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Exploratory and exploitative innovation: the moderating role of partner geographic diversity

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ABSTRACT

The aim of this study is to explore the effect of exploratory and exploitative innovation separately and ambidexterity premise simultaneously relating to firms' innovation performance. To test these relationships, we applied a hierarchical linear regression analysis to a large sample of international organisations (by using the Community Innovation Survey [CIS] 2006 micro data). We show that the relationship between exploratory innovation and a firm's innovation performance is moderated by geographically different partners. We found that ambidexterity premise in innovation context undermines innovation performance.

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1. Introduction

Organisational scholars argued that the firm's ability to balance exploitation and exploration is crucial for long-term survival and competitive advantage (March, 1991). Although such an ambidextrous approach encompassing both exploration and exploitation activities were welcomed, research on the performance implications of organisational ambidexterity has yielded mixed results (Simsek, 2009). In the past, innovation was inevitably connected to both types of activities, exploratory and exploitive, with little attention given to their simultaneous effect (Greve, 2007). Therefore, a broader concept of innovation that includes synergistic effects of both types of activities is needed.

According to the seminal research made by James March (1991), firms need to opt toward balance between their exploration and exploitation activities to improve growth performance. March (1991) defines exploration activities as things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, and discovery, while exploitation activities include 'such things as refinement, choice, production, efficiency, selection, implementation, and execution' (p. 71). In other words, an ambidextrous view of innovation encompasses exploratory and exploitative innovations. However, achieving an

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ambidextrous approach (hereafter balance) between exploration and exploitation is not an easy task, because activities, exploration, and exploitation draw resources (Gupta, Smith, & Shalley, 2006; Levinthal & March, 1993; March, 1991; Tushman & O'Reilly, 1996). In other words, resource constraints require firms to choose whether and to what extent to emphasise exploitation innovations or exploration innovations, i.e., make trade-offs between them (Greve, 2007).

The notion that innovation is a key vehicle for competitive advantage is well accepted (Schumpeter, 1934). Previous studies argued that innovations can influence the ambidexterity-performance relationship (Benner & Tushman, 2003; He & Wong, 2004). Firms struggle to manage trade-offs between exploration and exploitation. As exploration and exploitation rests on different organisational routines and capabilities (Benner & Tushman, 2003; Lewin, Long, & Carroll, 1999), firms may specialise in one of them to efficiently perform a mixture of both (Greve, 2007). In technological innovations, if firms decide to heavily invest in exploitation of existing knowledge, i.e., by refining existing commercialisation of products and services, it can reduce the firms' possibility of exploring new knowledge development, i.e., development of new expertise and technology (Leonard-Barton, 1995; Levinthal & March, 1981; Tushman & Anderson, 1986). Then a question of balance emerged – is it possible? Another salient issue is how it affects performance. What is the relationship between the two dimensions of innovation and firms' innovation performance? Exploration innovation has uncertain and often long-term benefits, and exploitation innovation has more certain, often short-term benefits.

The concept of exploration–exploitation is scarce with respect to technological innovations and thus is needed. In past, exploration–exploitation was linked through mergers and acquisitions, alliances, and other strategic changes (Lavie & Rosenkopf, 2006), with little attention given to the innovations (Greve, 2007). Hence, empirically testing exploration–exploitation propositions using innovation data is another contribution of this article. In general, there is still modest evidence to support either the balancing or the specialisation hypothesis (Greve, 2007). Greve (2007) considered exploration innovation and exploitation innovation to be crucial for performance, but indicated that a balance between both innovation activities is possible but probably difficult to maintain.

Simsek (2009) proposed that organisational ambidexterity is influenced by different factors. The key vehicle for exploration innovation and exploitation innovation are alliance ties (Powell, Koput, & Smith-Doer, 1996). A key idea is that firms are embedded in the structure of their diverse relationships (Simsek, 2009). Simsek, Heavey, Veiga, and Souder (2009) specified diversity of the firm's network as an important influence on exploration–exploitation performance relationship. The widely accepted premise is that no firm is an island, and the need for resources and knowledge possessed by external actors – such as clients, suppliers, competitors, or consultants (Knoben & Oerlemans, 2012) – is necessary. Firms can derive complementary resources and knowledge that are not available within their own organisation, which can lead firms to various innovation advantages (Knoben & Oerlemans, 2012). Diversity holds as a major determinant of innovation (Capaldo & Petruzzelli, 2014). Previous research has focused on external partner diversity in terms of their geographical variety when examining their role on innovation performance (Knoben & Oerlemans, 2012; Oerlemans, Knoben, & Pretorius, 2013). It draws on extended resource-based view of firm (Lavie, 2006), in which it is argued that firms can acquire competitive advantages from resources acquired through different partners.

