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## CAPABILITIES, INNOVATION, AND OVERALL PERFORMANCE IN BRAZILIAN EXPORT FIRMS

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## ABSTRACT

This article extends the current research on innovation by investigating the relationship between innovative capabilities and export firms' overall performance. From the perspectives of the resource-based view (RBV) and dynamic capability, we examine the differential and interactive effects of exploration and exploitation capabilities in product innovation for external markets and overall performance (direct and mediated by a new product). In addition, we test the moderating effect of market dynamism and the controlling effect of firm size on these relationships. Hence, the main contribution of this article is developing and empirically testing an original model, by combining these constructs that address new relationships, in an emerging country. This model was tested with data from 498 Brazilian export firms, distributed throughout all Brazilian manufacturing sectors, by firm size, and in states. The analysis was made with application of the structural equation modeling (SEM). As a result, we found support for the assumptions that exploitation capabilities influence product innovation and overall performance, whereas exploration capabilities and their interaction to exploitation capabilities influence overall performance, but not product innovation. Additionally, the relationship between exploitation capabilities and overall performance is mediated by product innovation. Unlike hypothesized, market dynamism does not moderate the relationship between product innovation and overall performance. Furthermore, firm size works as a controlling variable in the relationships analyzed. Regarding the implications for theory, this study contributes to grasp that exploitation capabilities influences a firm's overall performance, both directly and indirectly (via product innovation), and highlights the various direct and mediatory effects of innovation on overall performance. These insights show the importance of considering the role of mediating and moderating variables in theory and research models that address the determinants of overall performance to avoid overestimation of certain constructs. Finally, the paper provides original empirical support for the hypothesis of the interdependency of product innovations for external markets and overall performance.

## KEYWORDS

Innovation. Export. Capabilities. Performance. Brazil.

# 1 INTRODUCTION

Product innovation is a major factor in a firm's competitive advantage and survival and it is particularly significant in turbulent environments. It is an entrepreneurial process which relies on the application of existing and new capabilities to bring a new product into the market (Zhou & Wu, 2010; Atuahene-Gima, 2005; Atuahene-Gima & Murray, 2007; Yalcinkaya, Calantone, & Griffith, 2007; Verhees & Meulenbergh, 2004). Thus, the interrelationships between capabilities, innovation, and firm performance are interesting to CEOs and researchers (Neely, Filipini, Forza, Vinelli, & Hill, 2001).

In turn, generally export is the first stage of firms' internationalization and it is of paramount importance for the firms' sustainability and countries' economic growth, mainly in emerging countries, such as Brazil, given their need for commercial surplus to balance their external financial commitments (Morgan, Katsikeas, & Vorhies, 2011; Cadogan, Paul, Salminen, Puumalainen, & Sundqvist, 2001). However, firms in these countries need to overcome many technical and non-tariff barriers to export (Costa, 2013). Hence, these barriers are significant sources for product innovation in export firms.

These export firms, as noticed by Salomon and Shaver (2005), through an extensive literature review, tend to be more productive than non-exporters. Salomon and Shaver (2005, p. 441) confirmed this tendency for Spanish industrial firms, showing that "exporters consistently have greater average product innovation and patent application counts than their non-exporting counterparts." Also, Cassiman and Martinez-Ross (2007) show that firms' good performance is related to entering export markets.

In spite of this, so far, studies on Brazilian export firms have not examined the relationship between capabilities, product innovation for external markets, and overall performance. As stressed by Wu (2013), previous research on capabilities as sources of superior performance has been conducted mostly in developed markets, with very few examples from emerging markets. Hence, the stock of this specific knowledge does not consider the institutional environment of the emerging countries and it cannot be generalized to them (Wu, 2013). To address this gap, this research defines and tests empirically a conceptual model about that

relationship in an emerging market setting (Brazil), establishing a link between the international literature and the particularities of emerging countries.

Specifically, this study seeks to improve knowledge on these relationships in Brazilian export firms by analyzing the firms' previous product innovation and overall performance. Regarding antecedents, the investigation evaluates the impact of capabilities on product innovation for external markets and concerning the consequents, how these product innovations affects firm performance.

To develop product innovations, firms invest in new innovation capabilities (explorative) and/or apply those already existing within them (exploitative capabilities). However, it is unclear which approach is more tightly linked to innovation and high performance. For instance, Zhou and Wu (2010) claim that, although the absorptive-capacity perspective indicates a distinctive capability may foster explorative innovation, the organizational inertia theory suggests that superior organizational capabilities in a particular field are linked to a tendency towards exploitative innovation. In general, firms are thought to rely on exploitation when trying to reduce costs and exploration when focusing on new products or distinction.

Thus, the general objective is analyzing the impact of single and interconnected capabilities on product innovation for external markets and, directly and mediated by innovation, on overall performance of Brazilian export firms.

These kinds of innovation and performance were selected because the literature suggests that product innovation and export strategy complement each other (Cassiman & Golovko, 2011). Particularly, we follow Golovko and Valentini (2011), who found robust empirical support for the hypothesis that the positive effect of innovative activity on a firm's growth rate is higher for firms that engage in exports and vice versa.

To achieve such an objective, this paper adopts the perspectives of the resource-based view (RBV) and dynamic capability. Researches based on these perspectives highlight the heterogeneity of firms as determined by their internal resources and capacities, acquired and developed over time. According to the RBV (e.g. Hansen & Wernerfelt, 1989), the difference of firms' performance within an industry is bigger than this difference between industries, something which suggests that the influence of internal determinants is more important than external ones. Therefore, the competition nature is defined by firms' heterogeneity, where innovation is key.

In turn, researchers like Mahoney and Pandian (1992) have stressed that these differences are not directly due to having more or less resources, but to the way how resources are applied (capabilities). As proposed by the dynamic capabilities approach (Teece, Pisano, & Shuen, 1997), a firm achieves competitive

advantage through distinctive capabilities (Prahalad & Hamel, 1990), i.e. “the accumulated, complex bundles of skills and knowledge embedded in organizational processes” (Wu, 2013, p. 36). This capability view stresses the importance of dynamic capability building processes to gain competitive advantage (Weerawardena, Mort, Liech, & Knight, 2007).

This paper is structured as follows. The relevant concepts and relationships regarding innovation, firm capabilities, and overall performance are reviewed in section 2 (subsections 2.1 and 2.2). In subsection 2.3, a conceptual model of these relationships and the corresponding hypotheses, derived from the review, are proposed. The study method is described in section 3. Next, in section 4, the model is tested in a specific sample of Brazilian export firms. This paper finishes with our conclusions, a discussion of the managerial and theoretical implications of results and suggestions for further research.

## **2 CAPABILITIES, INNOVATION, AND PERFORMANCE: A LITERATURE REVIEW**

### **2.1 CAPABILITIES AND INNOVATION**

Firms’ capabilities are the main determinants of firms’ performance (Knight & Cavusgil, 2004) and they are important in providing and sustaining their competitive advantage (Guan, 2003). Generally, a firm develops and applies knowledge and skills that make it more innovative and increase its overall performance (Li & Calantone, 1998; Atuahene-Gima, 1995a, 1995b, 2005; Lages, Silva, & Styles, 2009; Vorhies & Morgan, 2005). From a strategic viewpoint, Yalcinkaya *et al.* (2007) reviewed several studies and suggest that product innovation capabilities are central to a firm’s sustainability. Accordingly, studying export firms, Golovko and Valentini (2011) notice that the innovation process depends on a firm’s learning abilities, which may improve through exports.

