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The moderated mediating effect of international diversification, technological capability, and market orientation on emerging market firms' new product performance

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ABSTRACT

This study proposes a moderated mediating framework to describe the relationships among international diversification, technological capability, market orientation and emerging market multinational enterprises' new product performance. Within this framework, emerging market multinational enterprises' technological capabilities mediate the impact of internationalization on new product performance. This mediating effect is more salient for firms entering more developed markets than those entering less developed markets. Analysis of a sample of Chinese multinationals' internationalization process supports these relationships.

1. Introduction

Studies of international diversification and organizational learning have suggested that international diversification enhances product innovation by exposing a firm to diverse customer requirements (Matarazzo & Resciniti, 2013; Zahra, Ireland, & Hitt, 2000). Notably absent in the literature is a basic but puzzling question: Does international diversification relate to new product performance through technological capability? This question has received little attention, perhaps because scholars investigating the topic have mainly focused on multinational enterprises (MNEs) from developed markets and assumed that all MNEs possess strong technological capabilities and can develop new solutions to satisfy different customer requirements (Petison, Thongthou, & Lekmoung, 2012). But recent studies have questioned this assumption because they have found many MNEs from emerging markets (EMNEs) have technological capability which is actually weak compared with their counterparts from developed markets (Piperopoulos, Wu, & Wang, 2017; Wu & Park, 2017). In order to satisfy diverse requirements of international customers and succeed in global markets, EMNEs need an ability to develop new products that solve those customers problems. So academic and practical considerations call for an explanation of how EMNEs international diversification relates to their technological capabilities and innovation performance.

A second problem relates to the relationships among international diversification, technological capability, innovation performance and market orientation. Market orientation in this context refers the state of economic development of the markets to which an EMNE orients its products. Some, for example, aim to serve highly-developed markets while others aim at less developed markets. Such orientation is important for two reasons. First, different market orientations usually have different requirements for product configuration and different customer needs. Customers in less-developed markets tend to prefer inexpensive products with acceptable quality, whereas customers in developed markets have higher expectations and will pay higher prices (Byeong-Joon, 2006; Ozer & Dayan, 2015). Different markets also have different levels of infrastructure development. More-developed markets have better infrastructure for developing technology (e.g., high-speed Internet) which less-developed markets tend to lack. Such differences imply that the relationship between international diversification and technological innovation may be more salient for serving more-developed markets.

This study aims to address these questions. Drawing on a conjunction of the international diversification and organizational learning perspectives, this study proposes a moderated mediation model to explain the complex relationships among EMNEs international diversification, technological capability, market orientation and innovation performance. The hypothesis is that international diversification improves an EMNEs innovation performance by promoting organizational

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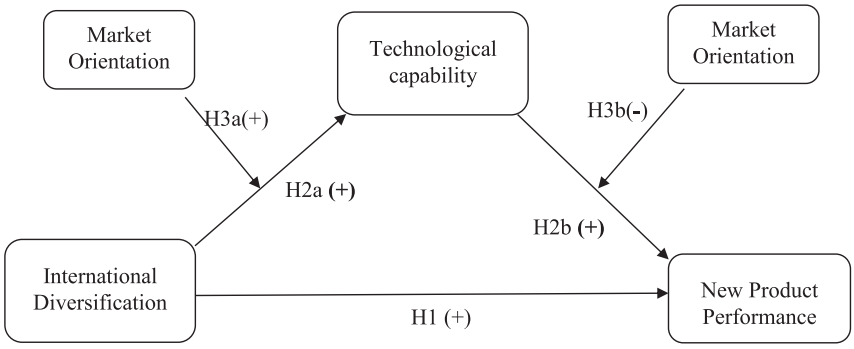

Fig. 1. The research model.

learning and that strong technological capability enhances this process, which leads to better new product performance. The EMNEs market orientation further moderates this process. That is, the impact of technological capability on the relationship between international diversification and innovation performance is more salient when an EMNE orients itself towards more-developed markets, and is less salient when less-developed markets are an EMNE's target, as illustrated in Fig. 1.

This study will contribute to the existing literature in several aspects. First, this study is one of the few studies that have tried to analyze the complex relationships among international diversification, technological capability, market orientation, and EMNEs new product performance. Second, even fewer studies have explored these complex relationships for EMNEs within an integrated framework. This study addresses this limitation by exploring the existence of a moderated mediating relationship explaining the interplay of EMNEs international diversification, technological capability, and market orientation in promoting new product performance. Specifically, the hypothesis is that international diversification helps EMNEs strengthen their technological capability, which improves their innovation performance. Technological capability thus mediates the relationship between international diversification and EMNEs innovation performance. Moreover, this relationship is contingent on an EMNEs market orientation. The mediating effect of technological capability is more salient for firms aiming more-developed markets.

This study tests these relationships using data from Chinese MNEs. In recent decades, Chinese firms have been very active in expanding globally (Buckley et al., 2007) seeking to acquire advanced technology and management skills (Child & Rodrigues, 2005; Ma, Lee, & Chen, 2009). Different Chinese firms have adopted different market orientations, some towards highly-developed markets and others towards developing economies. These characteristics make Chinese MNEs particularly suitable for testing the hypothesized relationships.

