



Effective sense-and-respond strategies: Mediating roles of exploratory and exploitative innovation

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ABSTRACT

Integrating the dynamic capabilities view of the firm with ambidexterity theory, this article proposes a sense-and-respond performance framework, in which technology- and market-sensing capabilities drive explorative and exploitative innovation activities, which then determine firm performance in an emerging market. With a sample of 150 Vietnamese firms, this study shows that exploratory and exploitative innovations are salient *modi operandi* through which the effects of technology-sensing and market-sensing capabilities affect firm performance. No performance-related empirical evidence supports the proposed complementarity between exploratory innovation and exploitative innovation. Instead, the findings imply that a firm's ability to compete in a complex market depends on its possession of adaptive capabilities.

1. Introduction

A single, permanent, competitive advantage likely is unattainable today (McGrath, 2013). Instead, if they hope to grow, firms must generate recurring competitive advantages that culminate in their sustained marketplace leadership. Such advantages depend on efficient systems of resource appropriation that can reconfigure and renew continually (Day, 2014), to enable the firm to capitalize on its unique, valuable capabilities (Wernerfelt, 1984). Marketing capabilities built on market-based assets and resources (Srivastava, Shervani, & Fahey, 1998) are among the most important drivers of firm performance (Takata, 2016); they also can transform into dynamic marketing capabilities. This latter category refers to resources that help shape the environment by enabling the firm to sense and respond to changes, which it does by recombining its resources (Day, 2011), exhibiting its innovativeness, and generating complex effects for firm performance (Menguc & Auh, 2006). The resulting adaptive capabilities support the firm's efforts to understand and adjust rapidly to dynamic markets (Day, 2014).

Firm innovativeness refers to a “firm's capacity to engage in innovation through the introduction of new processes, products, or ideas” (Hult, Hurley, & Knight, 2004, p. 429). It entails both exploitative and exploratory innovation. Exploitative innovation leverages current capabilities to develop products and services to serve existing customers better; exploratory innovation identifies new customers through the use

of disruptive or new technologies (He & Wong, 2004). Both types are important to firm performance, but “ambidextrous firms” that can integrate them, rather than trade off between the two activities, may achieve the best market performance (O'Reilly & Tushman, 2008). Firms that focus more on exploitative innovations often find themselves disrupted by new entrants; firms that only pursue explorative innovation may fail to leverage their existing capabilities. Therefore, combining the two activities may produce an optimal balance. The direct effects of marketing capabilities such as technology and market sensing on firm performance are relatively well understood (e.g., Narver, Slater, & MacLachlan, 2004; Slater & Narver, 1995), but the mediating roles of explorative and exploitative innovation and the impact that marketing capabilities may have on their efficacy have not been studied before.

Most research in this stream also refers to stable economies, usually observed in developed markets. However, increasing numbers of firms are seeking growth opportunities in emerging markets (Eyring, Johnson, & Nair, 2011). An emerging market is a product of an emerging economy, which refers to a country that is experiencing rapid economic development, with government policies that support economic liberalization and a free market system (Arnold & Quelch, 1998). Emerging markets are highly dynamic and heterogeneous (Hoskisson, Eden, Lau, & Wright, 2000), and they create distinct competitive landscapes that require different tools for successful navigation compared with those in developed economies. For example, emerging markets are

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characterized by turbulence and high levels of competitive intensity (Kim & Atuahene-Gima, 2010). The consumer populations are large, diverse, and heavily fragmented, due to idiosyncratic, localized consumption patterns (Dawar & Chattopadhyay, 2002). The intensity of emerging markets requires incumbents to develop innovations consistently while still offering high price-to-performance ratios (Agnihotri, 2015). In addition, enhanced competition forces firms to innovate in their customer service (Freeman, Edwards, & Schroder, 2006) and leverage their marketing assets to support customer relationships (e.g., Gupta, Malhotra, Czinkota, & Foroudi, 2016). The speed and innovation required to compete in emerging markets requires a shift from reactive “make-and-sell” strategies to adaptive “sense-and-respond” strategies that can continuously identify and act on emerging trends (Jayachandran, Hewett, & Kaufman, 2004). That is, competing firms must adjust their strategies to match emerging contexts (Subramaniam & Hewett, 2004) and create market offerings that reflect the alignment of their competences with local needs (Meyer & Tran, 2006). These conditions raise important questions related to the influence of marketing capabilities, and market- and technology-sensing capabilities in particular, on a company's explorative and exploitative innovations: how do explorative and exploitative innovations, linked to the extent of firm ambidexterity, affect firm performance? The present study extends prior research considering the performance of firms in emerging markets, which offer unplanned opportunities to the firm and also demand agility and adaptability.