Therefore, Neely *et al.* (2001) claim that the relevant question “why are certain firms more innovative than others?” should be reformulated: “why do certain firms have a higher propensity to innovate than others?” The answer, according to Zhou and Wu (2010), based on a literature review, is that the innovation process implies that a firm must search, identify, and evaluate information from different sources. This knowledge is disseminated within the firm and transformed into specific product designs that constitute product innovation. Therefore, Yalcinkaya *et al.* (2007) claim that exploration and exploitation capabilities are central themes in the product innovation process.

According to March (1991), this knowledge may be divided into two groups: the exploration of new possibilities and the exploitation of old certainties. March (1991, p. 71) states that, although “maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity,” firms must choose between the two because of their limited resources.

Zhou and Wu (2010, p. 548) adapted the knowledge view proposed by March (1991) to the product innovation domain and define “exploitation as the use and refinement of existing knowledge and skills in product development, whereas exploration refers to the search and pursuit of completely new knowledge and skills in product development.”

Accordingly, Atuahene-Gima (1995b) claims that, as product innovativeness reflects a firm’s experience in developing or adopting the innovative product by definition, it may be accepted that radical product innovations are more likely to require more learning and behavioral change on the part of the firm than incremental innovation.

From the perspective of dynamic capabilities, Yalcinkaya *et al.* (2007) also studied the influence of exploration and exploitation capabilities on product innovation. Based on March (1991), the authors defined

[...] exploration capabilities as the importer’s ability to adopt new processes, products, and services that are unique from those used in the past and exploitation capabilities as the importer’s ability to improve continuously its existing resources and processes (Yalcinkaya *et al.*, 2007, p. 66).

According to Atuahene-Gima (2005), exploiting existing capabilities may provide short-term success. However, to ensure a firm’s long-term sustainability, exploration capabilities must be brought into the firm’s innovation strategy. In addition, Atuahene-Gima and Murray (2007) claim that exploitation is linked to the full use of a firm’s existing technology and product-market domains. Innovation efficiency is higher because the process uncertainty is lower. According to March (1991, p. 85), exploitation capabilities show “returns that are positive, proximate, and predictable.”

Regarding exploration capabilities, Atuahene-Gima and Murray (2007) suggest that these capabilities enhance product innovativeness because of the cumulative process of new knowledge being added to the knowledge repertoire of a firm’s members. This new knowledge leads to differential products, which distinguish the firm from competitors and enable superior competitiveness. However, exploration capabilities present “returns which are uncertain, distant and often negative” (March, 1991, p. 85).

In addition, Yalcinkaya *et al.* (2007) suggest that exploration and exploitation capabilities are closely linked because exploring only existing knowledge (exploitation) without exploring new knowledge (exploration) will eventually become ineffective, given the probability of technological exhaustion in the market. According to Atuahene-Gima and Murray (2007), focusing on exploration capabilities may lead to a deficit in the ratio between experimentation costs and turnover with new products, whereas a focus on exploitation can produce a suboptimal equilibrium. Therefore, balancing exploratory and exploitation capabilities, as proposed by March (1991), requires incorporating adequate levels of both capabilities.

## 2.2 INNOVATION AND EXPORT FIRMS' OVERALL PERFORMANCE

According to Verhees and Meulenber (2004, p. 136), the various interpretations of “innovation” over the years may be summarized as “the process of developing a new item, the new item itself, and the process of adopting the new item.” Freeman (1982, p. 7) focuses on the object and defines innovation as the “first commercial transaction of one idea involving a new or improved product or process.” Success is defined as the economic return that follows the launch of some innovation.

Innovation has been addressed at the sectoral, regional, firm, and project levels (Verhees & Meulenber, 2004). In this study, innovation is addressed at the firm level, because it analyzes antecedents and consequences that are internal to firms. At this level, innovation has been suggested to be the main indicator of superior performance. For example, Yalcinkaya *et al.* (2007) claim that the continuous introduction of new products and services that meet the customer’s needs and wishes is core to a firm’s survival.

Thus, Sandvik and Sandvik (2003) stressed that successful product innovation affects three market elements: availability of a price premium, sales growth, and use capacity. The authors claim that, because improved and new successful products “generally provide value to customers and greater differentiation for the firm’s products from those of Competitors” (Sandvik & Sandvik, 2003, p. 359), the pricing decision is often similar to that of a monopoly. Therefore, innovation may be expected to lead to a higher performance.

In addition, according to Golovko and Valentini (2011), since export firms have access to knowledge not available in their domestic market, they may improve the internal learning process, which is the basis of innovation. This route increases the likelihood that a firm will enter new geographical markets, making exports more successful and increasing domestic sales. According to the authors, “exports and innovation can thus give rise to a virtuous, reinforcing



circle” (Golovko & Valentini, 2011, p. 363), which culminates in better overall performance.

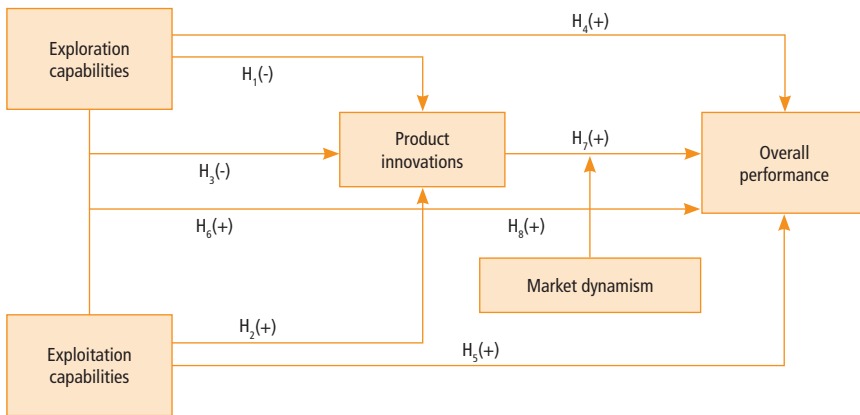
Moreover, Golovko and Valentini (2011) stress that investment in innovation for exports may produce positive spillovers in a firm’s domestic markets, as the firm will be able to obtain a price premium for the domestic sales of an export product.

### 2.3 CONCEPTUAL MODEL AND HYPOTHESES

The model displayed in Figure 1 illustrates the concept of capabilities as antecedents of innovation and the effect of capabilities and innovation on the performance of Brazilian export firms. Therefore, this paper’s focus lies on innovation as a dependent, explanatory, and mediating variable. In addition, capabilities are antecedents and overall performance is the consequence under analysis. Hence, the main contribution of this article is developing and empirically testing an original model, by combining these constructs that address new relationships, in an emerging country.

FIGURE 1

#### RESEARCH CONCEPTUAL MODEL



Source: Elaborated by the authors.

The following hypotheses are formulated having this conceptual model as a basis. Starting from capabilities, Yalcinkaya *et al.* (2007) have evaluated the direct and indirect influence of exploitation and exploration capabilities on the market performance of U.S. importers. Innovation was analyzed as a mediated variable

and addressing its direct influence on performance. The same researchers formulated the hypotheses that “exploration capability is positively related to an importer’s degree of new product innovations” (and exploitation is negatively related), while “exploration and exploitation capabilities are positively related to an importer’s market performance” (Yalcinkaya *et al.*, 2007).

