moderating effect of LEC on the relationship between PI and NPD speed.

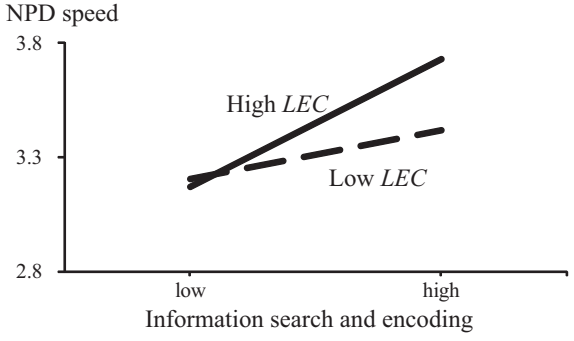

Fig. 5. The moderating effect of LEC on the relationship between ISE and NPD speed.

5. Discussion, implications, and conclusions

5.1. Discussion of major findings

The empirical results of this study provide support for most of the hypotheses. Firstly, Chinese firms that actively engage in ISE and IG would receive superior new product performance, but we did not find supporting evidence that Chinese firms who engage actively in PI would enjoy high new product performance. Therefore, the three CPE components do not equally affect new product performance, which stresses the importance of not considering CPE as a unitary antecedent of new product performance. Taking a component-level approach of studying the impact of CPE on new product performance allows us to understand which component of CPE is relatively stronger (or not significant) in affecting new product performance.

Secondly, the mediating effects of NPD speed were significant on the three separate links of each CPE component and new product performance. Specifically, NPD speed fully mediated the link of PI and new product performance, as well as the link of ISE and new product performance. Therefore, Chinese firms that actively engage in PI and ISE will first experience better NPD speed and then receive positive new product performance. Because NPD speed partially mediated the link of IG and new product performance, Chinese firms that actively engage in IG will achieve positive new product performance directly or indirectly via NPD speed. Overall, in the setting of Chinese firms, the mediating role of NPD speed in the relationship between CPE and new product performance is supported.

Further, we found that LEC did not serve as a significant moderator consistently across the links between the three CPE components and NPD speed. Counter to our predictions, the interaction of LEC and PI, as well as of LEC and ISE, did significantly increase NPD speed. However, we did not find significant support for the moderating role of LEC on the relationship between IG and NPD speed. As a result, Chinese firms that receive positive LEC while they actively engage in the process of creativity such as identifying problems or searching/encoding information are likely to receive high NPD speed. For those who actively engage in the process of generating ideas, they would need something more than positive leader encouragement for creativity to speed up NPD innovation.

5.2. Theoretical contributions

Although CPE plays an important role in the NPD process, the effect of CPE on NPD speed and new product performance has not been examined thoroughly, particularly in the setting of firms from emerging markets. Our study provides several theoretical contributions to the literature of creativity (especially CPE), NPD speed, and new product performance, and innovation by firms from emerging markets such as China. For the literature of creativity, our results first show that CPE should be examined in separate components. The results of this study revealed that the three components of CPE (PI, ISE, and IG) offered different levels of impact on new product performance. Among the

three CPE components, IG had the greatest impact on NPD speed and new product performance. Specifically, IG had a stronger impact on new product performance than ISE, while PI was not significant in affecting new product performance.

Secondly, our results highlight the critical mediating role of NPD speed in the linkage from CPE to new product performance. This finding offers an interesting theoretical discovery on creativity in the NPD process and advances existing study findings (Carbonell & Rodriguez, 2006; Luzzini, Amann, Caniato, Essig, & Ronchi, 2015). Particularly, the three CPE components do not equally depend on NPD speed to achieve positive new product performance. The fully mediating effects of NPD speed on PI and ISE to new product performance show that firms who actively engage in PI and ISE would only increase new product performance indirectly via NPD speed. On the contrary, a partially mediating effect of NPD speed on IG to new product performance indicates that firms who actively engage in generating ideas for creativity can receive positive new product performance directly or indirectly via NPD speed.

Thirdly, for the literature of creativity, this study offers a theoretical implication on the role of LEC between CPE and NPD speed. Our results advance the theoretical viewpoint by showing that the mechanism differed across the three CPE components for leadership inspiration on employees' engagement in the process of creativity to enhance NPD speed. Specifically, LEC positively moderated the relationships of PI and ISE to NPD speed, but it had no significant moderating effect on the link between IG and NPD speed. Consistent with previous literature, our results confirm that firms could speed up innovation process if their employees who actively identify innovation problems and widely search information receive positive support from their leaders who emphasize the shared values favorable to creativity (Swink, 2003). However, our result did not find supporting evidence that firms with strong LEC are likely to display a high level of NPD speed when they actively engage in generating creative ideas. Firms would need something more than positive leader encouragement for creativity to speed up NPD innovation.