This article aims to investigate the following: first, we examine a separate effect of exploratory innovation and exploitative innovations on firms' innovation performance. In particular, we distinguish between exploration and exploitation in innovation context. In doing so, we considered exploration and exploitation as outcomes of innovation, and exploratory innovation is seen as synonymous with radical innovation, while exploitative innovation with incremental innovation (Li, Lin, & Chu, 2008). Greve (2007) proposed exploratory innovation as 'search for new knowledge, use of unfamiliar technologies, and creation of products with unknown demand', and exploitative innovation as 'use and refinement of existing knowledge, technologies, and products' (p. 2). In our study, we conceptualise exploration and exploitation through innovation in a similar way. In next step, we conceptualise the simultaneous effect of both types of innovation on firms' innovation performance. Second, we explore the nuanced effects of network partners in terms of their geographical composition. In the context of innovation, having more diverse partners (e.g., local and non-local) was shown to be critical to higher innovative outcomes (Knoben & Oerlemans, 2012). On the other hand, maintaining local partners, i.e., proximates, may lead to lock-in situations and lack of flexibility and openness toward distant knowledge sources, which could hinder innovation (Boschma, 2005). For exploratory innovation, more specialised, diverse partners are needed, and knowledge possessed by partners in local environment is less likely to have it (Knoben, 2009). Therefore, a worthwhile strategy would be maintaining a geographically diverse set of partners (Knoben, 2009). Finally, researchers (Lavie & Miller, 2008) propose that from a theoretical perspective, cross-cultural studies can advance a broader concept of exploration and exploitation through innovation context.

In this article, we make the following contributions. First, we explore how exploratory innovation and exploitative innovation separately impact firms' innovation performance. We also explore their simultaneous, i.e., ambidextrous, effect. In addition, we investigate the moderating role of geographically diverse collaboration partners in the relationship between exploratory innovation, exploitative innovation, and innovation performance.

2. Theoretical background and hypotheses

2.1. Exploratory, exploitative innovations and their interaction effect: performance implications

Based on previous literature, we classify innovations along two dimensions: (1) degree of novelty of new or existing technologies, products, and services that firms introduce *into market before their own competitors* (it may have already been available in other markets); and (2) degree of novelty of new or existing technologies, products, and services that firms introduce, but are *already available from competitors in firms' market*. Exploratory innovations are radical innovations because they are designed to meet the needs of new markets (Benner & Tushman, 2003; Danneels, 2002). For example, development of a distribution channel that is new to the market is a form of exploratory innovation (Abernathy & Clark, 1985). In turn, *exploitative innovations* are incremental innovations and designed to serve existing markets (Benner & Tushman, 2003). For instance, improving the efficiency of existing distribution channels is a form of exploitative innovations (Abernathy & Clark, 1985).

Exploratory innovations require development of new knowledge (Benner & Tushman, 2002; Levinthal & March, 1993). They enable firms to scan a variety of opportunities from the environment and create capabilities that are necessary for long-term survival and prosperity (Ireland, Hitt, & Sirmon, 2003; March, 1991; Uotila, Maula, Keil, & Zahra, 2009). Moreover, exploratory innovation transposes in new processes, products, or markets (Lumpkin & Dess, 1996). In turn, the goal of exploitative innovation is to build a firm's current competitive advantage by efficiently managing the firm's existing resources, skills, and capabilities to improve the designs of current products and services or to strengthen current customer relationships (Benner & Tushman, 2003; Lubatkin, Simsek, Ling, & Veiga, 2006; Sirén, Kohtamäki, & Kuckertz, 2012). They broaden existing firms' knowledge (Benner & Tushman, 2002; Levinthal & March, 1993). Li et al. (2008), found, for example, that both exploratory innovation and exploitative innovation have a positive effect on firm performance (while an ambidextrous approach has no significant effect on firm performance).

