Innovation Processes in Latin American Firms: A Dynamic Capability approach

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Abstract

The aim of this paper is to explore the microfoundations of dynamic capabilities in Latin American firms. In particular, we analyze the sense and shape opportunities, seize opportunities, and maintain competitiveness through reconfiguring assets. Our results suggest that when firms manage their innovation processes based on sensing opportunities and reconfiguring their tangible and intangible assets, they are more likely to improve on four innovation-related outcomes: development of new products and services, profitability, market share, and diversification.

Keywords: Latin America, Innovation management, Innovation processes, Business administration
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1. Introduction

During the last 30 years, strategic management scholars have focused on understanding the sources of competitive heterogeneity that result in differential levels of value creation among firms **(Foss and Lindenberg, 2013)**. Analysis has ranged from a focus on the resource bundles needed to achieve, and protect, privileged product market positions **(Barney, 1986)**; to approaches focusing on identifying portfolios of idiosyncratic, and difficult-to-trade, assets and competencies **(Eisenhardt and Martin, 2000; Teece et al., 1997)**; and, more recently, to a concern for unveiling the microfoundations of strategy. The latter approach focuses on the underlying individual- and group-level actions that shape strategy, organization, and, more specifically, dynamic capabilities **(Eisenhardt et al., 2010)**. The field's focus on resources to understand competitive advantage gained ascendancy with the resource-based view of the firm (RBV) **(Barney, 1991)**. This perspective puts the focus on the internal organization of firms, and so is a complement to the traditional emphasis of strategy on industry structure. In short, RBV proposes that when firms have bundles of resources that are valuable, rare, inimitable, and non-substitutable (VRIN), they can achieve sustainable competitive advantage by implementing strategies that are not easy to imitate by competitors. The concept of dynamic capabilities **(Teece et al., 1997)** emerged as an extension of the resource-based view (RBV) to more unstable and dynamic environments **(Eisenhardt and Martin, 2000)**. In this kind of environments, the ability to dynamically integrate, build, and reconfigure resources becomes a crucial factor to achieve sustainable competitive advantage. In particular, the ability to innovate and manipulate knowledge resources becomes especially critical **(Grant, 1996)**.

Several empirical studies have reported a direct relationship between dynamic capabilities and performance **(García-Morales et al., 2007; Wu, 2007; Zhang, 2007)**. And others have proposed dynamic capabilities as a mediating variable between organizational, knowledge and network resources and performance **(Hung et al., 2007; Griffith et al., 2006; Yiu & Lau, 2008),** therefore also implying a direct link with performance. However, despite a large body of empirical studies, the mechanisms by which dynamic capabilities lead to performance outcomes are still an unresolved issue in empirical research **(Eriksson, 2014)**. A main concern that remains in dispute is related to the specifics of how dynamic capabilities are built, transform organizations, and induce the emergence of competitive heterogeneity **(Barney and Felin, 2013)**. In particular, **Teece (2007)** suggests that the process of how managers build competitive advantage is related to the firm's ability to (1) sense and shape opportunities and threats, (2) seize opportunities, and (3) maintain competitiveness by reconfiguring the organization's tangible and intangible assets. This is what is he refers to as dynamic capabilities. Although **Teece's (2007)** theory that excellence in the orchestration of these capabilities undergirds the organization's capacity to innovate and deliver superior performance has been highly influential, much uncertainty still exists about how firms build these dynamic capabilities in practice. In other words, there is much debate about which concrete processes and routines provide a foundation (or *microfoundation* on his terminology) for the emergence of dynamic capabilities. Moreover, there is a need to investigate the microfoundations in firms within dynamic and unstable environments.

The traditional view of innovation suggests that firms located in developed countries tend to span multiple markets and technology domains, and innovate by brokering knowledge from where it is known to where it is not **(Hargadon, 1998)**. Analysis in other regions of the world has been largely neglected **(Martin and Javalgi, 2016)**, although the situation is starting to change as many industries and companies from the developing world have proven to possess significant

innovative potential **(Martin and Javalgi, 2016)**. In particular, in recent years, increasing attention has been paid to understanding innovation processes in Latin American countries **(Chaston and Scott, 2012; Akhter and Pinto-Barcellos, 2013; Rodriguez et al. 2013)**. This trend has been fueled as the region is gaining relevance as a world player given its recent growth in terms of gross domestic product (GDP) **(Rialp et al., 2005)**. Therefore, Latin America can be thought of as offering a high-growth dynamic environment ripe with opportunities and threats, perhaps more so than those found in developed economies **(Cañibano et al., 2006)**. The study of dynamic capabilities in such an environment can help identify the range of application of the framework for understanding business performance. Moreover, probing on the presence of dynamic capabilities (and associated microfoundations) in this environment can help extend our knowledge with valuable insights about the workings of the innovation process in not-fully developed markets with great potential. Our analysis focuses on firms located in the largest Latin American countries in terms of GDP: Brazil (8th worldwide), Mexico (15th), Argentina (21st), Colombia (38th), Chile (41st), Peru (48th), and Venezuela (*)[1].