The study’s empirical results confirmed that capabilities span a diverse knowledge base, with exploitation capabilities primarily derived from a marketing resource base and exploration capabilities derived from a technological resource base. Additionally, the results confirmed the hypotheses that, although exploitation capabilities are negatively related to the product innovation degree, exploration capabilities are positively related both to the product innovation degree and market performance. In addition, exploitation capabilities and product innovation are positively but not significantly related to market performance. The authors claim that their results reveal “the intricate relationships between exploitation and exploration capabilities and specific firm outcomes” (Yalcinkaya *et al.*, 2007, p. 84), because the former tends to decrease and the latter tends to increase the importer’s product innovation. However, because exploitation capabilities provide a foundation for exploration capabilities, exploitation capabilities produce an indirect effect on product innovation and market performance.

Atuahene-Gima and Murray (2007) claim that exploitation capabilities reduce errors with regard to problem solving and mistakes in product innovation. However, deeper exploitation within a familiar knowledge base makes the adoption of alternate, new directions of development difficult. Therefore, the same researchers also tested the hypothesis that exploitation enhances new product innovation performance until a certain threshold is reached, after which new product performance is lower due to knowledge ossification. The result points out a different direction: the relationship between exploitative learning and new product performance is U-shaped (not inverted), suggesting that high product innovativeness is linked to both low and high exploitation capability levels, with a lower product innovativeness corresponding to a medium exploitation capability level.

Additionally, Atuahene-Gima and Murray (2007) claim that exploration shows higher risks and costs due to likely inefficiencies in problem solving caused by the submission of too many proposed solutions for meeting customer needs and a high occurrence of unsuccessful innovations. Therefore, the same researchers tested the hypothesis that exploration capabilities also have an inverted U-shaped relationship with product innovativeness, with a positive effect at low levels and negative effect at high levels. In this case, the hypothesis was refuted again, suggesting, however, that the relationship is “positively curvilinear, denoting a faster-than-linearly increasing returns on new product performance” (Atuahene-Gima & Murray, 2007, p. 21).

Combining their results with others in the literature, Atuahene-Gima and Murray (2007) conclude that the assumption of reducing returns from exploration and exploitation is exaggerated, something which increases the likelihood that both exploitative and exploratory learning show increasing returns and product innovativeness.

Addressing export firms, Salomon and Shaver (2005) argue that these firms generally access new knowledge (explorative), which leads to a process of learning by exporting and ultimately increases capabilities and fosters increased innovation. They confirmed the existence of this process of learning by exporting and its association with innovation in a representative sample of Spanish manufacturing firms, with data from 1990 to 1997.

In addition, based on the proposal that capability exploitation enhances incremental innovation and hinders radical innovation, because it is focused on the improvement of existing processes and products, Atuahene-Gima (2005) formulated and confirmed the hypothesis that capability exploitation is positively related to incremental innovation performance and negatively related to radical innovation performance. In turn, capability exploration was confirmed to be negatively related to incremental innovation performance and positively related to radical innovation performance.

Therefore, results from the literature provide conflicting views on the effect of capabilities on product innovation. Given these conflicts, the predominance of incremental innovations in Brazilian industrial firms (Cabral, 1998; Instituto Brasileiro de Geografia e Estatística [IBGE], 2010), which apply knowledge “in use” in their innovation process, and that in Brazil, like in other countries that experienced a late industrialization process, significant innovative capabilities in industry still have to be built up (Ariffin & Figueiredo, 2006) and we propose the following hypotheses:

- $H_1$ : The internal exploration capabilities of Brazilian export firms are negatively related to the intensity of product innovation for the overseas market.
- $H_2$ : The internal exploitation capabilities of Brazilian export firms are positively related to the intensity of product innovation for the overseas market.

Corroborating the statement by March (1991) that “an appropriate balance between exploration and exploitative learning is a crucial factor in a firm’s effectiveness,” Atuahene-Gima and Murray (2007) tested the alternative hypothesis that “the interaction between exploration and exploitation learning is positively (or negatively) related to new product performance.” They suggested that firms that exploit and explore more become more efficient with regard to their learning processes and achieve better new product performance. The result of the test

had a negative and significant coefficient that confirms the hypothesis of a negative relation between this learning interaction and innovativeness. In addition, the analysis shows that the advantages of exploration learning for new product performance decrease when exploitative learning increases. Therefore, it is suggested that companies must maintain a balance between exploratory and exploitative capacity to raise the innovative performance, as a high or low level of both capabilities result in process inefficiencies.

In addition, in line with this balance proposal, Atuahene-Gima (2005) tested the hypotheses that interaction between competence exploration and exploitation is related to incremental innovation performance and radical innovation performance. The results confirm that the relationship of interaction with incremental innovation is not significant and the interaction with radical innovation is negative. Therefore, exploitation and exploration capabilities are independent in their relationship with incremental and radical innovation. For Benner and Tushman (2003), this double pursuit is possible for an ambidextrous organization, something which allows senior executives to combine variation reduction and control (exploitation), as well as exploration and option creation.

Given these results and, again, the predominance of incremental innovation in Brazilian industrial firms (Cabral, 1998; IBGE, 2010), which apply “knowledge in use,” we formulate the following hypothesis:

- $H_3$ : The integrated exploration and exploitation capabilities of Brazilian export firms are negatively related to the intensity of product innovation for the overseas market.

As stated above, Yalcinkaya *et al.* (2007) confirmed that exploration capabilities and product innovation were positively related to market performance, while exploitation capabilities were not. According to Nath, Nachiappan, and Ramanathan (2010) the extensive research dedicated to understanding the relation between capabilities and firm performance has been conclusive regarding the significance of this relationship. The same researchers tested and confirmed this hypothesis for a sample of 102 UK firms, showing that capabilities (marketing and operational) have a significant effect on superior financial performance. They conclude that firms must include these capabilities when striving to improve their business performance.

In a survey of 230 top marketing executives at U.S. firms in 6 industries, Vorhies and Morgan (2005) tested and confirmed the hypothesis that marketing capabilities are associated with superior business performance. In addition, the same researchers observed that the gap in marketing capabilities between top and bottom firms explains the significant variance in business performance.

In addition, Atuahene-Gima (1995a) formulated the hypotheses that new product propensity and performance are determined by two groups of factors: those related to the firm (firm size, R&D intensity etc.) and those related to new product factors (proficiency of predevelopment activity, product advantage, international orientation in new product development etc.). Furthermore, Atuahene-Gima (1995a) claims that the contribution by the second group is greater than that by the first. The results confirmed that new product factors play an outstanding role in export performance. However, the firm's specific factors overwhelm the new product factors in explaining export performance.

Given the scarcity of empirical evidence of the effect of capabilities on export performance, Lages *et al.* (2009) formulated and confirmed the hypothesis that relationship capabilities influence export performance as measured by relationship performance.

Therefore, the following hypotheses are proposed:

- $H_4$ : The internal exploration capabilities of Brazilian export firms are positively related to their overall performance.
- $H_5$ : The internal exploitation capabilities of Brazilian export firms are positively related to their overall performance.

According to He and Wong (2004), although the conceptual distinction between exploration and exploitation and its implications for strategy and structure are adequately understood, surprisingly, there has been little empirical investigation of the interaction between the two and the effect of interaction on a firm performance indicators. However, out of the few studies that have been conducted, most of them provide empirical evidence that this interaction is positively related to a firm's overall performance. For example, based on a sample of 206 Singapore and Malaysian manufacturing firms, He and Wong (2004) found evidence consistent with the ambidexterity hypothesis that the interaction between explorative and exploitative innovation strategies is positively related to performance, as measured by the sales growth rate.