2. Theoretical development and hypotheses

2.1. Conceptual framework

International diversification refers to the extent to which a firm expands to multiple foreign countries with diverse market environments (Wu & Park, 2017). New product performance refers to the performance achieved by any novel product, service, or production process that departs significantly from prior product, service, or production process architectures (Calantone, Di Benedetto, & Rubera, 2012, 2018; McKinley, Latham, & Braun, 2014). While scholarly work on international diversification has generally concluded that international diversification can promote new product performance (e.g., Hitt, Hoskisson, & Kim, 1997; Zahra et al., 2000), relatively few studies have devoted to identifying the underlying mechanisms explaining how international diversification affects new product performance for firms from recently-industrialized emerging economies.

Research has shown that building technological capability is central to the success of new product development and introduction in international markets (Hitt et al., 1997), especially for EMNEs aiming to gain access to new technology (Luo & Tung, 2007). Insights from the organizational learning theory suggest that international diversification effectively promotes an EMNE's technological capabilities, which in turn has a positive effect on their new product performance. The organizational learning theory also suggests that market choice has important implications for EMNEs' organizational learning. Successful capability-building depends on the characteristics of foreign markets. More-developed markets provide more learning opportunities for technology acquisition, but such learning opportunities are less abundant in less-developed foreign markets (Wu, 2013). Thus this study proposes that EMNEs' market orientation moderates the mediating effect of technological capability on the relationship between international diversification and new product performance.

2.2. International diversification and new product performance

Operating in diverse environments exposes a firm to a variety of knowledge and ideas and adds new elements to its knowledge pool, strengthening its knowledge base, and its repertoire of technology (Barkema & Vermeulen, 1998; Hitt et al., 1997). New product development requires diverse inputs. International diversification provides access to new and diverse ideas from a variety of market and cultural perspectives (Hitt et al., 1997: 774). Katila (2002) and March (1991) have expressed similar opinions. Walsh (1995), Carlile (2004) and Smith, Collins, and Clark (2005) have suggested that experience in a variety of environments tends to equip managers with different ways of doing things, and that diversity enriches a firm's knowledge structure, which can transform into specific product designs. This is especially true for EMNEs that expand internationally, which often aim at seeking knowledge, advanced proprietary technology, immobile strategic assets, and other technological capabilities (Buckley et al., 2007).

Operating in diverse environments also helps an EMNE become more aware of new opportunities in its foreign markets. Exposure to and direct involvement with customers with distinct requirements in multiple countries is an important means of “learning by doing”, which can promote a deeper understanding of the market and industry and can thus induce the development of new applications for existing technologies (Barkema & Vermeulen, 1998; Zahra et al., 2000). Exposure to customers in multiple countries can further trigger the redevelopment of old concepts that have been shelved in the industry, often for a long time (Katila, 2002: 1000). Therefore, exposure to diverse market environments and customers can enhance new product development, and consequently, EMNEs' international diversification positively affects their new product performance.

Hypothesis 1. EMNEs international diversification positively affects their new product performance.

2.3. The mediating role of technological capability

This study contends that technological capability mediates the relationship between EMNEs' international diversification and product innovation for two reasons. First, international diversification exposes EMNEs to a broader array of new, dissimilar requirements from diverse markets, and thus EMNEs need strong technological capabilities to go beyond organizational limits and develop new products and novel solutions to better satisfy market needs. Strong technological capability can accelerate product development and help resolve conflicts among multiple technical requirements (Brown & Eisenhardt, 1995). Moreover, strong technological capability, coupled with a robust product design process, leads to high-quality new products. Fast product development and robust product design are likely to generate better new product performance (Eisenhardt & Tabrizi, 1995). Furthermore, because introducing new products requires a moderate to high level of conceptual design, product design, and testing process, strong technological capability can also help introduce new product features faster, often ahead of competitors (Clark, 1989). Technological capability thus should positively relate with new product performance.

Second, international diversification can stimulate EMNEs to develop new technological (and other) capabilities to address diverse market demands. These new capabilities should help these EMNEs more readily recognize new market opportunities, identify new demand trends, and experiment with new products in foreign markets (Barkema & Vermeulen, 1998), which promotes new product development (Wu, Wang, Hong, Piperopoulos, & Zhuo, 2016) and strong technical capabilities. Along with superior management skills, which can help a firm achieve superior performance (Rothaermel & Alexandre, 2009), strong technology enables a firm to better understand the value of new technologies, assimilate them, and apply them to commercial ends (Cohen & Levinthal, 1990). In addition, developing strong technological capabilities normally requires substantial commitment of capital and human resources (Dierickx & Cool, 1989). International expansion provides EMNEs greater opportunities to achieve optimal economic scale and amortize investments in developing technology (Caves, 2007; Hitt et al., 1997). Kotabe, Srinivasan, and Aulakh (2002) have also suggested that international diversification is very useful for EMNEs seeking to exploit new technology.

Hypothesis 2. An EMNEs technological capability mediates the relationship between international diversification and new product performance such that: (a) international diversification positively affects the EMNEs technological capability, and (b) technological capability positively affects the EMNE's new product performance.