On the other hand, the original (March 1991) premise is that exploration and exploitation can be seen as a continuum, whereas periods of exploration and exploitation intertwine. Similarly, traditional technology life cycle theory (Abernathy & Utterback, 1978) argued that after stage of exploratory innovation, which generates potential higher returns characterised by radical innovations such as new product designs or distribution channels, comes post design stage where exploitative innovations characterised by incremental improvements may generate substantial performance benefits, for example, by reducing the cost and increasing efficiency (He & Wong, 2004). Therefore, a high or low level of exploratory innovation in one domain may be present with a high or low level of exploitive innovation in complementary domain. This theoretical mechanism is argued by Benner and Tushman (2003) and is thoroughly explained in following paragraph.

Although exploration–exploitation yields a trade-off situation where exploration innovation exhibits exploitation and performance may suffer, another stream of research claims that it is possible that firms have high levels of both exploratory innovation and exploitative innovation (Gupta et al., 2006). This view proposed that exploratory innovation and exploitative innovation can *complement* each other and that they are not necessary mutually antithetical. In particular, they may take places in complementary domains (e.g., technologies and markets), which do not necessarily compete for the same resources (Cao, Gedajlovic, & Zhang, 2009).

Therefore, innovation through exploitation can sustain its market share by introducing small refinements in products and services (Davila, Epstein, & Shelton, 2007). In particular, it introduces products and services that are *new to the firm*, but they are already available from other firms in the market. Thus, *exploitation innovation* complements the *technology domain*. On the contrary, exploratory innovation has the potential to rewrite the rules of games in the industry (Davila et al., 2007). By introducing products or services that are *new to the market* and thus enlarging markets by attracting new customers or developing new distribution channels (Markides & Charitou, 2004), the firm complements *market domain*. As organisational knowledge and resources can be leveraged across both exploratory and exploitative innovation (Cao et al., 2009), we hypothesise that they *complement each other* and lead to the firm's enhanced innovation performance. This led us to conclude that the individual effect of innovations may lead

to positive performance outcomes. Consequently, this study compares the level of the two distinct dimensions of innovation and their impact on firm performance. Thus, we propose the following:

Hypothesis 1a: *Exploratory innovation is positively related to a firm's innovation performance.*

Hypothesis 1b: *Exploitative innovation is positively related to a firm's innovation performance.*

March (1991) and Jansen, van den Bosch, and Volberda (2005) argue that firms' ability to be successful in the long-run depends on combining explorative and exploitative activities simultaneously to achieve ambidexterity. Studies (e.g., Gibson & Birkinshaw, 2004; He & Wong, 2004) provide support for such an ambidextrous premise. In particular, they argued that development of exploratory and exploitative innovation is needed and that interaction of both at same time leads to superior performance.

Prior studies argued that the ambidextrous approach is related to firm performance. However, the empirical results of these studies are contradictory. Some scholars have argued that these innovation activities do not necessarily guarantee performance and that the relationship between ambidexterity and performance is more complicated (Sirén et al., 2012). In particular, Venkatraman, Lee, and Iyer (2006) did not find empirical support for the ambidexterity-performance relationship. Similarly, Bierly and Daly (2007) found that ambidextrous firms did not lead to better performance. Li and Si (2008) also found that an ambidextrous firm has no significant effect on firm performance. By contrast, Cao et al. (2009) found that ambidextrous firms that balance exploratory and exploitative innovations are more successful. Similarly, He and Wong (2004) found that ambidextrous firms with a high degree of exploratory innovation and exploitative innovation resulted in higher sales growth. However, there are mixed empirical results and little direct empirical evidence on performance implications of organisational ambidexterity. The exception is He and Wong's (2004) research that empirically validates ambidexterity-performance relationship in the context of innovation. Thus, we aim to contribute to a more systematic understanding of the interplay between exploratory and exploitative innovations and their impact on firms' performance.

The main argument in March's (1991) seminal work is that exploration and exploitation are both beneficial for performance: exploration for the long-run and exploitation for the short-run. There is also a negative side to the performance implications of exploration and exploitation. The argument in organisation studies is that firms overly focused on exploration may never gain from the knowledge they create (Levinthal & March, 1993), which eventually will lead to a 'failure trap' and no performance benefits. Too much focus on exploratory innovation does not necessarily guarantee that a firm will eventually capitalise on the commercial potential of such innovations.

As Gibson and Birkinshaw (2004) claimed that some firms 'build tomorrow's business at the expense of today's,' in turn, too much focus on exploitative innovations can yield a 'success trap' (March, 1991) where firms can yield success in the short-term but will see a decrease in success over the long-term. Thus, if the firm over-focuses on exploitative innovation, it eventually will fall from a leader in technology to an obsolete enterprise (March, 1991). Consequently, if firms heavily focus on either exploratory or exploitative innovations, they might find success in the short-term but eventually experience a decrease in innovation performance over the long-term (Tushman & O'Reilly, 1996).