Effective sense-and-respond strategies are critical for firms operating in global contexts, and their applications are essential components of business success (Drucker & Macriariello, 2008). However, little guidance for implementing such strategies is available; this area is underresearched, with very few scholars having examined technology- or market-sensing capabilities (e.g., Ngo & O’Cass, 2012). Fewer still explore integrated frameworks of complementary adaptive processes that might assist firms in anticipating and responding to rapid market shifts and nonlinear disruptions (Day, 2011, 2014). None has done so in the important context of emerging markets. Yet a better understanding of how to develop adaptive capabilities to balance exploration and exploitation is increasingly urgent, as managers struggle to compete (Srinivasan, Lilien, & Rangaswamy, 2002). Accordingly, we examine the extent to which technology- and market-sensing capabilities directly and indirectly, through their impact on the success of exploratory and exploitative innovations, contribute to firm performance in emerging markets. In addition, we seek insights into firm adaptive capabilities, in the form of a balance between explorative and exploitative innovation activities, and their impact on firm performance. As our major contribution, we propose an integrated framework that outlines the process by which firm capabilities affect firm performance. Leveraging the dynamic capabilities view of the firm and ambidexterity theory, we propose that developing effective sense-and-respond strategies requires specific configurations of sense-and-respond capabilities. After we establish the theoretical foundations for the research hypotheses, we provide a description of the data collection process in an emerging market. We then present the results, with a discussion of the findings and research limitations, and conclude with some further research directions.

2. Conceptual model and hypotheses

Innovation is a main driver of firm success (Sharma, Davcik, & Pillai, 2016). The success and survival of a firm depend on its ability to exploit its current capabilities while searching for new competencies (Raisch, Birkinshaw, Probst, & Tushman, 2009). Exploitative activities that leverage current capabilities yield incremental innovations; radical innovations or breakthroughs usually reflect the explorative activities of the firm. Although prior literature points to an inherent tension between exploitation and exploration, firms that are able to balance these two activities effectively are ambidextrous (Andriopoulos & Lewis,

2009). Organizational ambidexterity has received considerable attention, due to its importance to firm success. However, we do not have a clear sense of how firm marketing capabilities might help support both exploitative and explorative activities. Firm capabilities, and by extension marketing capabilities, are responsible for performance variance among firms. Marketing strategy literature further specifies that it is dynamic marketing capabilities that determine firm performance (Morgan, 2012; Vorhies, Morgan, & Autry, 2009). Day (2011, p. 187) suggests “two dimensions for thinking about capabilities: whether the orientation is from inside-out or the outside-in and whether the function is primarily to exploit existing resources or to explore new possibilities.” Capabilities enable a firm to be adaptive (Teece, 2007). Advocates of the dynamic capabilities view of the firm suggest that to stay in synch with market changes, firms require dynamic capabilities that can create, extend, or modify the existing resource base (Teece, 2007; Teece, Pisano, & Shuen, 1997). Dynamic capabilities may be considered a category of resources that enable the activation of adaptive processes that can help firms balance valuable, rare, inimitable, and non-substitutable resources (Barney, 1991) that are exploitative in function. However, the dynamic capabilities view of the firm is traditionally myopic in its inside-out approach (Day, 2011, 2014). In the context of sense-and-respond competencies, new classes of adaptive capabilities need to be created that facilitate an outside-in orientation to encourage and support balanced exploration and exploitation efforts (Day, 2011).

In an operational setting characterized by rapid technological change and complex market pressures, developing technology-sensing and market-sensing capabilities is an initial step in narrowing the gap between environmental changes and organizational capacity. A firm requires technology-sensing capabilities to identify technological opportunities proactively, then must link them with effective market-sensing capabilities to generate market insights about customers, competitors, and channel members (Morgan, Slotegraaf, & Vorhies, 2009; Srinivasan et al., 2002). This study advances prior theoretical contributions by examining the extent to which technology-sensing and market-sensing capabilities align with explorative and exploitative innovation to enhance firm performance. In line with extant literature, the framework leverages the interface of ambidexterity and firm capabilities to explicate the mediating role of explorative and exploitative activities between firm marketing capabilities and firm performance (Fig. 1).