2.4. The moderating role of market orientation

Market orientation refers to an EMNE's efforts to concentrate its resources, energy, and attention on a subset of key markets (Bergen & Peteraf, 2002). Doing so helps an EMNE to segment a complex competitive landscape and concentrate on the most promising segments. In the context of international competition, an EMNE will often categorize its foreign markets into two subsets: markets that are economically better-developed than its home country and those that are economically less-developed (Cuervo-Cazurra & Genc, 2008). Market orientation would have important implications for the mediating effect of an EMNE's technology capability in the relationship between international diversification and product innovation (Yoo & Frankwick, 2012). Aiming towards highly-developed markets exposes an EMNE to stronger competitors, resulting in a greater risk of failure. But strong competitors are also more effective in motivating an EMNE to acquire new technology and skills (Abrahamson & Fombrun, 1994). In contrast, an EMNE addressing less-developed markets often faces weaker competitors and a relatively benign market environment, a situation with less risk of failure, but also less incentive to develop better technology and less exposure to emerging opportunities and threats. Focusing on markets economically more developed than the home market exposes an EMNE to advanced technology and new ideas that are unavailable in the home market. That exposure should help the firm develop strong technological capabilities of its own (Berry, 2006; Hoskisson, Kim, White, & Tihanyi, 2004; Luo & Tung, 2007; Makino, Lau, & Yeh, 2002), but the EMNE will need to fight head-to-head against strong competitors in those foreign markets, which of course is more risky and often less profitable.

An EMNE focusing on more benign markets that are economically less-developed than its home market may forego many of these advantages. Competitors in less-developed countries tend to have weak technology and to be poor innovators (Makino et al., 2002). EMNEs focusing on competitors from less-developed countries thus encounter only limited technological challenges, which reduce their incentive to invest in R&D and develop their technological abilities (Buckley et al., 2007). Exploiting a technological advantage in such less-developed markets can yield easy economic success, but with less incentive to develop new technology that transcends the specific setting, resulting in blind spots or holes in an EMNE's knowledge structure (Barkema & Vermeulen, 1998). Such narrowness can hurt an EMNE in the long run if competitive conditions change (Miller & Chen, 1996). Singh (2007) has argued that MNEs entering less-developed countries may be less likely to explore the technology that local firms exploit because they conceive of themselves as possessing comparatively better firm-specific advantages than local firms. In contrast, when competing in more developed foreign markets, firms are more likely to develop strong technological capabilities through learning from their competitors. Therefore,

Hypothesis 3a. EMNEs market orientation will moderate the relationship between international diversification and technological capability such that the relationship will be stronger for EMNEs oriented towards more-developed markets.

While EMNEs may acquire new technology through international diversification, they may still find themselves less competitive in developed markets than their counterparts from the developed economy, which are often more socially connected in their home markets (Luo & Tung, 2007; Makino et al., 2002). The competition and their rivals superior technology may pose a great challenge for a new EMNE entrant to successfully launch new products in those markets (Bradley, McMullen, Artz, & Simiyu, 2012; Keupp, Friesike, & von Zedtwiz, 2012). As a result, even given similar level of technological capability, EMNEs that have expanded into developed markets are less likely to succeed in introducing new products than EMNEs that have expanded into less-developed markets. An EMNEs market orientation thus moderates the impact of its technological capability on its new product performance.

Hypothesis 3b. EMNEs market orientation will moderate the relationship between technological capability and new product performance such that the relationship will be weaker for EMNEs oriented towards more-developed markets.

Taken together, these proposed relationships suggest that market orientation moderates the mediating effect of technological capability on the relationship between international diversification and new product performance. In other words, the major target markets an EMNE chooses to expand into may affect the role of technological capability in influencing new product success in the process of international diversification. A moderated mediation model thus is more appropriate for explaining the dynamic process of EMNEs efforts in international expansion in order to achieve better performance in the global markets.

Hypothesis 4. A moderated mediation model exists for EMNEs international expansion in the global markets wherein EMNEs market orientation moderates the mediating effect of technological capability in the relationship between international diversification and new product performance.

3. Data and methods

3.1. Data

This study uses data from a large survey jointly conducted by the World Bank and China's National Bureau of Statistics in 2002. The survey covers 1500 firms from five cities in developed and less-developed areas of China.[1] Experts select 300 firms from each city with the aim of obtaining a representative sample stratified by city, industry, and size. The surveyed firms come rough evenly from northern and southern China, and from inland and coastal areas. The proportion of firms belonging to different industrial categories is roughly equal; with small, medium-sized, and large firms include n the survey in each area and industry.

Scholars competent in both languages and with substantial research experience prepare the questionnaire in English and translate the questionnaire into Chinese. Before the formal survey, the CEO or general manager of each company receives a letter of introduction explaining the purpose of the study and inviting participation. The survey experts then phone these executives within two weeks to encourage their participation in the study and to make appointments for onsite interviews. This method ensures access to the right respondents, confirms the correct use and understanding of the terms, and thus helps obtain high response rates (Wu et al., 2016). A survey supervisor checks each completed questionnaire immediately after the respondents complete the questionnaire to determine whether the participants have filled out the questionnaire in accordance with the instructions. Survey supervisors verify all questionnaires before data entry (the World Bank, 2003).

The survey comprises two separate questionnaires answered by two different groups of respondents. The surveyed firms' accountants or personnel managers complete one questionnaire which provides basic profile information such as ownership and revenue, R&D expenditure, marketing activities and labor force size. Senior line managers (e.g., the head of manufacturing unit or a general manager) complete the other one, which provides information on new product performance outcomes and other items. The sample covers ten industry sectors, including five manufacturing sectors – consumer products, electronic components, electronic equipment, vehicles and vehicle parts, and apparel and leather goods – and five service sectors – accounting, advertising and marketing, business logistics, communications, and information technology. Because manufacturing and service industries exhibit different innovation patterns (Sirilli & Evangelista, 1998), this study uses the data from manufacturing firms only.