Therefore, we propose the following hypothesis:

- $H_6$ : The interaction of the internal exploration and exploitation capabilities of Brazilian export firms is positively related to their overall performance.

Based on a literature review, Li and Calantone (1998) suggest that, when new successful products are correlated with buyers' favorable perceptions, the products are also correlated with superior market performance. Through this proposal, they tested and confirmed the hypothesis that "the greater the new

product advantage, the better the product market performance will be” (Li & Calantone, 1998, p. 17).

Sandvik and Sandvik (2003) examine the influence of two dimensions of innovativeness – new-to-the-firm products and new-to-the-market products – on business performance, because it has been suggested that the dimensions produce different responses in the outcome variables. The same researchers formulated and confirmed the hypotheses that only new-to-the-market products leverage all of the analyzed dimensions of performance: sales growth, the relative price premium, use capacity, and firm profitability.

In a specific analysis of the global market, Lages *et al.* (2009) stress that the increasing level and the decreasing time until new product imitation by competitors, among other factors, enhance the importance of product innovation in improving export performance. Based on this proposal, the same researchers formulated and confirmed the hypothesis that product innovation produces a positive effect on export performance, measured by the economic effect. In a similar way, product innovation has proven to be an equally important determinant of export firms’ overall performance, measured by sales turnover, market share, and profit margin (Baker & Sinkula, 1999), by growth in net turnover and return on assets (Han, Kim, & Srivastava, 1998), or by return on investments and assets and profit margin (Calantone, Cavusgil, & Zhao, 2002).

In turn, Aulakh, Kotape, and Teegen (2000) have studied a sample of firms from Brazil, Chile, and Mexico and they concluded that cost-based strategies (generally an outcome of the innovation processes) enhance export performance in developed country markets, while distinction strategies (generally an outcome of product innovations) enhance performance in other developing countries.

Moreover, Golovko and Valentini (2011) state that a data analysis of 1,400 Spanish SMEs over 10 years confirmed the hypothesis of complementarity between innovation and export. Therefore, innovation has a positive effect on sales growth and this effect is stronger in export firms.

Hence, we propose the following hypothesis:

- $H_7$ : The intensity of product innovations for the overseas market of Brazilian export firms is positively related to the firms’ overall performance.

Hypothesis 7 has not been supported in several studies, something which is consistent with the statement that the relationship is contingent on the market dynamics. In this regard, Jansen, Van Den Bosch, and Volberda (2006) claim that, for actual and emerging customers and markets, the relationship between product innovation and overall financial performance is moderated by the market dynamism degree. The same researchers found that the effect of radical innovations

on financial performance is greater in dynamic markets, while incremental innovations positively affect this performance in competitive markets. Based on this result, the authors suggest that ambidextrous organizations coordinate the development of both types of innovation to efficiently respond to market conditions.

Therefore, we examine herein the moderating effects of market dynamism on the relationship between product innovation and performance. According to Jaworski and Kohli (1993), market dynamism refers to the perceived speed of change in product preferences, customer demand and the emergence of new customer segments in the industry. This definition suggests a positive link between the market and innovations. Thus, the following hypothesis is proposed:

- $H_8$ : Market dynamism moderates the relationship between innovation and overall performance. That is, a greater market dynamic strengthens the positive effect of innovation on performance.

Finally, based on results from the literature, we test whether product innovation mediates the relationship between capabilities and overall performance. For example, Li and Calantone (1998, p. 25) have found that “market knowledge competence leads to better product market performance by enhancing new product advantage.”

### **3 RESEARCH METHODS**

The conceptual model formulated in this research claims that factors internal to firms, namely, exploitation and exploration capabilities, directly and when mediated by product innovation for the overseas market, influence the export firms’ overall performance. In addition, the model stresses that the relationship between innovation and performance is moderated by market dynamism. Empirical data will be used to evaluate whether this model applies to Brazilian manufacturing firms that export. From our literature review, this is an original model, but it may be applied to other geographical contexts.

#### **3.1 SAMPLING AND DATA COLLECTION**

The unit of analysis in this study is the Brazilian manufacturing export firm. The research population in 2010 comprised 20,133 firms (Ministério do Desenvolvimento, Indústria e Comércio Exterior [MDIC], 2010). The sample size, defined by the finite population method (Fonseca & Martins, 1996), is 378 firms.

However, to increase data reliability, analytical possibilities, and representativeness of industries, we interviewed a larger number of firms. We stopped the process when we completed a sample of 498 firms distributed throughout all Brazilian manufacturing sectors, firm size, and regional states.

The data were collected through a formal structured questionnaire of mainly closed questions using the back-translation process. This questionnaire comprised 38 questions to be answered by using a 7-point Likert scale with 1 meaning “not at all” and 7 meaning “to an extreme extent.” Before being finalized, the questionnaire was submitted to five scholars and three experts in international trade to test clarity, layout, and relevance. Their suggestions contributed to a reformulated design. This new design was pre-tested through in-depth interviews with managers of approximately 3% of the calculated sample (11 firms). The pre-test provided more guidance for improving the clarity and face validity of the definitive questionnaire. The data of the pre-test was not included in the analysis.

The questionnaire was administered by a team of trained researchers from the Center for Studies and Research in Management (CEPA) of the Federal University of Rio Grande do Sul (UFRGS). The researchers phoned the top executive of a randomly selected firm. Each interviewer explained the objectives and relevance of the study and attempted to schedule interview appointments to complete the questionnaire.

## 3.2 MEASURES

We measured all constructs in our study by at least four items (see the Appendix A), as suggested by Hair, Anderson, Tatham, and Black (2009), which were selected from previous studies in the literature. The component unidimensionality of the measurement items was evaluated through exploratory factor analysis, while the internal consistency was evaluated through Cronbach’s alpha obtained from reliability analysis. We test complementarily for reliability assurance. We perform analyses for each construct: exploitation capability (EXPLOI), exploration capability (EXPLOR), product innovation (INP), firm’s overall performance (DG), and market dynamism (DM).

We adopt the exploitation ( $\alpha = .87$ ) and exploration capabilities ( $\alpha = .88$ ) proposed by Atuahene-Gima (2005), who defined them as the extent to which a firm uses existing or explores new knowledge and technologies in product development. The capabilities are measured through 5 items each. To measure product innovation ( $\alpha = .96$ ) for the overseas market, we follow the definition by Lages *et al.* (2009), which comprises 5 indicators. Overall performance (OP), as a multidimensional construct that embeds economical and non-economical dimensions



(Katsikeas *et al.*, 2000), is measured as a second-order construct comprising 3 first-order latent dimensions: customer satisfaction, CS ( $\alpha = .84$ ); market effectiveness, ME ( $\alpha = .88$ ); and profitability, PR ( $\alpha = .92$ ). Each of the first-order latent dimensions is measured by 4 indicators (Vorhies & Morgan, 2005). The last construct, market dynamism ( $\alpha = .87$ ), is defined as “the rate of change, hostility, and heterogeneity inherent in the firm’s export markets” and it is measured by 5 indicators (Cadogan, Kuivalainen, & Sundqvist, 2009). The measurement of market dynamism in external marketplaces follows the definition of innovation for these markets. Overall, the exploration tests show coefficients confirming satisfactory reliabilities, with all Cronbach’s alphas exceeding .7, confirming the theoretically expected factor solutions.