For the literature of new product performance, this study offers a theoretical implication for the debate regarding the trade-off between NPD speed and creativity outcomes (e.g., Goktan & Miles, 2012; Langerak & Hultink, 2006; Swink & Song, 2007). Separating three components of CPE, we find that when firms actively engage in identifying innovative problems and searching/encoding information for creativity, they will improve (not hinder) NPD speed and receive positive outcomes of new product performance. In addition, with or without achieving positive NPD speed, firms from emerging markets will experience positive NPD performance when they actively engage in generating creative ideas.

Lastly, this study offers new insights for the study of firms from emerging markets. Specifically, this study advances understanding of the competitive advantages of firms from emerging markets such as China in NPD innovation. Though firms from emerging markets are relatively weak in R&D as opposed to firms from developed markets (Aulakh, 2007; Chen & Lin, 2011), our results show that they act as what the existing theory predicts that active engagement on ISE and IG of CPE increase their new product performance. In addition, NPD speed is found as a critical mediator for firms from emerging markets in the link between CPE and new product performance. Contrary to the existing literature, firms from emerging markets that actively engage in PI of CPE would not necessarily increase their new product performance. Moreover, firms from emerging markets with strong LEC would achieve high NPD speed only when they actively engage in PI and ISE, but not necessarily in generating creative ideas.

5.3. Managerial implications

A number of important managerial implications follow from these results. First, how the three CPE components are used is the key to improving new product performance. Findings from our study point out that, among the three CPE components, IG had the greatest impact on NPD speed and new product performance. Therefore, firms undertaking innovation in NPD with limited resources can consider this component of CPE as a priority.

Secondly, our findings suggest that managers who lead NPD teams or projects should take actions to increase the engagement of CPE, which would improve NPD speed and result in high new product performance. Because NPD speed is a critical mediator, we suggest that firms build an integrated innovation system to facilitate full communication among three components of CPE and across different departments as well. For example, within an energetic and productive NPD department, employees should communicate regularly on innovation viewpoints so that building a regular exchange mechanism would help reach a consensus on NPD innovation solutions efficiently and effectively. Simultaneously, full communication and coordination among different departments (e.g., R&D, manufacturing and marketing) would speed up the entire NPD process to help firms achieve high new product performance.

Finally, our results show that LEC is valuable in enhancing the links of NPD speed and two components of CPE. When employees are actively involved in identifying innovation problems or searching/encoding information to resolve such innovation issues, we suggest top management help increase NPD speed by assuring the important value of innovativeness, articulating and sharing a culture embracing innovation, encouraging employees to think beyond the scripted patterns, and providing assistance or resources devoted to creativity processes.

5.4. Limitations and future research directions

We note several limitations of the present study. First, we based our analysis on perceptual data. Future research introducing objective measures is suggested (e.g., secondary data for new product performance). Second, the data used in this study were mainly collected from eastern China, which may cause sample bias on the results. Because the economic development of eastern China is better than other regions of China, future studies may choose data from other China regions to test the theoretical model. Similarly, to ensure the generalizability of our findings beyond the Chinese context to other developing countries, additional research is needed in other countries with different institutional environments.

Apart from the necessary improvements in the measurement process, some other lines of further research can be suggested. First, it could be interesting to investigate the mediating effect of other variables such as product quality or customer satisfaction (Rodriguez-Pinto, Carbonell, & Rodriguez-Escudero, 2011; Stock, 2011). Second, empirical evidence suggests that other firm-specific factors such as organizational structures and capabilities (Heirati & O'Cass, 2016; Yu, Hao, Ahlstrom, Si, & Liang, 2014) can serve as new moderators affecting the organization's utilization of CPE.

5.5. Conclusions

This study aims to investigate the processes underlying the relationship between creativity processes and new product performance in the setting of firms from emerging markets. We examine and find that CPE's three components (PI, ISE, and IG) are not equally associated with new product performance. The mediating role of NPD speed is confirmed between CPE and new product performance. Accordingly, firms should take actions to increase CPE, which would improve (not hinder) NPD speed and result in high new product performance. Finally, this study identifies the boundary condition under which the link between CPE and NPD speed enhances. Specifically, leadership encouragement of employees' engagement with the process of creativity to enhance NPD speed is not constant across the components of CPE.

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