After deleting manufacturing sector surveys with missing observations, the final sample comprises 727 firms. Of the 727 firms, about half (53%) are of medium size with 100–1000 employees. About 37% have been in business between 5 and 10 years, with another 29% aged between 10 and 30 years and 21% older. Just 13% are aged < 5 years. About 20% of the firms are from the apparel and leather goods industry, 17.5% in consumer products, 20% in electronic components, 19% in electronic equipment, and 23% in the vehicle and vehicle parts industry. About 22% are from Beijing, 23% from Chengdu, 16% from Guangzhou, 20.5% from Shanghai, and 17.5% from Tianjin. In all, 80% of the firms have at least some overseas sales during the surveyed period.

[1] Five cities are Beijing, Chengdu, Guangzhou, Shanghai and Tianjin

To assess the possibility of heteroscedasticity (i.e., whether pooling data across industries and cities would be appropriate), this study conducts Whites generalized test on the collected cross-sectional data (Bowen & Wiersema, 1999). The Breusch-Pagan test statistics reveals no heteroscedasticity concerns ($\chi^2 = 17.91$, $p = 0.41$). This study also plots the estimated residuals against the independent variables and finds no systematic patterns of heteroscedasticity (Wooldridge, 2009). This study also creates dummy variables representing industries and cities to model coefficient variations to further alleviate any concern about possible heteroscedasticity associated with pooling the data (Greene, 1994). To forestall common method bias, this study uses different sources to collect different types of information. For example, information on each country's economic profile is from the International Country Risk Guide 1999, whereas information about new product performance is obtained from the World Bank survey.

3.2. Measures

3.2.1. New product performance

This study uses new product sales to assess new product performance. New product sales are an important indicator because they represent the realized commercial significance of a firm's innovative activities (Katila, 2002: 996). Previous studies have shown that new product sales increase market share and market value (Chaney & Devinney, 1992), improve overall firm performance (Roberts, 1999), and increase a firm's chance of survival (Banbury & Mitchell, 1995).

3.2.2. International diversification (ID)

International diversification usually refers to expansion across national or regional borders into different geographic locations, or markets (Ghoshal, 1987; Leontiades, 1986; Prahalad & Doz, 1987). Thus, an EMNEs level of international diversification often manifests itself in the number of different markets in which the firm operates and their importance to the firm. Empirically, the percentage of total sales obtained in each market indicates the importance of each market. While previous research has used several measures to assess international diversification, the most common has been a unidimensional measure of international sales as a percentage of total sales – the percentage of foreign sales over total sales (Aulakh, Kotabe, & Teegen, 2000; Hitt et al., 1997; Zahra et al., 2000). Some scholars have proposed multidimensional measures (Sullivan, 1994), but that has received little support from other scholars (Ramaswamy, Kroeck, & Renforth, 1996). This study employs an entropy approach to quantify international diversification using international sales as a percentage of total sales. Based on the information about each sampled firms most important overseas markets, this study groups those markets by region: Asia, Europe, Oceania, North America, Latin America, and Africa. The entropy measure of international diversification used in this study is $ID = \sum_{i=1}^{6} [P_i \times \ln(1/P_i)]$, where P_i is a firms sales in the i^{th} regions markets as a proportion of its total sales, $\ln(1/P_i)$ is a weight given to the i^{th} region market, and i indexes the regions. As Hitt et al. (1997) have pointed out, this measure considers both the number of regions in which a firm operates and the relative importance of each to its total sales.

3.2.3. Technological capability (TC)

Quantifying technological abilities is inherently challenging. Previous studies have used a firms total patents granted to measure its technology capability (e.g., Ahuja, 2000; Hagedoorn & Schakenraad, 1994; Henderson & Cockburn, 1994; Ma & Lee, 2008; Rothaermel & Alexandre, 2009; Stuart, 2000) for three reasons. First, because patent count reflects not only a firm's technical ability to produce novel solutions but also its success in combining existing technologies to develop new ones. Also, previous studies have found that patent count data are correlated with citation-weighted patents across a wide range of manufacturing industries (Hagedoorn & Cloodt, 2003; Stuart, 2000).

As such, either patent count or citation-weighted patent reasonably taps into the same theoretical construct as indicators of technological capability (Rothaermel & Alexandre, 2009). Third, patent count data are also highly correlated with other indicators of technology capability including technology licensing to other firms (Hagedoorn & Cloodt, 2003). This study therefore measures a firms technological capabilities using the total number of patents assigned to the firm by the China Patent Office during the three-year time period between 1998 and 2000.

3.2.4. Market orientation

This study measures market orientation in several steps. First of all, this study traces each EMNEs foreign sales to their corresponding foreign markets, resulting in a list of 74 foreign markets. Second, this study classifies foreign markets as more- or less-developed than Chinas market based on GDP, for which the International Country Risk Guide provides information about GDP per capita and real GDP annual growth for each of the 74 countries (Anonymous, 1999). This study normalizes those data to range between 0 and 1 by dividing each value by the highest value of that indicator (e.g., GDP per capita), and uses the average of the two national ratios as a composite economic indicator for that country. Then this study matches the indicators for the selected 74 countries with the cross-sectional data in the analysis. Table 1 shows that 40 of the countries involved are economically more developed than China in 1999 (Chinas index is 0.710), and 34 countries are economically less developed.

Table 1
More and less developed foreign markets.