Several researchers have measured the innovation process based on inputs and outputs available in open databases. Commonly used indicators are: research and development (R&D) expenditure, number of patents and new products, and profit shares that are due to recently-launched products **(Tidd, 2001)**. However, there is still a need for unpacking the innovation process itself – beyond inputs and outputs. More specifically, there is a need for delving deeper into the microfoundations of the innovation process, and into their impacts on performance. We conceptualize the innovation process as a dynamic capability structure related to the sensing, shaping and seizing of innovation opportunities, the managing of threats, and the reconfiguring of assets (**Lessard et al., 2016; Teece, 2007**). Moreover, we identify specific organizational processes and routines that provide an enabling microfoundation for this structure. Currently, there are no empirical studies that test these microfoundations of the innovation process, and their impact on performance, in multiple developing countries, such as Chile, Argentina, Brazil, Colombia, Peru, Mexico and Venezuela.

Results suggest that the organizational processes that enable sensing opportunities and reconfiguring a firm's tangible and intangible assets are associated with: a higher degree of innovation in products and services, improved profitability, market expansion, and the identification of new ideas to innovate. In particular, a firm's process for recognizing new ideas for R&D and innovation through business intelligence is the most influential microfoundation for the sensing of opportunities. And, the knowledge management process for R&D and innovation is the most influential microfoundation for the reconfiguring of assets. Nonetheless, the process for seizing opportunities was not significantly associated to innovation performance in our sample. The latter result suggests that Latin American firms have trouble with a number of microfoundations, among them: delineating business models well-adjusted to innovation opportunities, developing mechanisms to promote the generation of new ideas, and selecting appropriate decision-making protocols for distributing innovation-related responsibilities.

The remainder of the paper is organized as follows: section 2 develops the theoretical framing and hypotheses related to the microfoundations of the innovation process; section 3 describes the empirical method, sample, and variables we employed; section 4 presents the results of the study; section 5 offers a discussion of our findings with practical and theoretical implications; and, finally, section 6 presents the concluding remarks.

[1] The place in parentheses was collected from the World Bank ranking database 2017. (*) Venezuela was placed in 27th place worldwide in 2014, but data for 2017 is not currently available.

2. Theory and hypotheses

Over the last two decades, a sizable amount of research in strategic management has emphasized the role of dynamic capabilities as a source of competitive advantage **(Barney and Felin, 2013; Foss and Lindenberg, 2013; Helfat and Peteraf, 2015; Edurne et al., 2017)**. Since **Teece et al.'s (1997)** seminal article on the subject, several authors have offered definitions of what dynamic capabilities are **(Eisenhardt and Martin, 2000)**. Although some articles have criticized dynamic capabilities for their (arguably) intangible nature **(Barney and Felin, 2013**), most definitions accept that dynamic capabilities are actual capacities enabling a firm's processes to integrate, reconfigure, gain and release resources **(Eisenhardt and Martin, 2000)**. The term "process" refers to the idea that dynamic capabilities are stable patterns of collective activity through which the organization systematically re-generates its operating routines and resource base **(Zollo and Winter, 2002)**. Moreover, as **Winter (2003)** explains, dynamic capabilities govern the rate of change of a firm's valuable, rare, and difficult-to-imitate resources. These definitions suggest that a dynamic capability more closely resembles a piece of organizational structure than a one-off spontaneous organizational reaction **(Helfat et al., 2007)**. In solving the puzzle about the nature of dynamic capabilities, **Teece (2007)** proposes an umbrella framework, that connects the strategy and innovation literatures, by suggesting that firms inhabiting dynamic and turbulent environments exhibit a set of capabilities that enables them to innovate and sustain superior performance. These capabilities can be disaggregated, for analytical purposes, into three components – sensing opportunities, seizing them, and reconfiguring assets accordingly – and rely on important micro-foundational routines for enabling a successful innovation process **(Edurne et al., 2017)**.