In summary, too much emphasis on one side of ambidexterity may hamper or decrease firm performance. March (1991, p. 4) argued, 'It is clear that a strategy of exploitation to the exclusion exploration is a route to obsolescence. It is equally clear that a strategy of exploration to the exclusion of exploitation is a route to elimination.' Therefore, a scenario where firms follow ambidextrous approach and balance exploratory and exploitive innovation is a path to superior performance and sustainability.

The benefits from cost effectiveness and flexibility, are to avoid organisational inertia, and ensure both current and future viability (Han & Celly, 2008; Levinthal & March, 1993; March, 1991). More specifically, a firm's ability to compete successfully in the long-run may be rooted in an ability to jointly pursue exploitation and exploration (Raisch & Birkinshaw, 2008). In line with these studies, ambidexterity is a critical organisational capability that drives organisational actions and performance. Thus, the above-proposed argument rests on the premise that firms that engage in sufficient exploitation and enough exploration (Levinthal & March, 1993) can exhibit superior performance. This argument, although not generally supported, has substantial theoretical and empirical support (Gibson & Birkinshaw, 2004; He & Wong, 2004). Therefore, we hypothesise along our theoretical arguments that joint pursuit of exploratory innovation and exploitive enhances firms' innovation performance.

Hypothesis 1c: *The interaction effect of exploratory and exploitive innovation is positively related to a firm's innovation performance.*

2.2. Partner geographic diversity and exploratory innovation

One of the first studies that tackled the portfolio diversity was provided by Jiang, Tao, and Santoro (2010), who provided the comprehensive portfolio partner diversity construct. The portfolio diversity concept consists of two elements: portfolio and diversity (de Leeuw, Lokshin, & Duysters, 2014). The first one can be defined as the set of alliances (Oerlemans et al., 2013), while the second element, diversity, refers to the distribution of differences in relation to an attribute 'X' (Harrison & Klein, 2007). Scholars have focused on different attributes such as size, age, geographical location, or partner type (Wuyts & Dutta, 2014). Partner geographic diversity can be generally defined as the degree to which a firm's partners are located in geographically diverse settings, where geographical differences are distinguished by the partner being local, national, or international (Terjesen, Pankaj, & Covin, 2011). Prior studies (Capaldo & Petruzzelli, 2014) suggest that high geographic distance between partners can provide the alliance with the heterogeneous knowledge resources needed for successful innovation.

Several studies have pointed out the contextual variable as a possible moderator of the relationship between exploratory innovation and its innovation performance – the portfolio partner diversity (defined in terms of alliance geographic diversity) (Lavie & Miller, 2008; Terjesen et al., 2011). Meyer-Krahmer and Reger (1999) showed that diversity with respect to geographical locations of partners can provide the focal firm with highly sophisticated, specialised, and partially tacit knowledge from local sources. For example, the existence of local, national, and international suppliers can allow firms to take advantage of location-based variations in raw material costs and quality, and thereby potentially strengthening

the ventures' abilities to hold down manufacturing costs and deliver consistently high-performing products (Terjesen et al., 2011).

Collaboration with geographically distant partners relaxes proximity constraints, enabling the firm to coordinate activities and allocate them to qualified partners that enjoy comparative advantage in certain domains (Porter, 1990), thus capitalising on differential skills and asset costs (Lavie & Miller, 2008). Geographically different partners can provide access to network resources that may spur innovation (Gulati, 1999). A firm that approaches partners in remote countries and is exposed to the needs of distinctive foreign markets can extend the scope of its accessible knowledge base (Lavie & Miller, 2008). Network resources that foreign partners offer can remove a firm from its own competency traps and stimulate innovations (Levinthal & March, 1993).

Having local, national, and international partners that are similar, i.e., less diverse in terms of business culture, economic development, or institutional factors, increases the focal firm's likelihood of leveraging its current knowledge (Danneels, 2008), which can be beneficial for incremental innovation. Thus, less geographically-diverse partners become an attractive solution to exploitative innovation. The potential benefit of less geographically-diverse partners is manifold, from reduced cost through standardisation and economies of scale to minimised risk between partners (Danneels, 2008).