More-developed markets		Less-developed markets	
Economies	Average index	Economies	Average index
Argentina	0.760	Albania	0.597
Australia	0.823	Bangladesh	0.597
Austria	0.840	Bolivia	0.607
Belgium	0.883	Brazil	0.680
Canada	0.837	Bulgaria	0.650
Chile	0.730	Cuba	0.650
Cyprus	0.787	Czech	0.670
Denmark	0.887	Dominican	0.670
Finland	0.940	Ecuador	0.520
France	0.873	Egypt	0.650
Germany	0.843	Ethiopia	0.58
Holland	0.890	Guinea	0.623
Hong Kong	0.953	India	0.607
Hungary	0.733	Indonesia	0.620
Iran	0.773	Jordan	0.647
Ireland	0.930	Kenya	0.567
Israel	0.790	Mali	0.550
Italy	0.833	Mongolia	0.540
Japan	0.793	Myanmar	0.693
Korea	0.870	Nigeria	0.647
Kuwait	0.870	North Korea	0.283
Libya	0.753	Pakistan	0.597
Malaysia	0.790	Peru	0.680
Mexico	0.711	Philippines	0.653
New Zealand	0.823	Poland	0.687
Norway	0.930	Russia	0.670
Panama	0.747	Sri Lanka	0.583
Saudi Arabia	0.807	Sudan	0.593
Singapore	0.980	Tunisia	0.690
Slovenia	0.713	Turkey	0.590
South Africa	0.711	Uganda	0.610
Spain	0.820	Ukraine	0.613
Sweden	0.933	Venezuela	0.707
Switzerland	0.900	Vietnam	0.693
Syria	0.770		
Taiwan	0.850		
Thailand	0.710		
UAE	0.910		
U.K.	0.847		
U.S.A.	0.830		

Note: Categories based on economic indices extracted from the International Country Risk Guide (Anonymous, 1999) with the categories defined relative to China's economic development index at 0.710.

Third, this study aggregates an EMNEs foreign sales across all foreign markets to arrive at its total foreign sales, and aggregates its foreign sales from different markets to arrive its foreign sales derived from more-developed markets and from less developed markets, respectively. This study then calculates the percentages of each firms foreign sales derived from more-developed markets over its total foreign sales and the percentages of each firm's foreign sales derived from less-developed markets over its total foreign sales. If an EMNE derives 75% or more of its foreign sales from more developed foreign markets[2] (Aulakh et al., 2000), its market orientation is towards more-developed markets. Similarly, if an EMNE derives 75% or more of its foreign sales from less-developed foreign markets, its market orientation is towards less-developed markets.

3.2.5. Control variables

This study controls for the effect of several variables that may influence overseas new product performance. Foreign ownership is one control variable, because a foreign owner may actively engage in the management of the focal firm and help the firm identify useful knowledge and information in overseas markets which promotes new product performance (Lyles & Salk, 1996). This study measures foreign ownership using the aggregate percentage stake in each firm owned by foreign firms, foreign individuals, foreign institutional investors, or foreign banks. R&D collaboration with domestic universities and research institutes (R&D collaboration) is a second control variable because such collaboration should usually provide access to external knowledge useful for new product performance (Powell, Koput, & Smith-Doerr, 1996). This measure is a dummy variable coded as “1” if a firm has a contractual or long-standing relationship with either a local university or a government research institute and “0” otherwise. A firms prior year performance, assessed as the return on sales (ROS) in the previous year, is another control variable to control for differences in firms financial resources for investment in new product development. Fourth, because large firms have more resources to devote to new products (Piperopoulos et al., 2017), firm size, measured as the logarithm of the number of employees, is another control variable. Prior studies show that firm age has influence on new product performance (e.g., Sorensen & Stuart, 2000), so firm age is another control variable. This study also controls for whether or not a firm is publically listed (1 = yes; 0 = no), as private firms often lack access to capital markets (Bai, Liu, Lu, Song, & Zhang, 2004). In addition, because the sample includes firms from five manufacturing industries with different levels of technological intensity, this study includes an industry dummy variable, ranged from 1 (low-tech sector) to 3 (medium-tech sector) to 5 (high-tech sector). Location is another dummy variable to control for location effects (See Appendix A for the measurement variables and the data sources).

3.3. Statistical modeling

The theoretical framework proposed in this study predicts that international diversification positively affects new product performance, and technological capability mediates this positive relationship. The effect of international diversification on technological capability depends on market orientation, and the effect of technological capability on new product performance also depends on market orientation. This model suggests evaluating a first and second stage moderation model (Edwards & Lambert, 2007). Specifically, this process takes the form of

[2] This study also experiments alternative cutoff points like 80%, 70%, as well as 60%. The results adopting these alternatives are qualitative consistent with the results adopting 75%.

two statistical equations as:

$$M = i_M + a_{1i}X + a_{2i}W + a_{3i}XW + a_jC_j + e_{Mi} \quad (1)$$

$$Y = i_Y + c_1'X + b_{1i}M_i + b_2W + b_{3i}WM_i + b_kC_k + e_Y \quad (2)$$

where M refers to technology capability (TC), Y refers to new product sales (NPS), X refers to international diversification (ID), W refers to market orientation (MO) and C refers to a vector of control variables. The direct effect of X on Y is unmoderated and captured by c_1' in Eq. (2). The indirect effect of X on Y involves the product of two conditional effects: one representing the effect of X on M, and a second representing the effect of M on Y (please refer to Appendix B for the statistical diagram). The conditional effect of X on M, from Eq. (1), is $(a_{1i} + a_{3i}W)$ and the conditional effect of M on Y is from Eq. (2) as $b_1 + b_2W$. So the conditional indirect effect of X on Y through M is $(a_{1i} + a_{3i}W)(b_{1i} + b_{3i}W)$.