To account for the effects on the relationships with overall performance, we include firm size as a control variable. To measure firm size, we use the logarithm of the number of full-time employees as an indicator.

Finally, before creating two interaction terms, exploitation capability with exploration capability (EXPLOI\*EXPLOR) and product innovation with market dynamism (INP\*DM), we mean-centered these independent and moderating variables (Aiken & West, 1991; Marôco, 2010). Next, we multiply the values of each indicator of EXPLOI by EXPLOR and each indicator of INP by DM (Slater & Narver, 1994; Marôco, 2010).

### 3.3 ANALYSIS AND RESULTS

We tested the reliability and validity of constructs by following a two-step approach (Anderson & Gerbing, 1988). Hence, we ran exploratory factor analyses, followed by confirmatory factor analyses (CFA), to verify the construct structures. The CFA measurement model included all constructs, control variable, and interactions. The test yielded a  $\chi^2$  value of 1,635,668 (df = 609). In general, all indexes show a good fit: GFI = .87; PGFI = .76; CFI = .92; PCFI = 0.84; IFI = .92; TLI = .91; and RMSEA = .06; with a PCLOSE of .001 and a confidence interval of .055 to .062.

We examine the convergent and discriminate validities of the model next. Table 1 provides the indices of validation. Overall, the confirmatory tests show coefficients confirming convergent and discriminant validities (Hair *et al.*, 2009; Marôco, 2010). Regarding convergent validity and reliability, the composite reliabilities (CR) of all of the constructs are far above the .70 benchmark and all the average variance extracted (AVE) exceeded the benchmark of .50. Regarding discriminant validity, we follow the suggestion by Marôco (2010) and Fornell and Larcker (1981) and calculate the square root of average variance extracted from

each construct and compare the results with the correlation coefficient between pairs of constructs. Because all of the square roots of AVE are equal to or greater than the shared variance, we can state that the measures show adequate reliability and validity.

TABLE I

MEASUREMENT ITEMS AND VALIDITY ASSESSMENT

	1	2	3	4	5	6	AVE	CR	MEAN	SD
1. EXPLOI	<b>.83</b>						.69	.92	5.69	.81
2. EXPLOR	.73*	<b>.86</b>					.74	.93	5.58	.85
3. INP	.35*	.33*	<b>.94</b>				.89	.98	4.79	1.52
4. OP	.39*	.39*	.28*	<b>.90</b>			.81	.96	5.72	.86
5. INP*DM	-.04	-.05	-.07	-.03	<b>.79</b>		.67	.91	.37	2.04
6. EXPLOI*EXPLOR	-.45*	-.43*	-.19*	-.16*	.19*	<b>.77</b>	.78	.95	.49	1.19
7. SIZE	-.01	.04	.07	.13*	.01	-.04	NA	NA	2.104	8.728

Notes: 1. \* Correlation is significant at the .01 level ( $p < .01$ ; 2-tailed). 2. The diagonal (in bold) shows the square roots of AVE. 3.  $N = 498$ . 4. Items 5 and 6 with independent variables mean-centered. NA: Not available. SD: Standard Deviation.

Source: Elaborated by the authors.

Additionally, the descriptive statistics and correlations in Table I provide initial evidence in support of the study's hypotheses. As expected, given the suggestion (e.g. Zhou & Wu, 2010) that exploration capability is riskier and more uncertain in returns than exploitation capability, our results show a mean of the former capability that is slightly lower than the latter. Product innovation for external markets has the smallest mean of independent variables, which is consistent with the view that Brazilian export firms are not innovative, given the predominance of commodities and mature-product export and the firms' orientation towards production (Cabral, 1998; Aulakh *et al.*, 2000). In addition, the overall performance has the highest mean, as expected, given the Brazilian exports' overall performance in the 2000s. Moreover, all of the correlation coefficients between the main routes are significant, providing initial evidence of the results predicted by our theoretical model.

To confirm the adequate fit of the measurement model, we performed a causality test (structural equation) of our hypotheses. The model shows adjustment

indices similar to those of the measurement model, suggesting that the model is acceptable ( $\chi^2 = 1,690.230$  ( $df = 646$ ),  $\rho < .001$ ;  $\chi^2/d.f. = 2.62$ ;  $GFI = .87$ ;  $PGFI = .76$ ;  $CFI = .92$ ;  $PCFI = .85$ ;  $IFI = .92$ ;  $TLI = .91$ ;  $RMSEA = .06$ ). The results in Table 2 show that out of the 9 hypotheses tested, 6 are supported by statistically significant results.

TABLE 2

HYPOTHESIS-TESTING RESULTS

HYPOTHESIS
H <sub>1</sub> . Exploration capabilities → product innovation (-)
H <sub>2</sub> . Exploitation capabilities → product innovation (+)
H <sub>3</sub> . Exploration X exploitation capabilities → product innovation (-)
H <sub>4</sub> . Exploration capabilities → performance (+)
H <sub>5</sub> . Exploitation capabilities → performance (+)
H <sub>6</sub> . Exploration X exploitation capabilities → performance (+)
H <sub>7</sub> . Product innovations → performance (+)
H <sub>8</sub> . Market dynamism X innovation → performance (+)
Control path: Firm size → performance (+)

Source: Elaborated by the authors.

Hypothesis 1 is not supported: the result is not significant, and the coefficient is not negative. Therefore, we did not find evidence to support the hypothesis that exploration capability is negatively related to product innovation in Brazilian export firms. However, H<sub>2</sub> is supported: exploitation capability is positively and significantly ( $\rho < .01$ ) related to product innovation.

Hypothesis 3 was not confirmed because the coefficient is negative, but not significant. Thus, there is no evidence for an effect of the interaction of exploration and exploitation capabilities on product innovation.

Both exploration and exploitative capabilities are significantly ( $\rho < .05$ ) and positively related to overall performance, confirming H<sub>4</sub> and H<sub>5</sub>. In addition, the interaction of both capabilities is positive and significantly ( $\rho < .05$ ) related to performance, supporting H<sub>6</sub>.

To gain further insight into this result, we follow the recommendation by Aiken and West (1991) to plot the interaction and conduct simple slope tests.

For this purpose, we use the unstandardized coefficients and split the exploration capabilities (exploitative capabilities) into a high group (one standard deviation above the mean) and a low group (one standard deviation below the mean) and re-estimate the relationship between the interaction of the capabilities and overall performance. The results strengthen the finding that this interaction influences performance in Brazilian export firms. They show that when exploration capabilities are high, the positive relationship between the exploitation capabilities and performance is stronger (simple slope:  $b = .28$ ,  $t = 4.11$ ,  $\rho < .001$ ) than when the exploration capabilities are low (simple slope:  $b = .21$ ,  $t = 3.02$ ,  $\rho < .01$ ). Similarly, they also show that when exploitation capabilities are high, the positive relationship between the exploration capabilities and performance is stronger (simple slope:  $b = .27$ ,  $t = 3.98$ ,  $\rho < .001$ ) than when the exploitation capabilities are low (simple slope:  $b = .20$ ,  $t = 2.94$ ,  $\rho < .01$ ).

In addition, the results confirm evidence of the relationship between product innovation and performance, supporting  $H_7$ . However, the interaction effect of market dynamism and product innovation on performance is negative, though not significant. This result does not support the hypothesis ( $H_8$ ) that market dynamism moderates positively the effect of product innovation on performance. Therefore, performance varies according to product innovation, regardless of market dynamism.