2.1. Sensing opportunities within innovation processes

According to **Teece (2007),** firms detect opportunities because of two types of factors: (1) access to existing information, and (2) the emergence of new information and knowledge (exogenous or endogenous) that can create opportunities. Most definitions of opportunity describe three central characteristics they possess, namely: *economic value*, referring to the potential to generate value and profits; *newness*, referring to the potential for leading to the creation of a new product or service; and *perceived desirability*, which relates to the acceptability a new product or service may have in society **(Baron, 2004)**. Managers guide actions and objectives in the creation of innovations in organizations by identifying gaps between the firm's actual and future states **(Cañibano et al., 2006)**. This way of sensing opportunities is crucial in the development of sustainable actions to create and develop new products **(Laamanen and Wallin, 2009)**.

Although the literature conceptualizes innovation in a variety of ways, such as new products, services, processes or business models **(Govindarajan and Trimble, 2004)**, most definitions imply that innovation involves the adoption of a new idea or behavior based on opportunity recognition; which is also the case in Latin American firms **(Jimenez-Jimenez and Sanz-Valle, 2011)**. In general, a managers' capacity for sensing opportunities for innovation is enabled by its firm capacity to develop processes for scanning, creating, learning and interpreting innovation opportunities **(Helfat and Peteraf, 2015)**. These processes not only involve investment in research activity and the testing of customer needs and technological possibilities, but also involve understanding latent demand, the structural evolution of industries and markets, and likely

supplier and competitor innovative responses **(Teece, 2007)**. Firms can capitalize on opportunities if they engage in R&D and innovation while simultaneously learning about customer needs. Therefore, all the aforementioned activities related to directing internal R&D and innovation, detecting and tapping into external innovations, and identifying changing customer needs provide a microfoundation for the capability of "sensing" opportunities; which should ultimately impact on a firm's innovative potential. Hence, we propose that:

> *Hypothesis 1: The sensing of opportunities relates positively to innovation performance in firms located in Latin American countries.*

2.2. Seizing opportunities within innovation processes

Addressing opportunities involves maintaining and improving technological competencies and complementary assets. Once an opportunity is sensed, it can be addressed by creating new products or services. Nonetheless, firms must develop a structured process for managing knowledge before attempting to do so successfully **(Hargadon, 1998)**. A firm that manages its own knowledge is more likely to establish a decision-making capacity that enables it to determine how to positioning its new products first into the market. This is an advantage for pioneering firms because consumers are more likely to perceive their usefulness and uniqueness, in contrast to firms that are perceived as redundant and less interesting **(Kardes et al., 1993)**.

Firms must also select, or create, particular business models that define their commercialization strategy and investment priorities **(Teece, 2007)**. The implementation of these business models implies making enterprise boundary choices and selecting, or developing, technological infrastructure **(Rodriguez et al. 2013)**. Business models are also fundamental to developing incentives programs that align employee commitment to the firm's strategy **(Currie et al., 2007)**. Therefore, success depends not only on the selection of the right technological tools but also on organizational design and innovation, which is also de case for firms in Latin America. This poses difficulties because the organizational issues are usually more convoluted and difficult to understand than the technologies themselves. Without the support of appropriate organizational structures, managers can perceive long-term innovation performance as causally ambiguous, increasing the tension of exploring new opportunities while simultaneously exploiting current resources, which may decrease employee commitment to innovation **(Yalcinkaya et al. 2007).** The aforementioned activities related to delineating new business models, establishing enterprise boundaries, commitment building and decision-making provide a microfoundation for the capability of "seizing" opportunities; which should ultimately impact on a firm's innovative potential. Hence, we propose that:

> *Hypothesis 2: The seizing of opportunities relates positively to innovation performance in firms located in Latin American countries.*

2.3. Reconfiguring resources in the innovation process

The successful identification and calibration of technological and market opportunities, the judicious selection of technologies and product attributes, the re-design of business models, and the commitment of (financial) resources to investment opportunities can lead to enterprise growth and profitability **(Teece, 2007)**. On top of that, a key to sustained profitable growth is the ability

to recombine and reconfigure assets and organizational structures **(Helfat and Peteraf, 2015)**. According to **McIver et al. (2013)**, firms gain new competencies through a continuous and cross-functional process of involving and integrating a growing number of different types of activities **(Cormican and O'Sullivan, 2004)**, such as adopting new technologies **(Rodriguez et al. 2013)** and adapting to new customer needs, which enables receptivity to change **(Prange and Verdier, 2011)**.