Consequently, partners located in more diverse geographic locations are likely to have a negative influence on firms' innovation performance when the firms adopt an exploitative innovation. In contrast, firms that have exploratory innovation are willing to take a risk to acquire new knowledge and skills. For instance, a firm that is focused on more exploratory breakthroughs and acquires knowledge from its partners in order to create new products and technologies can harvest benefits of geographically diverse partners. Furthermore, innovation through exploration can give a firm an ability to cope with changing environments, open up new business opportunities, and thus produce new products that differ significantly from existing ones (Levinthal & March, 1993; March, 1991), which are important in order to harvest long-term gains. Moreover, exploration activities reduce the risk of becoming outdated by stimulating the development of new skills and capabilities (Leonard-Barton, 1992) or experimenting with different business opportunities which conversely lead to the introduction of new products of process for which partners located in diverse geographic locations can be useful sources. We posit that geographically diverse partners can enhance firms' innovation performance in terms of exploratory innovation. Hence, we propose:

Hypothesis 2: *The geographic diversity of partners moderates the relationship between exploratory innovation and the firms' innovative performance. The higher the partner's geographic diversity, the less negative the relationship.*

The proposed relationships are depicted in Figure 1.

3. Methods

To test our hypothesis, we developed a set of models and tested them with multiple hierarchical linear regression analyses. In the following we discuss our sample, and analytical procedure.

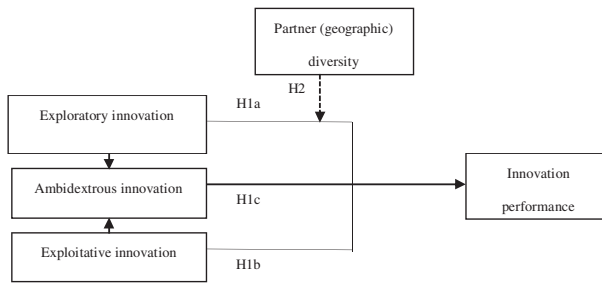


Figure 1. Moderating effect of partner diversity (geographic) and ambidextrous innovation.

3.1. Data

The hypotheses are tested with the Community Innovation Survey (CIS) 2006 micro data (company level). Eurostat CIS is a well-accepted innovation survey that provides data about the innovation behaviour of firms. The CIS questionnaire has been used and validated by different studies in different innovation management literature (Laursen & Salter, 2006; Leiponen & Helfat, 2010). In comparison with patent citation data, which are traditional, measures of innovation performance, CIS measures are constructed in such a way that respondents are asked about innovation activity and output of firm. In particular, CIS measure is constructed in a way that asks for information about amount of revenue, amount of innovation and their degree of novelty. In particular, CIS questionnaires also have questions about external partners and their geographical dispersion.

The data used for this survey covers the years 2004–2006. Data for the following countries was available: Bulgaria, Cyprus, the Czech Republic, Estonia, Norway, Portugal, Romania, the UK, Slovakia, Slovenia, Spain and Switzerland. Like most ambidexterity studies to date (He & Wong, 2004; Lubatkin et al., 2006; Tushman & O'Reilly, 1996), we frame our ambidexterity hypothesis in terms of technological innovation. The CIS database contains information on 15,251 firms. In this research, a subset of 2506 firms will be analysed. This subset has been created by selecting only firms that had introduced product innovation between 2004 and 2006. The CIS contain data concerning firms' innovation activities and engagement in collaborative technology development distinguished by geographical partner type (de Leeuw et al., 2014).

3.2. Measures

To measure constructs in our model, we adopted existing measure from the literature.

Exploratory Innovation and Exploitative Innovation. We differentiated between exploratory innovation and exploitative innovation, as it was case in several prior studies (Tushman & O'Reilly, 1996). Both dimensions of innovation were measured with one item. Item for exploratory innovations include firms new or significantly improved products and services that were *new-to-the-market*, while item for exploitative innovation include products and services that were only *new-to-the-firm*. A similar approach was used to analyse radical and incremental innovation in, e.g., Faems, Van Looy, and Debackere (2005), Laursen and Salter (2006), and Oerlemans et al. (2013).

Ambidexterity Innovation. We conceptualised ambidexterity innovation by multiplicative interaction between exploratory and exploitative innovation. From the CIS focal constructs exploratory innovation and exploitative innovation respectively were operationalised on the question: *Were any of your product innovations (goods or services) during the three years 2004 to 2006:*

- *New to your market?* Your enterprise introduced a new or significantly improved product onto your market before your competitors (it may have already been available in other markets), as *exploratory innovation*, and
- *Only new to your firm?* Your enterprise introduced a new or significantly improved product that was already available from your competitors in your market, as *exploitative innovation*.