Emerging economies are characterized by relatively unstable political systems, legal frameworks, and market structures, which elevate the strategic challenges for firms (Agnihotri, 2015). Thus Zhou and Li (2010, p. 227) suggest that “firms armed with high adaptive capability effectively can cope with environmental changes and achieve superior performance.” That is, an organization's ability to acquire knowledge regarding new technology developments may be developed either internally or externally (Srinivasan et al., 2002). Technology sensing allows firms to be more technologically opportunistic and navigate the market with greater speed than competitors (Sarkees, 2011). The resulting advantages include heightened adaptability and a capacity to create valuable new technical solutions and differentiated products (Agnihotri, 2015). In this view, such a capability constitutes a unique

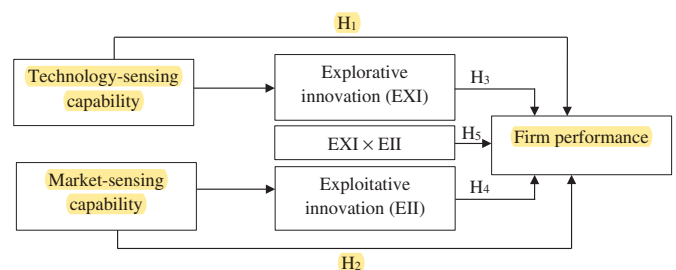


Fig. 1. Proposed conceptual framework.

competency of the firm that becomes difficult to imitate and thus generates a competitive advantage (Hamel & Prahalad, 1994). It is valuable further because it enables the firm to evolve (Teece et al., 1997) by learning and accumulating new skills that are conducive to its innovativeness (Tuominen, Rajala, & Möller, 2004) and enhances firm performance. Formally,

Hypothesis 1. *Technology-sensing capability has a positive effect on firm performance.*

Day (1994) argues that a firm's ability to learn about existing and future markets is crucial to its ability to respond effectively and in a timely manner. This important marketing capability, or market-sensing capability, reflects the firm's ability “to learn about customers, competitors, and channel members in order to continuously sense and act on events and trends in present and prospective markets” through processes that are “systematic, thoughtful, and anticipatory” (Day, 1994, p. 43). A superior market-sensing capability enables the firm to adapt its behavior to match market opportunities (Foley & Fahey, 2004). For example, a firm might identify and fulfill demand from underserved or unsatisfied market segments, improve its relationships with channel members, lower its average costs, better utilize its resources, or outperform its competitors (Day, 1994). Such market capabilities are essential for creating a competitive advantage (Kharabsheh, Jarrar, & Simenova, 2015). Empirical studies of market-sensing capabilities produce mixed results though (Morgan et al., 2009), so the need to understand their influences on firm performance in emerging markets remains pertinent. With the notion that market-sensing capability is a form of learning and a critical source of ongoing competitive advantage, the next hypothesis predicts an effect on firm performance.

Hypothesis 2. *Market-sensing capability has a positive effect on firm performance.*

Exploratory and exploitative types of innovation enable firms to realize the potential value of knowledge generated from technology- and market-sensing efforts; they have varied effects on firm performance (O'Cass, Heirati, & Ngo, 2014). However, firms' effective responses require appropriate configurations of their resources. Adaptive capability enables the dynamic capacity of firms to both identify and capitalize on market opportunities by appropriately configuring their resources (Tuominen et al., 2004). Evidence from successful firms suggests that technology is the main starting point, because it permits efficient technology and market sensing (i.e., outside-in orientation), on which firms capitalize by pursuing exploratory innovation, often in the form of a new product introduction or new market entry, as well as exploitative innovation, typically by introducing improved products, increasing economies of scale, and expanding services for existing customers (He & Wong, 2004; Jansen, Van Den Bosch, & Volberda, 2006). We thus argue that firms with high adaptive capabilities are likely to outperform those with low adaptive capabilities. Breakthroughs and radical innovations are often associated with explorative activities, for which both technology and technology sensing are important precursors, so we predict a link between technology-sensing capability and exploratory innovation. A firm's exploitative activities instead relate more to the introduction of incremental innovations, so we anticipate a pairing of the market-sensing capability with exploitative innovation, in the form of high adaptive capability. Exploratory innovation enables firms to deploy and capitalize on accumulated technological knowledge, because they are more likely to realize value creation through the effective leveraging of capabilities with value-creating potential (Sirmon, Hitt, & Ireland, 2007). Exploratory innovation is an essential leveraging process that facilitates the connection between technology-sensing capabilities and firm performance. Along similar lines, exploitative innovation typically aims to improve an existing product market position (He & Wong, 2004; Jansen et al., 2006) by capitalizing on accumulated market knowledge.