Using a path analysis similar to the approach described by Edwards and Lambert (2007), Hayes (2013) develops a versatile program "PROCESS" for estimating moderated mediation models. The program invokes powerful bootstrapping methods to test the statistical significance of the indirect effects in moderated mediation models. This study uses the PROCESS (Version 21) software in its analyses.

4. Results

Table 2 reports the descriptive statistics for the variables. A review of the correlations among independent variables suggests that multicollinearity is not a major concern. The analysis of a variance of inflation (VIF) confirms this conclusion.[3]

As noted above, this study uses PROCESS to estimate the proposed relationships. Following prior studies (Hayes, 2013; Ozer, 2011), this study calculates the significance of the indirect effects by boostrapping 1000 samples and computes confidence intervals for the moderated mediation model. Tables 3 and 4 report the regression coefficients of the estimated results. Hypothesis 1 predicts that an EMNE's international diversification positively relates to its new product performance. In Tables 3 and 4, the first-stage simple coefficient relating international diversification with technological capability is 16.83 ($p \leq 0.001$), and the direct effect of international diversification on new product sales is 3.67 ($p \leq 0.05$), indicating that international diversification has a positive and significant impact on new product performance, in support of Hypothesis 1.

Hypothesis 2 predicts a mediating effect of technological capability on the relationship between international diversification and new product performance. After substituting Eq. (1) for technology capability into Eq. (2), this study calculates the indirect effects of international diversification on new product sales separately for firms oriented towards developed markets and firms oriented towards less-developed markets. As Table 4 shows, the conditional indirect effects of international diversification on new product sales is positive and significant ($\beta = 34.61$ for more-developed market orientation and $\beta = 27.24$ for less-developed market orientation, respectively). Both the lower and upper bounds of the confidence interval are positive (LLCI = 18.58 and ULCI = 35.93 for the low level of market orientation and LLCI = 25.89 and ULCI = 42.84 for the high level of market orientation). Taken together, these results suggest that the mediating effects of technological capability on the relationship between international diversification and new product performance are not equal to zero and that a significant mediating effect of technological capability exists in the international diversification-new product performance relationship. These results provide support for Hypothesis 2.

Hypothesis 3a predicts a positive moderating effect of market orientation on the relationship between international diversification and technological capability, while Hypothesis 3b predicts a negative moderating effect of market orientation on the relationship between technological capability and new product performance. The regression results for models with market orientation as a moderator at the first and second stage are in Table 3. In the left-hand side of the model the dependent variable is technological capability (TC), and in the right-hand side of the model the dependent variable is new product sales (NPS). As shown in the left-hand side of the model, the coefficient of the interaction of international diversification and market orientation is positive and significant ($\beta = 5.35$, $p \leq 0.05$), indicating that the effect of international diversification on technological capability will be stronger for EMNEs oriented towards developed markets. This result supports Hypothesis 3a.

On the other hand, Hypothesis 3b predicts a negative moderating

[3] The complete correlation table including all the variables and variance inflation factors is available on request.

Table 2
Means, standard deviations, and correlation matrix.

	Variables	Mean	S.D.	1	2	3	4
1	New product sales (%)	6.05	11.01	1.00			
2	International diversification	0.18	0.40	0.27*	1.00		
3	Technological capability	0.98	1.48	0.12*	0.13*	1.00	
4	Market orientation	0.57	0.45	0.26*	0.48*	0.17*	1.00

* Indicates the level of significance at the $p \leq 0.05$ (two-tailed).

Table 3
Coefficient estimates for the moderated mediation model.

Variable	First stage (dependent variable = TC)			Second stage (dependent variable = NPS)		
	a	SE	*t*	*b*	SE	*t*
ID	16.83	1.58	10.67**	3.67	1.60	2.29*
TC				1.83	0.04	51.89***
MO	−1.16	0.89	−1.30	−1.31	0.84	−1.56
ID × MO	5.35	3.17	1.69*			
TC × MO				−0.14	0.07	−2.10*
F		17.18			370.69	
d.f.		8			9	
Prob. > *F*		0.00			0.00	
Adjusted R^2		0.16			0.82	

Note: $N = 731$. NPS = New product sales; ID = International diversification; TC = Technological capability; MO = Market orientation; SE = Standard error. Significant level:
* $p \leq 0.05$.
** $p \leq 0.01$.
*** $p \leq 0.001$ (two-tailed).

Table 4
Direct and indirect relationships between ID and NPS.

Direct effect of ID on NPS

Effect	SE	*t*	*p*	LLCI	ULCI
3.67	1.6	2.29	0.023	0.52	6.82

Conditional indirect effects of ID on NPS at values of MO

Mediator	MO	Effect	Boot SE	Boot LLCI	Boot ULCI
TC	0	27.24	4.29	18.58	35.93
TC	1	34.61	4.26	25.89	42.84

Note. N = 731. NPS = New product sales; ID = International diversification; TC = Technology capability; MO = Market orientation; SE = Standard error; LLCI = Lower level of confidence interval; ULCI = Upper level of confidence interval.

effect of market orientation on the relationship between international diversification and technological capability. In the right-hand-side model, the coefficient of the interaction of technological capability and market orientation is negative and significant ($\beta = -0.14$, $p \leq 0.05$), indicating that the effect of technological capability on new product sales will be weaker for EMNEs oriented towards developed markets. Hence, this result supports Hypothesis 3b. Together, the results reported in Tables 3 and 4 indicate that a moderated mediation model explains the interplay among international diversification, technology capability, new product performance, and market orientation, which supports Hypothesis 4.