This is similar approach already employed in ambidexterity literature (Cao et al., 2009; He & Wong, 2004). In order to mitigate the potential for multicollinearity we mean centered the exploration and exploitation scales before obtaining their product (Aiken & West, 1991).

Partner Geographic Diversity. The CIS data contains information about the types of partners and their geographical locations. We use a question from the CIS 2006 survey to distinguish if the firm had any co-operation arrangement on innovation activities with other enterprises or institutions during the period of three years (2004–2006). After responding regarding whether they had any or no innovation co-operation partnerships, they distinguish if they had it with one of the following actors: (1) other enterprises within their enterprise group; (2) suppliers; (3) clients or customers; (4) competitors; (5) consultants, commercial labs or private R&D institutes; (6) universities or other higher education institutes; and (7) government or public research institutes. Firms are further asked to indicate whether their partner was located either in their own home country or in the following geographical areas: *other EU countries, EFTA or EU candidate countries, the United States or other*. In line with Oerlemans et al. (2013), geographic diversity is calculated in several steps. Firstly, we merge the list of co-operative agreements by four geographical locations of the partners into two lists. This conceptualisation of partner diversity focuses on the differences in geographical scope, and not on the partner types. We distinguish between domestic co-operation and international co-operation. It is important to note that this measure is not indicating portfolio size. More diverse portfolios purely signal that a more diverse set of external actors possessing diverse knowledge sources are part of the ego network of the firm. This approach was also employed by de Leeuw et al. (2014).

Firms' Innovation Performance. To operationalise a firm's innovation performance, we follow the approach of the previous studies that have conceptualised this variable using the CIS data (Blindenbach-Driessen & Ende, 2014; Laursen & Salter, 2006). Innovation performance is operationalised with one combined measure through which firms are asked to indicate the percentage of the turnover introduced from 2004 to 2006 that is attributable to: (1) products and services, which are completely new to the firm; and (2) products and services that are new to the market.

Control Variables. We included several control variables in the analysis. One of them is firm size. It is calculated as the logarithm of the number of employees in 2006. We also included a count variable that measured the number of factors hampering the firm's innovation activities (resource constraints). These hampering factors to innovation were included as resource constraints in a recent work by de Leeuw et al. (2014) and as different

types of bottlenecks to innovation in Oerlemans et al. (2013). The ‘lack of quality personnel’ or the ‘lack of financial resources’ is one of the 11 possible hampering factors measured on a four-degree importance scale (high, medium, low and no effect). We used the same additive measure as Černe, Jaklič, and Škerlavaj (2013). We cannot compare firms from different industries, given that different industries have different possibilities to innovate. We control the differences between the four Statistical Classification of Economic Activities in the European Community sectors. Following Černe et al. (2013), we dummy coded the firms as batch manufacturing, manufacturing, construction and utilities, professional and financial service, and other services. The variable R&D intensity is calculated by dividing the R&D expenditures by the turnover (Blindenbach-Driessen & Ende, 2014). Finally, we included the use of codified external information sources, because these sources provide firms with external information and/or knowledge and can influence innovative performance (Oerlemans et al., 2013). Control variable is calculated by taking the ratio of the total score and the maximum possible score (de Leeuw et al., 2014).

4. Results

To examine the potential moderating effects of the partner diversity (i.e., geographic) on the relationship between exploratory innovation and innovation performance, we developed a set of models and tested them with multiple hierarchical linear regression analyses. In order to prevent any multicollinearity problems between the main effect variables and interaction effect variables, we have mean-centred the variables before calculating the interaction terms (Aiken & West, 1991). The descriptive statistics and inter-correlations of the variables that were used in the study are indicated in Table 1. Table 2 indicates the results of the moderated regression.

The base model (Model I) showed that firm size had a significant positive impact on the firm’s innovation performance. R&D intensity and resource constraints were also significant as a control variable. Neither industry (except financial services) nor the use of codified external information sources had a significant influence on the firm’s innovation performance for either the base model or any of the subsequent models proposed.