Exploitative innovation is an essential leveraging process that connects market-sensing capabilities to firm performance. To accomplish exploitative innovation activities, a firm must rely on the useful knowledge generated by its market-sensing capability. These exploitative innovation activities might entail improving on established designs or extending market offerings (Jansen et al., 2006). Accordingly,

Hypothesis 3. *Exploratory innovation mediates the relationship between technology-sensing capability and firm performance.*

Hypothesis 4. *Exploitative innovation mediates the relationship between market-sensing capability and firm performance.*

Adaptive processes in an organization also require balancing exploratory and exploitative innovation (Jansen et al., 2006), yet there is no clear consensus regarding whether exploratory and exploitative types of innovation are mutually beneficial for improving firm performance. For example, some researchers suggest that the unique bundling of heterogeneous resources and capabilities increases the complexity of organizational actions, which can improve firm performance (Atuahene-Gima, 2005), particularly in turbulent, competitive environments (Kriz, Voola, & Yuksel, 2014). However, firms are not uniformly capable of combining exploration and exploitation to achieve superior firm performance (He & Wong, 2004). Research suggests that there are many permutations of the exploration–exploitation interaction that may improve or impede firm performance, where excessive exploitative innovation may lead to a lack of future viability, or too much exploration may be costly due to uncertainty (March, 1991; O'Reilly & Tushman, 2013). Thus it seems that exploratory and exploitative innovation “thrive under different organizational conditions, which make the combination difficult” (Atuahene-Gima, 2005, p. 65). This tension has received increasing attention (Andriopoulos & Lewis, 2009). The current study thus contends that firms that can integrate these two activities outperform firms that are unable to manage the tension between them. Ambidextrous firms should achieve high levels of both explorative and exploitative activities, thereby enhancing their performance. The interaction of exploratory and exploitative activities, as a measure of their extents within the firm, can reveal the impact that the degree of integration of the two activities has on firm performance:

Hypothesis 5. *The interaction between exploratory innovation and exploitative innovation affects firm performance.*

3. Method

3.1. Setting and data collection

The research setting for this study is Vietnam, an emerging economy and one of the most rapidly growing economies in the Asia-Pacific region (Ngo & O'Cass, 2009), which consistently ranks as one of Asia's best investment destinations (Breu, Dobbs, & Remes, 2012). Vietnam joined the World Trade Organization in 2007 and has secured its foothold in international markets with the appeal of its strong labor force, plentiful natural resources, political stability, and a growing consumer market of > 90 million people. Upward mobility and consumer confidence also are increasing, such that price sensitivity is diminishing, and demand for sophisticated products is rising (Maruyama & Le, 2012). From a trade perspective, consumer changes and escalating competition signal that firms might consider shifting their focus from price only, to a broader perspective that features value-adding quality attributes designed to attract higher returns (JFK School of Government, 2008). Competitors in this emerging market system need to develop complementary capabilities that enable continuous innovation, as well as agility so that they can be adaptive and responsive to market needs. Hence, Vietnam presents an ideal setting for the present study.

Surveys were developed in English and double back-translated by

two marketing researchers competent in English and Vietnamese. The back-translated versions were compared to ensure conceptual equivalence. The sample comprised 500 firms listed in a Vietnamese business directory. A random sampling procedure was implemented, and a professional research agency was tasked with contacting key informants to request research participation and administer the interview. Due to the high context nature of Vietnamese culture, the onsite interview method offers an effective information exchange mode (Hofstede, 1980).