5. Discussion and conclusions

Building on the conjunction between the organizational learning theory and the international diversification literature, this study develops a moderated mediation model to explain the complex relationships among EMNEs international diversification, technological capability, market orientation, and new product sales. The results show that EMNEs technological capability accumulated over the process of international diversification mediates the relationship between international diversification and new product performance. Moreover, the effect of international diversification on technological capabilities is stronger for EMNEs aiming to compete in developed markets.

5.1. Theoretical implications

This study offer a new and integrated theoretical framework to examine the interplay of international diversification, technological capability, market orientation, and new product performance for emerging market multinationals. While a number of studies have examined these issues from different perspectives (Atuahene-Gima, 2005; Li & Atuahene-Gima, 2001; Ozer, 2011; Wu et al., 2016), relatively few have explored them in one framework, even less so on multinational firms from emerging markets. Using the organizational learning theory, this study proposes that exposure to new customer needs and new competitors in the global market when engaging in international diversification will trigger organizational learning of new technical skills and thus enhance their technology capability. The continuously acquired technological capability in the process of international diversification can help improve firms new product performance. This study thus argues that EMNEs international diversification should have a positive impact on their new product performance in the global market and their technological capabilities mediate this relationship. Furthermore, these firms overseas market orientation moderates this mediating effect: Focusing on developed foreign markets amplifies the technological learning benefits of international diversification but weakens the benefits of any newly-acquired technology in terms of new product performance. The empirical results are consistent with these theoretical arguments, so this model has provided new insights. The enriched theory and the empirical evidence together suggest that the relationship between international diversification, technological capability, market orientation, and new product performance is less straightforward than previously conceived. This study may be among the first to theoretically argue and empirically substantiate the complex relationships among international diversification, technology capability, market orientation, and new product success.

The findings in this study also contribute to the ongoing debate about the impact of international diversification on new product performance. Past research has debated on proposed positive and negative effects of international diversification on new product performance, resulting in mixed and sometimes contradictory results (Hitt et al., 1997; Smith, 2014). This study adopts an organizational learning perspective to identify the underlying mechanism that links international diversification to new product performance, and argues that international diversification promotes organizational learning and the development of stronger technological abilities. The learning process helps firms to better recognize the value of new technologies in foreign markets and further assimilate and apply the technology in new product developments in their international expansion. Consistent with these theoretical arguments, the results empirically demonstrate that international diversification has a positive effect on technological capability and new product sales. Better technology improves new product sales even if the effect is not direct. These findings provide empirical evidence for the critical role of technology in EMNEs international diversification and new product performance.

The findings also offer a better understanding of the impact of an EMNEs market orientation (i.e., focus on economically more or less developed countries than their home countries) in shaping the impact of international diversification and technology capability on new product performance. Firms focusing on foreign markets that are more developed than their home market tend to learn better technology, and that helps them absorb advanced technologies and new ideas in foreign markets, which benefits their technology capability building. In contrast, firms focusing on less-developed markets can enjoy economic success in a comfortable environment, but they may have less incentive or few opportunities to update their technological capability. In other words, market orientation actually moderates the relationship between international diversification and technological capability. But EMNEs expanding into developed markets are less likely to perform well in new product performance than EMNEs expanding into less-developed markets. The results show that the positive effect of international diversification on technological capability is stronger for firms with a focus on developed markets, but the positive impact of technology on new product performance is weaker for firms with a focus on developed markets. The differential interaction effects pinpoint the important moderating role of market orientation in the relationship between international diversification and technological capability, and the relationship between technological capability and new product performance.

5.2. Managerial implications

The intriguing results in this study create a dilemma facing international managers: the findings of this study support international managers efforts to diversify business internationally into more developed markets to learn more advanced technology but the learned technology may not necessarily convert into better new product performance in those markets. As a result, international managers have to face a tradeoff: whether they should focus on more developed markets to foster technological learning in order to enhance their capability or they should avoid these markets in order to obtain better new product performance? More research has to explore this question and to compare the benefits brought by multinational firms' choice in choosing target markets.[4]

Moreover, this study probably is one of the first empirical studies that explicitly test the relationship between international diversification, technology capability, market orientation, and new product performance from EMNEs. Previous studies have largely focused on multinational enterprises from developed economies (DMNEs) and suggested that DMNEs tend to exploit their technological advantages in less-developed markets (Hitt et al., 1997; Luo & Tung, 2007; Makino et al., 2002; Rothaermel & Alexandre, 2009). The different effects of international diversification on technology capability and new product performance between EMNEs and DMNEs may come from the differences in their distinct motivations behind international expansion. As Hitt and colleague have noted (Hitt et al., 1997), one of key incentives for DMNEs international diversification is to appropriate returns from large investments in research and development. In contrast, EMNEs

[4] The authors are grateful to an anonymous reviewer for this idea.

international diversification is to learn advanced proprietary technology in an effort to enhance their technological capability and promote new product performance. International diversification helps an EMNE to gradually build up its technological capabilities, and the enhanced technological capability further enables them to swiftly capture new technological opportunities and more quickly respond to shifting market demands by developing and introducing new products. Such learning benefits become more attractive for EMNEs as they develop stronger technological capability, especially when they choose more developed markets as their main target.