Model II included exploratory innovation and exploitative innovation. We predicted that exploratory innovation (Hypothesis 1a) and exploitative innovation (Hypothesis 1b) are positively related to firms’ innovation performance. The results (Table 2) showed that the beta coefficients were positive and statistically significant for both predictors, exploratory ($\beta = .24, p < .001$) and exploitative innovation ($\beta = .23, p < .001$). This provides full support to hypothesis 1a and to hypothesis 1b. In Model III, we find that ambidexterity innovation is negative but significant ($\beta = -.20, p < .001$). The ambidexterity perspective builds on the balance perspective and proposes that the greatest advantages of organisational ambidexterity are derived from maintaining high levels of both exploratory and exploitative innovation. This implies that maintaining high levels of both exploratory and exploitative innovation is not rewarding for firms’ innovation performance. Thus, hypothesis 1c is partially supported (see Figure 3).

In Model III, we also examined the effect of the interaction between exploratory innovation and partner diversity. The interaction effect was positive and significant ($\beta = .05, p < .05$). The above-mentioned effect on innovation performance is shown in Figure 2. For

Table 1. Means, standard deviations, and correlations.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1 Innovation performance	0.32	0.34											
2 Firm size (log)	0.81	0.79	-.10**										
3 Batch manufacturing	0.36	0.48	-.04**	.02									
4 Construction and utilities	0.04	0.20	-.05**	.10**	-.16**								
5 Other services	0.16	0.37	-.04*	-.05**	-.33**	-.09**							
6 Professional and financial services	0.21	0.41	.07**	-.08**	-.38**	-.11**	-.22**						
7 Resource constraints	12.78	7.05	.05**	-.04*	.05**	-.06**	-.07**	-.05**					
8 R&D intensity	0.20	2.08	.05**	-.06**	-.04*	-.01	.01	.05**	-.01				
9 Use of codified knowledge sources	0.46	0.20	.01	.10**	.01	-.01	-.01	.07**	.11**	.02			
10 Exploratory innovation	0.55	0.50	.20**	.00	-.02	-.05**	-.06**	.05**	.07**	.00	.13**		
11 Exploitative innovation	0.67	0.47	.17**	.06**	.05**	-.08**	-.03	-.01	-.05**	-.05**	.05**	-.19**	
12 Geographic partner diversity	0.17	0.29	.00	.19**	-.05**	-.02	-.01	.09**	-.02	.06**	.33**	.09**	.02

N = 2,506

***p* < .01.

**p* < .05.

Source: Authors' calculations.



Table 2. Moderation analyses for innovation performance as the explanatory mechanism.

Variables	Innovation performance											
	Model 1			Model 2			Model 3					
	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>b</i>	<i>SE</i>	β	<i>t</i>	<i>b</i>	<i>SE</i>	β	<i>t</i>
Firm size (log)	-.04**	.01	-.10	-4.72	-.05**	.01	-.11	-5.42	-.04**	.01	-.09	-4.68
Batch manufacturing	-.05*	.02	-.07	-2.56	-.04*	.02	-.05	-2.22	-.04*	.02	-.05	-2.15
Construction and utilities	-.08*	.04	-.05	-2.33	-.03	.03	-.02	-.79	-.02	.03	-.01	-.44
Other services	-.06**	.02	-.06	-2.62	-.03	.02	-.04	-1.60	-.02	.02	-.03	-1.18
Professional and financial services	.01	.02	.02	.65	.02	.02	.02	.85	.02	.02	.02	.82
Resource constraints	.00*	.00	.04	2.08	.00	.00	.02	1.07	.00	.00	.02	.84
R&D intensity	.01*	.00	.04	2.11	.01**	.00	.05	2.80	.01**	.00	.05	2.73
Use of codified knowledge sources	.03	.03	.02	.80	-.04	.03	-.02	-1.01	-.03	.03	-.02	-.77
Exploratory innovation					.16**	.01	.24	12.02	.21**	.02	.31	13.50
Exploitative innovation					.16**	.01	.23	11.58	.23**	.02	.32	13.86
Geographic partner diversity					-.01	.02	-.01	-.22	.00	.03	.00	-.06
<i>Interaction effects</i>												
Ambidexterity innovation (Exploratory innovation × Exploitative innovation)					-.25**	.03	-.20	-8.82				
Exploitative innovation × Geographic partner diversity					-.05	.05	-.02	-1.08				
Exploratory innovation × Geographic partner diversity					.09*	.05	.05	2.01				
R ²		.02				.11						.14
Adjusted R ²		.02				.10						.13
R ² change						.08						.03

N = 2,506

**p < .01.

*p < .05.

Source: Authors' calculations.