In total, 150 firms responded, yielding an effective participation rate of 30%. Of the responding firms, 49% were from manufacturing industries (e.g., electronics, garments, motor vehicles, plastics, food technology) and 51% from services industries (e.g., banking, retailing, real estate, IT). Moreover, 22% were state-owned firms, while 78% were not state owned (private and foreign-invested). In terms of their customers, 70% were business-to-business firms and 30% were business-to-consumer firms. Of the informants, 45% were from marketing and sales, and 55% were chief executive officers or general managers. The informants had a mean industry experience of 9.51 years and a mean firm experience of 7.71 years. A comparison of marketing managers and CEOs indicates no significant differences in terms of technology-sensing capabilities ($F = 0.63$; $p = 0.82$) or market-sensing capabilities ($F = 1.61$; $p = 1.15$). Thus, respondent bias is not a significant concern in this study.

3.2. Measurement instruments

Well-validated items, measured on seven-point Likert-type scales, served to operationalize the constructs. For example, *technology-sensing capability* was measured using Srinivasan et al.'s (2002) four-item scale, which assesses the extent to which a firm has acquired knowledge about and understands new technology developments that may affect its business. *Market-sensing capability* was measured using Morgan et al.'s (2009) five-item scale, related to the extent to which a firm has learned about customers, competitors, and channel members to sense and act on trends in the markets. *Exploratory innovation* was measured with an adapted version of He and Wong's (2004) scale to assess the extent to which a firm has engaged in technological innovation activities to enter new product–market domains. *Exploitative innovation* was measured using a six-item scale adapted from Jansen et al. (2006), which captures the extent to which a firm has implemented technological innovation activities to improve existing product–market positions. *Firm performance*, adapted from Li and Atuahene-Gima (2001), reflects the firm's return on sales, profit growth, return on assets, sales growth, market share growth, cash flow, and customer satisfaction, compared with its major competitors. An exploratory factor analysis prompted the removal of five items (one from market-sensing capability, one from exploratory innovation, and three from exploitative innovation). The hypotheses tests also controlled for the firm's size, industry, and ownership (state-owned/non–state-owned).

The check for possible common method bias relied on Harman's single-factor test (Harman, 1976). The test generated a four-factor solution (all eigenvalues higher than 1), accounting for approximately 70% of the total variance, and the first factor accounted for only 25% of the total variance. Thus, systematic variance in the study measures was not a concern. Furthermore, the application of the marker variable technique (Lindell & Whitney, 2001) used firm size as the marker variable, because it shows the lowest correlations with other variables in the data set ($r_m = 0.03$, $p = 0.76$). According to the comparison of an adjusted correlation matrix with an unadjusted correlation matrix, the mean change in the correlations of the key constructs ($r_u - r_a$) when partialling out the effect of r_m was 0.09, indicating no evidence of common method bias. Finally, all the correlations that were statistically significant before the adjustment remained significant (t -values from 3.56–9.13), so the results cannot be explained by common method variance.

Table 1
Measurement model results.

Constructs and manifest variables	Loading
Technology-sensing capability (TSC) AVE = 0.79, CR = 0.94 (adapted from Srinivasan et al., 2002)	
1. Being the first in our industry to detect technological developments that may potentially affect our business.	0.87
2. Seeking intelligence on technological changes in the environment that are likely to affect our business.	0.86
3. Being fast to detect changes in technologies that might affect our business.	0.91
4. Reviewing the key effect of changes in technology on our business.	0.89
Market-sensing capability (MSC) AVE = 0.70, CR = 0.90 (adapted from Morgan et al., 2009)	
1. Learning about customer needs and requirements.	0.82
2. Gaining insights about the channel.	0.85
3. Identifying and understanding market trends.	0.85
4. Learning about the broad market environment.	0.81
Exploratory innovation (EXI) AVE = 0.63, CR = 0.84 (adapted from He & Wong, 2004; Jansen et al., 2006)	
1. Introducing new generations of products	0.69
2. Opening up new markets	0.77
3. Entering new technology fields	0.88
Exploitative innovation (EII) AVE = 0.67, CR = 0.86 (adapted from He & Wong, 2004; Jansen et al., 2006)	
1. Introducing improved but existing products and services for our local market.	0.83
2. Increasing economies of scales in existing markets.	0.72
3. Expanding services for existing clients.	0.89
Firm performance (FP) AVE = 0.76, CR = 0.96 (adapted from Li & Atuahene-Gima, 2001)	
1. Return on sales	0.93
2. Profit growth	0.92
3. Return on assets	0.89
4. Sales growth	0.84
5. Market share growth	0.84
6. Cash flow from market operations	0.85
7. Customer satisfaction	0.75

Notes: AVE = average variance extracted; CR = composite reliability.