According to **Teece (2014)**, firms have a need for continuous strategy realignment; which is also true for Latin American companies. This realignment implies that a firm must reconfigure its assets with its new innovation practices. **Teece (1986)** suggests three types of assets that can be involved in innovation processes: *generic assets*, which do not need to be tailored to the innovation process; *specialized assets*, where there is unilateral dependence between the innovation and its complementary assets; and *co-specialized assets*, where there is bilateral dependence. The ability of management to identify needs and opportunities to invest in co-specialized assets is fundamental to the dynamic capabilities framework **(Teece, 2007)**. Furthermore, the process of matching market opportunities to the development of co-specialized assets will depend on the firm's capacity to manage new knowledge **(Santoro and McGill, 2005; Reus et al., 2009)**. In turn, this latter capacity not only depends on the firm's structured process of knowledge management **(Jimenez-Jimenez and Sanz-Valle, 2011)**, but also relate to the entrepreneurial orientation of managers and employees, and to the autonomy they are given to create new projects and develop new ideas **(Baert et al. 2016)**. The aforementioned activities related to establishing an innovation orientation among employees, knowledge management, and co-specialization provide a microfoundation for the capability of "reconfiguring" resources; which should ultimately impact on a firm's innovative potential. Hence:

> *Hypothesis 3: The reconfiguration of business enterprise's tangible and intangible assets relates positively to innovation performance in firms located in Latin American countries.*

3. Methods

3.1. Data collection and sample

Our analysis focuses on firms located in the largest Latin American countries in terms of GDP: Brazil, Mexico, Argentina, Colombia, Chile, Peru, and Venezuela. We performed a computer-assisted random calling of the firms from the business directory of the Enlaces project. Enlaces is an alliance of well-known Latin American business schools, which are consistently ranked among the top 20 in the region (according to the QS and Financial Times rankings). Seven of them developed the Enlaces directory (that we used in this study) by combining firms listed in their own business directories. We emailed a survey to managers from a randomly selected sample of firms from this consolidated directory. We used the Qualtrics platform to administer the survey. We had full contact information from top management and were able to insist up to four times to get firms to answer the survey. The process worked as follows: (1) first, we emailed the survey; (2) if we received no answer within a week, then we would ask for confirmation that they received our initial email; (3) in case of no answer to this second email for another week we would call them on the phone; (4) if we received no answer after this third attempt, then we would try with another individual from upper management. We applied this

procedure during 2013 and 2014, until we reached 721 firms responding, which corresponds to a 93.6% response rate. Also, the last step of the process resulted in that %5 of firms submitted two answers, which we then averaged. Respondents were presidents or board members (37% of the sample), general or c-suite managers (32%), middle managers (15%), and analysts and group leaders (16%).

The survey was composed of 114 questions. Sixteen of them were used to elaborate the four constructs that form our measurement model (we give details below). **Table 1** presents a descriptive summary of the sample. There were 721 firms, with 3,809 employees on average, and mean age since founding of 39 years. Firms were located in: Argentina (5.4% of the sample), Chile (17.2%), Brazil (17.2%), Mexico (17.1%), Colombia (13.6%), Peru (12.3%), and Venezuela (21.3%). Also, 176 of them had their headquarters located in a country outside of Latin America (24.4%). In terms of innovation spending, a total of 367 firms reported investing less or equal than 5% of their annual turnover in innovation, 111 firms invested between 6 and 10%, 76 firms between 11 and 20%, and 56 firms more than 20%. Finally, **Table 1** also shows the main market in which the sample firms operated and their industry sector.

<<Insert **Table 1** about here>>

3.2. Variables

Table 2 lists the questions we elaborated for each of the four constructs. Each survey question/statement maps onto one of the proposed microfoundations of dynamic capabilities according to **Teece (2007, p. 1,342)**. Questions are shown in English in **Table 2**, however they were created and administered in Spanish in the survey. In each question, respondents were asked to indicate their level of agreement with the statement or the level of importance they assign to what was said in the statement (depending on the question). Respondents had to answer each question using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree" or from "not at all important" to "very important." In sum, we disaggregated dynamic capabilities into microfoundations to (1) sense and shape opportunities, (2) seize opportunities, and (3) maintain competitiveness through enhancing, protecting, and reconfiguring the firm's assets **(Teece, 2007)**. We as well measured (4) innovation performance as outcome. We call these constructs sensing, seizing, reconfiguring, and performance.