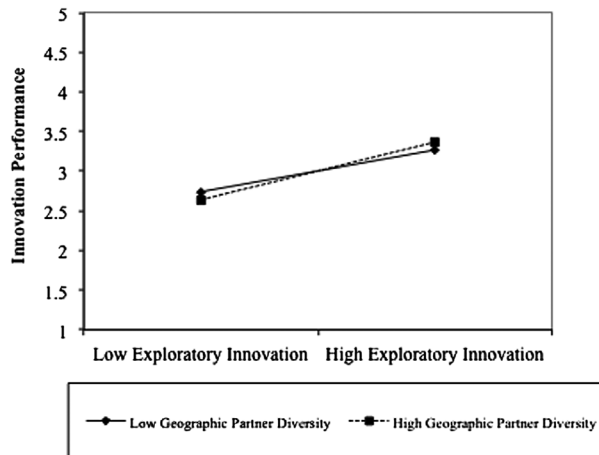


Figure 2. Moderating effects of geographic partner diversity and exploratory innovation on firms' innovation performance. Source: Authors' research.

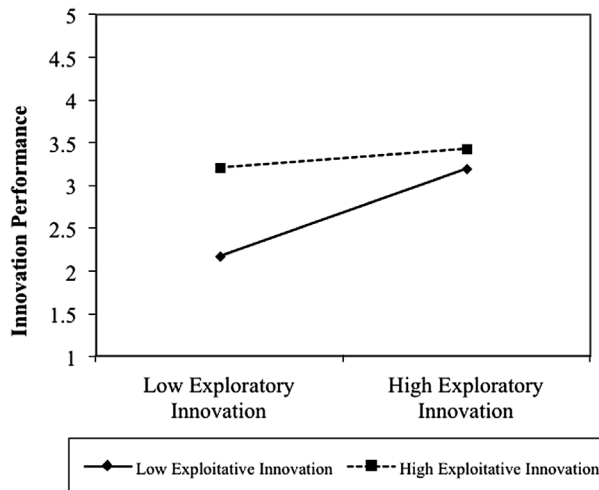


Figure 3. The moderating effect of exploitative innovation on the exploratory-innovation performance relationship. Source: Authors' research.

higher geographical partner diversity, the relationship between innovation performance and exploratory innovation was stronger. Thus, hypothesis 2 is fully supported.

5. Discussion and implications

The results of this research contribute to the growing body of empirical research on exploratory and exploitative innovations and firms' innovation performance. We built upon existing theoretical foundations and empirical evidence supporting the role of ambidextrous firms and their partners (in terms of geographical distinction) on the firm's innovation performance. In the following, our contributions to studying ambidexterity premise, geographic

diversity, and firm's innovation performance are discussed. The primary contribution of our research shows that firms' innovation performances focus on exploratory innovation as the most important. Moreover, geographically different partners strengthen this positive relationship.

If firms specialise in either exploratory innovation or exploitative innovation, they can be successful in terms of performance. Although we hypothesised a positive effect of ambidextrous innovation on a firm's innovation performance, this effect was negative and significant. Hence, a partial explanation can be found in the fact that if we want to have ambidextrous firms we need to opt for high exploratory innovation and high exploitative innovation. If a firm is in a position to maintain low exploratory innovation and high exploitative innovation, or vice versa, the performance effect of balance will diminish. This leads us to the conclusion that exploratory and exploitative innovation must work in tandem, as March (1991) originally claimed. We conceptualise exploratory innovation and exploitative innovation as orthogonal where high levels of both exploratory innovation and exploitative innovation are optimal for balance, and in this situation superior performance happens. Our results are going toward a continuum premise of ambidexterity, where trade-off between exploration and exploitation is necessary. This is supported by our results from hypotheses 1a and 1b. If a firm decides to opt for specialisation, it can achieve performance benefits.

The second contribution of our research shows that geographically distinct partners strengthen the relationship between exploratory innovation and a firm's innovation performance. These results suggest that, for exploratory innovation, if a firm has access to externally located resources, i.e., partners located in diverse geographic locations (a partner that is local, national, or international) appears suitable, the performance effects would not be diminished. Our study informs alliance managers about whether they should deploy partner diversity in their alliance portfolio. In regard to the latter, our findings show that as long as firms maintain high levels of exploratory innovation, the deployment of high levels of geographical distinct partners add to a firm's innovation performance. Our findings indicate that the answer to this open question may be contingent upon the type of resources available to the firm.

Disclosure statement

No potential conflict of interest was reported by the authors.

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