4. Analysis and results

4.1. Measure validation

All estimations in the proposed model were conducted using partial least squares structural equation modeling (PLS-SEM; Hair, Hult, Ringle, & Sarstedt, 2013), in Smart PLS3 (Ringle, Wende, & Becker, 2014). As in similar studies (e.g., Takata, 2016), we first estimate the proposed model in relation to the measurement model, to establish the validity and reliability of the constructs. Then we estimate the structural model to evaluate the hypothesized relationships empirically, as well as test the predictive ability of the proposed model.

A summary of the psychometric properties of the outer measurement models appears in Table 1. All factor loadings of the five constructs (ranging from 0.69–0.93) were greater than the minimum cutoff (Bagozzi & Yi, 2012). The composite reliabilities for the focal constructs (ranging from 0.84–0.96) exceeded the threshold of 0.7, indicating adequate convergent validity. The results also support the discriminant validity of the measures, according to Fornell and Larcker's (1981) method that compares the square root of the average variances extracted with all corresponding correlations (see Table 2). The diagnostic test of multicollinearity, based on the variance inflation factors (VIF) for the regression coefficients, reveals that the largest VIF in the model is 2.15, substantially less than the critical threshold of 10.0. Therefore, multicollinearity is not a concern for the conclusions derived from the parameter estimates.

Table 2
Descriptive statistics of the focal constructs.

Construct	1	2	3	4	5
1. Technology-sensing capability	0.89				
2. Market-sensing capability	0.66	0.84			
3. Exploratory innovation	0.40	0.48	0.79		
4. Exploitative innovation	0.53	0.54	0.61	0.82	
5. Firm performance	0.49	0.53	0.46	0.52	0.87
Mean	5.03	5.59	5.27	5.20	5.17
S.D.	1.17	0.87	1.02	1.12	0.98

Notes: all correlation coefficients are significant ($p < 0.01$); bold diagonal entries show the square roots of the average variances extracted.

4.2. Hypothesis testing

The first two hypotheses predict that technology-sensing and market-sensing capabilities have positive effects on firm performance. The results of the PLS analysis in Table 3 reveal that technology-sensing capability (Model 1, $\beta = 0.26, p < 0.05$) and market-sensing capability (Model 1, $\beta = 0.36, p < 0.01$) are significantly associated with firm performance, in support of H1 and H2. To test the mediating effects of exploratory innovation and exploitative innovation (H3 and H4), we followed the procedure recommended by Hair, Hult, Ringle, and Sarstedt (2016), then confirmed the results with Preacher and Hayes's (2008) method. In line with the prediction in H3 that exploratory innovation acts as a mediator of the relationship between technology-sensing capability and firm performance, Table 3 reveals that technology-sensing capability is positively associated with firm performance (Model 2, $\beta = 0.21, p < 0.05$) and exploratory innovation (Model 2, $\beta = 0.41, p < 0.01$). Exploratory innovation also is positively associated with firm performance (Model 2, $\beta = 0.27, p < 0.01$). The comparison of Models 1 and 2 reveals that the positive effect of technology-sensing capability on firm performance in Model 1 grows weaker in Model 2, after adding exploratory innovation. The difference in the R-square results between the two models is significant ($\Delta R^2 = 0.06, p < 0.01$). Hair et al. (2016) recommend calculating the variance accounted for (VAF) to determine the size of the indirect effect in relation to the total effect, which is 0.35. Therefore, 35% of the total effect of technology-sensing capability on firm performance is indirect, indicating partial mediation via exploratory innovation, in support of

H3.

The test for H4 adds exploitative innovation to Model 3 and then compares Models 3 and 2. As shown in Table 3, market-sensing capability is significantly associated with exploitative capability (Model 3, $\beta = 0.56, p < 0.01$), and exploitative capability is positively associated with firm performance (Model 3, $\beta = 0.22, p < 0.10$). The comparison reveals that the positive effect of market-sensing capability on firm performance in Model 2 is weaker in Model 3, after adding exploitative capability. The difference in the R-square value also is significant ($\Delta R^2 = 0.02, p < 0.01$). The VAF, to determine the size of the indirect effect in relation to the total effect, is 0.37, such that 37% of the total effect of market-sensing capability on firm performance is indirect, indicating partial mediation via exploitative innovation, as well as support for H4.