Furthermore, the results show that firm size exerts a control effect on the routes that include performance ( $\rho < .01$ ). The measurement of size was based on the number of employees, and in order to ensure normal distribution, this control effect was tested by taking its logarithm. In addition, to gain further insight, this control effect was tested by applying a multi-group analysis (Marôco, 2010). Based on the median split, we classified the groups as small/medium (o) and large (1) firms, with the 2 groups of firms distributed almost equally. The first group has 251 firms, and the second group has 247 firms. The largest firm in the first group has 450 employees, and the smallest firm in the second group has 500 employees.

Multi-group analysis shows a good fit for small/medium and large firms simultaneously to the total sample ( $\chi^2 = 2,724.015$ , 1292 d.f.,  $\rho < .001$ ;  $\chi^2/d.f. = 2.11$ , GFI = .80; PGFI = .70; CFI = .90; PCFI = .82; IFI = .90; TLI = .88; RMSEA = .05). The separate estimation of groups (unconstrained and measurement weights) results in a different estimation [ $\chi^2$  (1292) = 2,724,015 and  $\chi^2$  (1321) = 2,797,487], with both estimations significant at the  $\rho < .001$  level. The difference test shows that the 2 models differ significantly ( $\chi^2$  diff = 73,472 >  $\chi^2_{.95; (29)} = 42,56$ ). Because  $\chi^2$  of the difference is greater than the value observed, the hypothesis of the difference between firm sizes is reinforced.

Finally, to test for the mediation effect of innovation on the relationship between capabilities and performance, we observed the standardized total, direct and indirect effects of EXPLOI over DG. We follow the suggestion by Marôco (2010) and test the significance of the mediation effect through Sobel's test. We found a Z statistics of 103.5, which suggests rejecting  $H_0$  at  $p < .05$ . Therefore, we can accept the mediation effect. In addition, we ran the model for coefficients significance through bootstrap simulation and confirmed the direct effect of EXPLOI on OP ( $\beta = .321$ ;  $p < .001$ ) and an effect on the relationship mediated ( $\beta = .259$ ;  $p < .001$ ) by INP. In the next section, we discuss these main findings.

## 4 MAIN FINDINGS AND DISCUSSION

Building on the resource-based view and dynamic capability perspective, we provide an original perspective for an emerging country on the relationships among capabilities, product innovation for external markets, and overall performance. Build on these approaches means that the constructs involve processes rooted in them that are “knowledge-based and are instrumental in knowledge creation, integration and configuration” (Weerawardena *et al.*, 2007, p. 298). Specifically, we analyze the innovation and performance outcomes of the exploitative and explorative capabilities and whether product innovation for external markets mediates the relationship between capabilities and overall performance for Brazilian export firms.

We find that the exploration capability is not related to product innovation. The context of Brazilian export firms may explain this result; most of these firms innovate incrementally, and most of the product innovations are new only to the firm (Cabral, 1998; IBGE, 2010). In addition, the main products exported by these firms are commodities (MDIC, 2010). Therefore, the knowledge base is ‘knowledge in use,’ while the exploration capabilities are connected to key changes in current technology and knowledge.

As suggested by Benner and Tushman (2003), incremental technological innovations and innovations designed to meet the needs of existing customers build upon existing organizational knowledge. Therefore, firms use exploitative capabilities. In this regard, Atuahene-Gima (2005) found that competence exploration is negatively related to incremental innovation performance and positively related to radical innovation performance. These propositions and results partially confirm our research findings.

In addition, Brazilian firms tend to develop or adopt process innovation more frequently than product innovation (IBGE, 2010), and they tend to use

mainly internal knowledge. The outcome of process innovation is cost minimization, which is largely associated with a process of learning-by-doing (Cohen & Levinthal, 1989). As claimed by Sousa and Lengler (2009), the lower prices of Brazilian products when compared to the products of other countries is the main strategy for penetrating foreign markets, because the consumers in developed countries tend to perceive products and brands from developing countries negatively. Therefore, they equate the products with low prices and poor quality, something which makes a cost-leadership strategy more suitable for competition.

However, exploration capability enhances a firm's overall performance, because it influences other factors, such as grasping the needs of emerging customers and new markets. Process innovations that solve bottlenecks and minimize costs should be based on new knowledge and affect performance. Additionally, most firms in the sample sell to and innovate for the domestic market.

Furthermore, we find that exploitation capability is positively related to product innovation. Because most Brazilian firms use and refine existing knowledge and skills in product innovation, the required capabilities are mainly connected to the absorptive capability to adopt innovations developed out-of-house. Atuahene-Gima (2005) confirms this connection, finding that competence exploitation is positively related to incremental innovation performance, which is the predominant innovation kind in Brazilian export firms. Additionally, He and Wong (2004) found that the exploitative innovation strategy affects both product and process innovation.

Exploitation capability is also positively related to overall performance. Because exploitation capabilities lead to improvements in current products and exhibit no deviation from the current market, it is probable that this routine achieves greater customer satisfaction, leading to better firm performance.

The interaction between exploration and exploitation capabilities has no influence on product innovation. Therefore, the weight of exploitation capabilities is not sufficient to offset the importance of exploration capabilities on product innovation. This finding also corroborates the results obtained by Atuahene-Gima (2005), who show that the interaction between competence exploitation and exploration is negatively related to radical innovation performance and unrelated to incremental innovation performance. In addition, Atuahene-Gima and Murray (2007) find a negative interactive effect of exploitative and exploratory learning on new product performance, suggesting to reduce returns from their inclusion. According to these authors, probable reasons for this finding are the degree of market competition and differing organizational structures and environments.

However, we find that the interaction of exploration and exploitation capabilities is linked to overall performance, suggesting an increasing return when both capabilities are interconnected. As proposed by Lisboa, Skarmeads, and

Lages (2011), while exploitative capabilities provide the immediate capital flow that enables firms to operate in the present, explorative capabilities support the search for new sources of growth, including export markets. This result indicates that the trade-off between exploration and exploitation capabilities is pivotal in ensuring a high level of performance and this corroborates the proposition by Tushman and O'Reilly (1996) that an ambidextrous firm achieves superior performance through the simultaneous operation of exploration and exploitation capabilities.

We confirmed that the relationship between product innovation and performance is positive. This result is different from that of Yalcinkaya *et al.* (2007), who did not confirm this relationship in their study. However, the same researchers admit that this result is of paramount interest, because the literature generally confirms the existence of a relationship. They attributed the result to the intricate relationship between exploitation and exploration capabilities. Also, Santos, Basso, Kimura, and Kayo (2014) found that, in Brazilian firms, innovation is not associated with financial performance. However, innovation was measured by innovative efforts, which may have a long-term effect not observed in the research. Actually, most of the empirical research confirms the direct relationship between innovation and performance, observed in several contexts (Li & Calantone, 1998; Sandvik & Sandvik, 2003, Lages *et al.*, 2009).

Innovation was found not only to directly affect overall performance, but also mediate the effect of exploitation capabilities on performance. This result regarding mediation corroborates Hult, Hurley, and Knight (2004) and extends their relevance to Brazilian export firms. These authors found that innovation partially or totally mediates the effect of capabilities (market orientation, learning orientation, and entrepreneurial orientation) on business performance.