In addition, EMNE managers need to pay more attention to how their firms' technological capabilities contribute to new product performance derived from international diversification. To gain the maximum benefit from international diversification, firms should develop strong technological capabilities, which can promote more organizational learning from international diversity and lead to better new product performance. The positive moderating effect of market orientation on the relationship between international diversification and technological capability sends a message to managers that firms are more likely to benefit from international diversification if they focus on more developed markets. The negative moderating effect of market orientation on the relationship between technological capability and new product performance also suggests that EMNEs may not be able to leverage the technology they learn in foreign markets in introducing new products to more developed markets. Instead, they should try to introduce new products to less-developed markets, exploiting the technological capability they acquire from more developed countries in order to reap more new product performance benefits.

Many emerging markets (e.g., China and India) have created preferential policies to encourage their firms to participate in the global market. This study provides empirical support for such policies by showing that exposure to diverse international markets can significantly facilitate emerging market firms' new product performance. The results also suggest that policy-makers in developed markets should endeavor to improve the efficiency of their home markets to attract more foreign firms, especially those from less-developed markets, in order to help them gain more benefits from participating in the global market.

5.3. Limitations and future research directions

This study has some limitations which may well suggest interesting avenues for future research. First, this study tests the hypothesized relationships using data with a one-year lag. Future research should tackle the dynamics of international diversification, technological advantage, market orientation, and new product performance with a longitudinal study. Second, the sample is from one country. Further research should validate the applicability of the theory and test the relationships examined in this study in other international contexts. Although the processes observed in China appear to be similar to those in other emerging markets, scholars still need to test the model using data from firms in other emerging and developed markets to obtain greater generalizability (; Pucci, Casprini, Guercini, & Zanni, 2017). This replication is especially important given the heterogeneity of emerging and developed markets, as different levels of economic development will presumably affect how firms benefit from innovation through organizational learning from their market environment.

In addition, this study uses patent count, a variable often used to assess firm innovativeness, as an indicator of technology capability, which is another limitation. While scholars have not reached a consensus on what is the most appropriate measure for technological capability accumulated during the process of international expansion (Di Benedetto, 2013; Zhang & Di Benedetto, 2010), using patent count as a proxy for technology is certainly facing challenges. Future research should explore different measures, including composite measures to assess technological capability in order to validate and generalize these findings.

The results of this study also lead to some exciting questions for future research. Future research could examine how international diversification promotes other organizational capabilities such as marketing skill, managerial ability and operating capabilities. All should in turn affect new product performance. And rather than focus on new product sales, future research could also examine other aspects of new product performance such as new product quality and innovativeness of new product development process.

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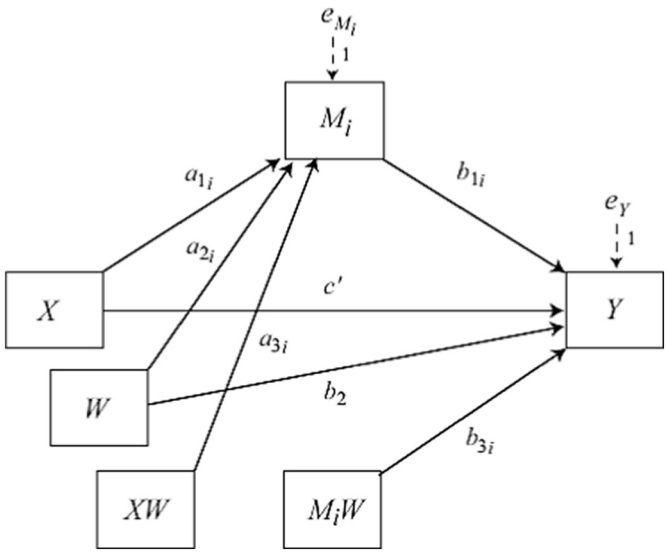
Appendix A. Variable definitions and data sources

Variable	Measure	Sources
New product sales	Total value of sales accounted for by new products successfully launched	Katila, 2002
Firm age	The number of years since the firm's establishment	Sorensen & Stuart, 2000
Firm size	The logarithm of the number of employees	Piperopoulos et al., 2017
Public listing	Whether the firm is a publically-listed company	Bai et al., 2004
R&D collaboration	Whether a firm had a contractual or long-standing relationship with either a local university or a government research institute	Hagedoorn & Cloodt, 2003;
Foreign ownership	The overall percentage of foreign ownership including foreign individuals, foreign institutional investors, foreign firms, and foreign banks	Wu et al., 2016
International diversification	An entropy approach to the unidimensional measurement of international diversification	Hitt et al., 1997
Technology capability	The total number of patents granted	Rothaermel & Alexandre, 2009
Market orientation	The extent to which a firm's foreign sales are from markets more-developed or less-developed than China's market	Tsang & Yip, 2007; Aulakh et al., 2000

Appendix B. A statistical diagram of the theoretical framework



Source: Hayes (2013). Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach. The Guilford Press: New York, NY.

(1) Direct effect of X on Y = C'.

(2) Indirect effect of X on Y through $M_i = (a_{1i} + a_{3i}W)(b_{1i} + b_{3i}W)$

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