To confirm the mediating effects of exploratory and exploitative innovation, this study also used Preacher and Hayes's (2008) bootstrapping method with 10,000 bootstrapping samples. The 95% bootstrapping confidence intervals (CI) for the indirect effects of exploratory innovation (CI = 0.04, 0.21) and exploitative innovation (CI = 0.10, 0.33) do not include 0. Thus, this test confirms the mediating effects of exploratory innovation and exploitative innovation.

Next, regarding the complementary effects of explorative and exploitative innovation, Model 4 indicates that the interaction of explorative innovation and exploitative innovation is not significant (Model 4, $\beta = -0.04, t = 0.57$). A goodness-of-fit (GoF) index provides an assessment of the fit of the measurement and structural models, according to the geometric mean of the average communality and average R-square for the endogenous constructs (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). The calculated GoF is 0.37, which reflects a large effect size (Wetzels, Odekerken-Schroder, & Van Oppen, 2009) and thus the robust fit of the model to the data. To assess the predictive relevance of the model, the Stone-Geisser Q^2 coefficient (Geisser, 1974; Stone, 1974) provides an indication of how well the model predicts the data of omitted cases, with thresholds of 0.02, 0.15, and 0.35 for weak, moderate, and strong levels, respectively, of predictive relevance. The calculated Q^2 coefficient was 0.29, suggesting a medium level of predictive relevance.

5. Discussion, limitations, and further research

Emerging markets offer attractive opportunities for firm growth but

Table 3
Hypothesis testing: standardized path coefficients (t-values).

Independent variables	Model 1		Model 2		Model 3		Model 4		
	Firm performance	Exploratory innovation	Firm performance	Exploratory innovation	Exploitative innovation	Firm performance	Exploratory innovation	Exploitative innovation	Firm performance
Technology-sensing capability	0.26 ^b (2.52)	0.41 ^c (5.03)	0.21 ^b (2.09)	0.41 ^c (4.49)	–	0.16 ^a (1.73)	0.41 ^c (4.50)	–	0.15 ^a (1.72)
Market-sensing capability	0.36 ^c (4.28)	–	0.26 (2.73)	–	0.56 ^c (8.83)	0.21 ^b (2.33)	–	0.56 ^c (9.00)	0.22 ^b (2.38)
Explorative innovation (EXI)	–	–	0.27 ^c (3.59)	–	–	0.18 ^b (2.02)	–	–	0.16 ^a (1.84)
Exploitative innovation (EII)	–	–	–	–	–	0.22 ^a (1.94)	–	–	0.21 ^b (2.06)
EXI × EII	–	–	–	–	–	–	–	–	–0.04 (0.57)
Controls									
Firm size	–0.03 (0.46)	–	–0.03 (0.52)	–	–	–0.03 (0.57)	–	–	–0.04 (0.63)
Firm industry	–0.06 (0.81)	–	–0.03 (0.40)	–	–	–0.03 (0.45)	–	–	–0.03 (0.41)
Firm ownership	–0.03 (0.46)	–	–0.01 (0.19)	–	–	–0.01 (0.11)	–	–	0.00 (0.06)
R-square	0.32	0.17	0.38	0.17	0.32	0.40	0.17	0.32	0.40

^a $p < 0.10$.
^b $p < 0.05$.
^c $p < 0.01$.

also demand caveats, due to the challenges associated with the velocity and complexity of the marketing environment (Agnihotri, 2015). Such settings require a shift from the static capabilities that have dominated traditional marketing approaches (e.g., Vorhies & Morgan, 2005) to new methods of value creation (Day, 2011). To respond to the challenges associated with emerging markets, it is crucial that firms proactively shift their organizational emphasis toward developing new classes of adaptive capabilities that reflect an outside-in approach to technological and market intelligence, by exploiting existing resources or exploring new possibilities. In this context, the current study develops and empirically validates a theoretical model that integrates technology-sensing capabilities, market-sensing capabilities, exploratory innovation, and exploitative innovation to explain performance differentials across firms. The hypotheses and findings thus enrich extant literature in several ways.