However, herein the contribution of exploitation capabilities to overall performance is not entirely mediated by product innovation for external markets, because those capabilities contribute directly to performance in addition to innovation.

In addition, market dynamism does not moderate the relationship of product innovation and performance. As previously stated, the reason for lack of moderation is likely to be related to the fact that product innovation in Brazilian export firms is predominantly incremental and these firms trade products (commodities) in markets that are relatively less dynamic. Actually, in the literature, there is little support for the effect of market dynamism also in other relationships, such as 'market-orientation and performance' (Slater & Narver, 1994). These authors emphasize that the effects of market orientation are long-term, while environmental conditions are often transient. Additionally, Hult *et al.* (2004) confirm for their sample that innovation is an important determinant of business performance, regardless of market dynamism.

Finally, we find that firm size exerts a control effect on the paths linking independent variables and overall performance. This finding corroborates other studies (e.g. Slater & Narver, 1994; Damanpour, Walker, & Avellaneda, 2009), which found a similar effect of firm size on performance.

## **5 THEORETICAL AND MANAGERIAL IMPLICATIONS, LIMITATIONS, AND FURTHER RESEARCH**

### **5.1 IMPLICATIONS FOR THEORY**

Capabilities are applied in new ways to produce competitive advantages. Therefore, this paper emphasizes that capabilities leverage firm performance directly and when mediated by product innovation. This study contributes theoretically to the literature on capabilities and innovation in the following ways.

First, it increases knowledge on the fact that exploitation capabilities influences a firm's overall performance both directly and indirectly (via product innovation) in the case of Brazilian industrial export firms. This insight shows the importance of considering the role of mediating and moderating variables in theory and research models that address determinants of overall performance to avoid overestimation of the role of constructs. Therefore, we will determine the needed and sufficient conditions for superior performance.

Second, this study highlights the distinct direct and mediating effects of innovation on overall performance. The study sheds some light on a research stream that explains the growth of a firm through innovation for domestic markets or by entering new international markets. Because innovation and export complement each other (Golovko & Valentini, 2011), we adopt a different perspective and provide evidence of the various effects of innovation for external markets on overall performance.

Third, this paper provides original empirical support for the hypothesis of the interdependency of product innovations for external markets and overall performance. This hypothesis was formulated having the proposition by Salomon and Shaver (2005) as a basis, i.e. export firms tend to be more productive when compared to non-exporters and the finding of Golovko and Valentini (2011) that the positive effect of innovation activity on a firm's growth rate is higher for firms that engage in exports and vice versa.

Fourth, this study provides new empirical evidence of the effects of ambidextrous capabilities on product innovation and overall performance in export firms.



In other words, explorative and exploratory capabilities have different influences on these constructs and both (interactive effect) influence overall performance, but not product innovation.

## 5.2 PRACTICAL IMPLICATIONS

The findings of this study are significant for export managers, suggesting that executives must invest in both capability kinds in a different way to improve product innovation. However, each capability will enhance overall performance directly and through their effects on other antecedents, regardless of which kind is used. The level of exploitative capabilities must be maintained in order to keep product innovation performance, and the explorative capabilities must be redirected to ensure the development of radical product innovation.

As indicated by Zhou and Wu (2010, p. 558), managers must be aware of their firm's existing capabilities with regard to innovations, because although the lower risk use of "knowledge stock" is related to a good incremental innovation performance, "it may trap them in existing technological trajectories, lock them in with existing customers, and prevent them from exploring new options." In other words, firms that focus only on exploitation capabilities may be stuck in developing incremental innovations. Therefore, given that the effects of capabilities on innovation and performance are apparent, and considering that capability resources are limited, managers must make decisions with regard to their resources allocation and define the trade-off between exploitation and exploration capabilities to ensure the best performance results. Hence, Brazilian firms must attribute to capability strategies the same significance attributed to innovation, as found by Sampaio, Simões, Perin, and Almeida (2011).

## 5.3 LIMITATIONS

Despite providing useful theoretical and managerial insights, this study has some limitations. First, our study analyzes the influence of exploitation and exploration capabilities on product innovation for external markets and overall performance. Therefore, our findings are limited to the resources and capabilities examined, because the study does not evaluate many other firms' antecedents.

Second, since we apply a cross-sectional approach, we cannot establish the causality of capability in relation to innovation and performance. Because capabilities and innovation co-evolve in a dynamic process, the ideal study might be longitudinal. Additionally, it is possible that the causality between capabilities and innovation and performance is reversed.

Third, our measures of capabilities, innovation, and performance rely on management decisions. However, although manager's perceptions might not coincide with reality, many studies have shown that it is likely to observe low levels of response bias arising from measures in cross-sectional studies examining concrete and externally oriented constructs with a sample of highly educated respondents.

Fourth, the test of the moderator effect of other environmental conditions on the relationships between capabilities, innovation, and performance could provide answers to major research questions. For example, Jansen *et al.* (2006), based on many studies in the literature, tested and confirmed the moderating effect of environmental dynamism and competitiveness on the relationship between innovation, capabilities, and performance.

Fifth, the findings are limited to Brazilian export firms. Therefore, it is not appropriate to generalize the results geographically or in terms of scope.

## CAPACIDADES, INOVAÇÃO E DESEMPENHO GERAL DAS EMPRESAS BRASILEIRAS EXPORTADORAS

### RESUMO

Este artigo aprofunda a pesquisa atual sobre inovação por meio do estudo da relação entre “capacidade de inovação” e “desempenho geral” em empresas exportadoras. A partir das perspectivas da visão baseada em recursos (*resource-based view* – RBV) e capacidade dinâmica, examinamos os efeitos diretos e interativos de capacidades exploratórias e explorativas na inovação de produtos para os mercados externos e no desempenho geral da empresa (direta e mediada pela inovação de produto). Além disso, testamos o efeito moderador do dinamismo do mercado e o efeito de controle da variável tamanho de empresa sobre essas relações. Assim, a principal contribuição deste artigo é desenvolver e testar empiricamente um modelo conceitual original, pela combinação desses constructos em novos relacionamentos, em um país emergente. Esse modelo foi testado com dados de 498 empresas exportadoras brasileiras distribuídas em todos os setores industriais brasileiros, por tamanho de empresa e por Estados. A análise foi feita com a aplicação de modelagem de equações estruturais (*structural equation modeling* – SEM). Como resultado, encontramos suporte para as hipóteses de que as capacidades explorativas influenciam a inovação de produto e o desempenho global, ao passo que as capacidades exploratórias e sua interação com as explorativas influenciam o desempenho geral, mas não a inovação de produtos. Além

disso, a relação entre as capacidades explorativas e o desempenho global é mediada pela inovação de produtos. Diferentemente do hipotetizado, o dinamismo do mercado não modera a relação entre inovação de produto e desempenho geral. Além disso, o tamanho da empresa atua como uma variável de controle das relações testadas. Quanto às implicações para a teoria, este estudo contribui para a compreensão de que capacidades explorativas influenciam o desempenho geral de uma empresa, tanto direta quanto indiretamente (via inovação de produto), e destaca os distintos efeitos diretos e mediadores de inovação no desempenho geral. Esses *insights* mostram a importância de considerar o papel das variáveis mediadoras e moderadoras nos modelos conceituais que avaliam os determinantes do desempenho global, evitando a superestimação da influência de determinados constructos. Por fim, o trabalho fornece suporte empírico original para a hipótese da interdependência entre inovações de produto para os mercados externos e o desempenho global.