First, the findings underscore the need to move beyond simplistic sense-and-respond models that focus on technology (Srinivasan et al., 2002) or customers (Jayachandran et al., 2004) to a more integrative theoretical framework that combines both technology- and market-sensing capabilities to achieve positive performance effects. In emerging markets, it is vital that firms differentiate themselves through their ability to sense and act on emerging trends.

Second, this study is the first to configure outside-in capabilities (i.e., technology- and market-sensing capabilities) relative to exploratory and exploitative functions (i.e., exploratory innovation and exploitative innovation). It shows that exploratory and exploitative innovations mediate the effects of technology- and market-sensing capabilities on firm performance, respectively. Extending prior research that has treated exploratory and exploitative innovations as the outcomes of new product development or antecedents of firm performance (e.g., He & Wong, 2004), we find that they are salient *modi operandi* through which the effects of technology-sensing and market-sensing capabilities get carried over to firm performance. The findings advance the dynamic capability view of the firm and empirically support prior arguments that a firm's ability to compete in markets in which positions of advantage form and erode rapidly (D'Aveni, 1994) requires the right adaptive capabilities (Day, 2011). Augmenting prior research on adaptive capabilities (e.g., Tuominen et al., 2004), this evidence provides a new theoretical mechanism through which technology- and market-sensing capabilities link to firm performance.

Third, marketing scholars have paid little attention to how the dynamic capabilities view of the firm couples with exploration–exploitation theory to suggest effective sense-and-respond strategies. By making this connection, the current research offers a paradigm to support the integration and extension of diverse literature (e.g., Palmatier, Dant, & Grewal, 2007). That is, we advance extant literature by integrating the dynamic capabilities view of the firm with exploration–exploitation theory to determine the extent to which technology-sensing and market-sensing capabilities align with explorative innovation and exploitative innovation to enhance firm performance. The findings stress that a firm's uniqueness is defined by its chosen resource and capability bundling, leveraged to achieve effective adaptation. At a time when marketers experience challenges in emerging markets, due to their complexities, such that traditional strategies are not effective (Day, 2011), this study provides insights that can help managers make better resource deployment decisions to leverage their firm's adaptive capabilities to improve firm performance.

Fourth, we find no empirical evidence to suggest performance implications of complementarity between exploratory and exploitative innovation. The uniqueness of our findings from Vietnam, an emerging market, contrast with evidence from studies conducted in developed market settings, which suggest that firms can achieve ambidexterity by embracing exploratory and exploitative innovation simultaneously (He & Wong, 2004; Jansen et al., 2006). This option does not hold for firms operating in the emerging economy of Vietnam. This finding echoes a review of literature on the ambidexterity–performance linkage

that acknowledges that “several studies report no effects for ambidexterity on performance ... and others find effects only under specific conditions” (O'Reilly & Tushman, 2013, p. 326). For managers, this important finding signals that an optimal balance between exploratory and exploitative innovation cannot be achieved using a simple formula. Instead, the endeavor requires careful thought and trade-offs with existing resources to transform sense-and-respond capabilities effectively into adaptive capabilities that enable the firm to reconfigure itself constantly and evolve to meet dynamic market challenges.

This study also has several limitations worth noting. Although we empirically examine alternative models with cross-sectional data, we cannot infer causal relationships from the reported findings. Further research should employ a longitudinal design to provide evidence of such causal linkages between adaptive capabilities and firm performance and to help capture the dynamics of adaptive capabilities and changes in firm performance. Another limitation of this study relates to the generalizability of the sampling, which was conducted in the specific national context of Vietnamese firms. Vietnam provides a unique context and has been described as an emerging leader in the Asia-Pacific context. In emerging and transitional economies that foster dramatic changes in both formal and informal institutions, social (e.g., political, business) ties often are important for business success (Sheng, Zhou, & Li, 2011). Further research should consider the contingent roles of political and business ties on the effect of exploratory innovation, exploitative innovation, and their complementary effects on firm performance. This suggestion is consistent with Junni, Sarala, Taras, and Tarba's (2013) call for a better understanding of the specific aspects of dynamism (i.e., fast pace of change, complexity, ambiguity, and unpredictability) and cross-industry contexts in ambidexterity research. Finally, additional research might examine the performance implications of other adaptive marketing capabilities, such as vigilant market learning, adaptive market experimentation, and open marketing and their role in facilitating ambidexterity (Day, 2014).

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