## **PALAVRAS-CHAVE**

Inovação. Exportadoras. Capacidades. Desempenho. Brasil.

## **CAPACIDADES, INNOVACIÓN Y DESEMPEÑO GENERAL DE LAS EMPRESAS BRASILEÑAS EXPORTADORAS**

### **RESUMEN**

En este artículo, se profundiza la investigación actual sobre la innovación a través del estudio de la relación entre la capacidad de innovación y desempeño general en las empresas exportadoras brasileñas. Desde las perspectivas de la visión basada en recursos (*resource-based view* – RBV) y capacidad dinámica, hemos examinado los efectos directos e interactivos de las capacidades de exploración y explotación en la innovación de productos a los mercados externos y el desempeño general de la empresa (directa y mediada por la innovación de productos). Además, hemos examinado el efecto moderador de la dinámica del mercado y el efecto de control de la variable tamaño de la empresa en estas relaciones. Por lo tanto, la principal contribución de este trabajo es el desarrollo y evaluación empírica de un modelo conceptual original, mediante la combinación de estos constructos en nuevas relaciones en un país emergente. Este modelo fue evaluado con datos de 498 empresas exportadoras brasileñas distribuidas en todos

los sectores nacionales, por tamaño de la empresa y por estados. El análisis se realizó con la aplicación de modelos de ecuaciones estructurales (*structural equation modeling* – SEM). Como resultado, encontramos evidencias para aceptar las hipótesis de que la capacidad de explotación influencia la innovación de productos y el desempeño general, mientras que las capacidades de exploración y su interacción con las de explotación influyen en el desempeño general, pero no innovación de productos. Además, la relación entre la capacidad de exploración y el desempeño general está mediada por la innovación de productos. De modo sorprendente, el dinamismo del mercado no modera la relación entre la innovación de productos y el rendimiento general. Además, el tamaño de la empresa actúa como una variable de control de las relaciones probadas. En términos de implicaciones para la teoría, este estudio contribuye a la comprensión de que las capacidades de explotación influyen en el desempeño general de una empresa, tanto directa como indirectamente (a través de la innovación de producto) y destaca los diferentes efectos directos e intermediarios de innovación en el desempeño general. Estas percepciones muestran la importancia de considerar el papel de las variables de mediación y moderadoras en los modelos conceptuales que evalúan los determinantes del desempeño general, evitando sobreestimación de la influencia de ciertas construcciones. Por último, el estudio proporciona una base empírica original para la hipótesis de la interdependencia entre innovaciones de productos a los mercados externos y el desempeño general.

## **PALABRAS CLAVE**

Innovación. Exportadoras. Capacidades. Desempeño. Brasil.

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## APPENDIX A

### SCALE ITEMS AND RELIABILITIES

CONSTRUCT	∞ CRONBACH (IF ITEM DELETED)
<p>Capability exploitation KMO = .857; Bartlet's significance .001; AVE = 66.4.                      Based on Atuahene-Gima (2005). (7-point scale: 1 = "not at all" and 7 = "to an extreme extent.")</p>	.873
Over the last three years, to what extent has your firm:	
1.1 Upgraded current knowledge and skills for familiar products and technologies?	(.844)
1.2 Invested in enhancing skills in exploiting mature technologies that improve the productivity of current innovation operations?	(.839)
1.3 Improved skills in searching for solutions to customer problems that are closer to existing solutions rather than completely new solutions?	(.842)
1.4 Upgraded skills in product development processes in which the firm already has a significant experience?	(.859)
1.5 Strengthened our knowledge and skills for projects that improve the efficiency of existing innovation activities?	(.844)
<p>Capability exploration KMO = .878; Bartlet's significance .001; AVE = 68.8.                      Based on Atuahene-Gima (2005). (7-point scale: 1 = "not at all" and 7 = "to an extreme extent.")</p>	
Over the last three years, to what extent has your firm:	.883
1.1 Acquired manufacturing technologies and skills entirely new to the firm?	
1.2 Learned product development skills and processes (such as product design, prototyping new products, timing of new product introductions, and customizing products for local markets) entirely new to the industry?	(.872)
1.3 Acquired entirely new managerial and organizational skills that are significant for innovation (such as forecasting technological and customer trends; identifying emerging markets and technologies; coordinating and integrating R&D; marketing, manufacturing, and other functions; managing the product development process)?	(.858)
1.4 Learned new skills in areas such as funding new technology, staffing R&D function, training and development of R&D, and engineering personnel for the first time?	(.848)
1.5 Strengthened innovation skills in areas where it had no prior experience?	(.850)
	(.865)

(continue)



## SCALE ITEMS AND RELIABILITIES (CONTINUATION)

CONSTRUCT	∞ CRONBACH (IF ITEM DELETED)
Product innovation for export market KMO = .903; Bartlet's significance .001; AVE = 85.3. Based on Lages <i>et al.</i> (2009). (7-point scale: 1 = "not at all" and 7 = "to an extreme extent.")	.956
Over the last three years and regarding products for external markets, to what extent has your firm believed the following:	
3.1 Several product-related innovations were introduced during the development of this product.	(.946)
3.2 Compared to similar products developed by our competitors, our product will offer unique features/attributes/benefits to the customers.	(.947)
3.3 Our product introduces many completely new features to this class of products.	(.947)
3.4 Our product is highly innovative, replacing an inferior alternative.	(.944)
3.5 Our product incorporates radically new technological knowledge.	(.945)
Overall firm performance: evaluate the performance of your business over the past year (the preceding 12 months) in relation to your major competitors. Based on Vorhies and Morgan (2005). (Scale: 1 = "much worse" and 7 = "much better.")	
4.1 Customer satisfaction KMO = .804; Bartlet's significance .001; AVE = 67.6	.839
4.1.1 Customer satisfaction	(.791)
4.1.2 Delivering value to your customers	(.762)
4.1.3 Delivering what your customers want	(.774)
4.1.4 Retaining valued customers	(.849) <sup>1</sup>
4.2 Market effectiveness KMO = .831; Bartlet's significance .001; AVE = 73.3	(.878)
4.2.1 Market share growth in relation to competitors	(.852)
4.2.2 Growth in sales revenue	(.828)
4.2.3 Acquiring new customers	(.857)
4.2.4 Increasing sales to existing customers	(.836)
4.3 Current (anticipated) profitability KMO = .852; Bartlet's significance .001; AVE = 81.6	(.924)
4.3.1 Business unit profitability	(.910)
4.3.2 Return on investment (ROI)	(.888)
4.3.3 Return on sales (ROS)	(.897)
4.3.4 Reaching financial goals	(.911)

(continue)

## SCALE ITEMS AND RELIABILITIES (CONCLUSION)

CONSTRUCT	∞ CRONBACH (IF ITEM DELETED)
Export market dynamism KMO = .844; Bartlet's significance .001; AVE = 66.4. Based on Cadogan <i>et al.</i> (2009). (7-point scale: 1 = "not at all" and 7 = "to an extreme extent.")	.871
5.1 Our export customers' product preferences change quite a bit over time.	(.864)
5.2 New export customers tend to have product-related needs that are different from those of our existing export customers.	(.842)
5.3 Our export customers tend to look for new products all the time.	(.838)
5.4 Our export customers tend to have unstable product preferences.	(.838)
5.5 We are witnessing changes in the kind of products/services demanded by our export customers.	(.836)