<<Insert **Table 2** about here>>

In the regression analysis (explained below), we controlled for firm size (number of employees), firm age (years since founding), country (dummies for Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela), having headquarters outside of Latin America, and industry effects (dummies for agribusiness, retail, manufacturing, services and IT, and other industries). All these variables are summarized in **Table 1**.

3.3. Data analysis

We carried out a Confirmatory Factor Analysis (CFA) to assess **Teece's (2007)** orchestration framework of dynamic capabilities. In particular, our measurement model considers four specific

dimensions, namely: sensing, seizing, reconfiguring, and performance. **Figure 1** depicts this conceptual measurement model, and its components, which we use to assess the validity and reliability of the orchestration framework in Latin American firms.

<<Insert **Figure 1** about here>>

To perform the CFA, we estimated the univariate and multivariate normal distributions of each variable (item) of the four constructs. Specifically, we calculated asymmetry and kurtosis to assess normal univariate distribution. According to **Curran et al. (1996)**, normal univariate distribution is achieved when the absolute value of asymmetry is less than two and kurtosis is less than seven. In our analysis, asymmetry was less than .672, and kurtosis was less than .225 for all variables. However, the analysis also showed that the constructs did not fulfill the normal multivariate distribution condition because the statistical k^2 exceeded the α of significance by 5% **(González et al., 2006)**. In this case, **Gonzalez et al. (2006)** and **Bollen (1989)** propose to use the asymptotic distribution-free estimation method. This method allows relaxing the assumption of normal multivariate distribution for optimal global adjustment of the structural model. We used SPSS AMOS 22 to carry out the asymptotic distribution-free estimation. AMOS provides a rich modelling framework for theoretical analysis through Structural Equation Modeling (SEM), which is one of the standard choices for this kind of analysis **(Arbuckle, 2005)**.

We performed several analyses to assess the reliability and validity of our measurement model. **Table 3** shows a reliability analysis employing the Cronbach's alpha criterion **(Bollen, 1989)**. Cronbach's alpha indicates the degree of reliability that a set of items is measuring the same construct (or latent variable). The Cronbach's alpha value of each construct was above 0.7, which is the minimum value commonly accepted to validate internal-consistency reliability **(Fornell and Larcker, 1981; Treiman, 2009)**.

<<Insert **Table 3** about here>>

Table 4 shows a critical ratio analysis performed to examine the significance of each item within the constructs. A critical ratio above 2.32 suggests that the weight of an item is significantly different from zero at the .01 level (**Arbuckle, 2005**). Moreover, a measurement model offers support for convergent validity if all factor loadings are high and significant. **Table 4** shows that all factor loadings are high and significant, and that all critical ratios are above 2.32; which support the hypothesis of convergent validity.

<< Insert **Table 4** about here >>

Table 5 shows the results of a composed reliability analysis of the constructs used in our measurement model. All composed reliability indexes (CRI) were above .7, which means that the overall reliability of all items is confirmed **(Jahanmir and Lages, 2016)**. **Table 5** also reports the average variance extracted (AVE), which was close to, or over than, .6 in all constructs. An AVE loading of over .6 indicates that more than 60% of the variance is captured by the construct **(Fornell and Larcker, 1981)**.

<<Insert **Table 5** about here>>

Table 6 helps performing a discriminant validity analysis, which compares the AVE by construct (diagonal of the matrix in that table) and the squares of correlations among the constructs. If the AVE index **(Table 5**) is equal or higher than the value of the diagonal of the correlations matrix (**Table 6**), the result suggests a preliminary discriminant validity. Our results suggest such validity: .651≥.650 (Performance); .551≥.550 (Reconfiguring); .701≥.700 (Seizing); and .580≈.577 (Sensing)).

<<Insert **Table 6** about here>>

Additionally, **Table 7** reports the correlation factors among the constructs, the standard deviation of the covariation, and the confidence interval to assess discriminant validity **(Anderson and Gerbing, 1988)**. Correlations among constructs were moderate to relatively low, and all confidence intervals were lower than 1, which means there was less than a 5% chance that two different constructs measure the same phenomenon or dimension.

<<Insert **Table 7** about here>>

Finally, a measurement model offers support for convergent validity if, overall, its goodness-of-fit indexes indicate appropriate fit to the data. **Table 8** reports a goodness-of-fit analysis of our measurement model. It appears to fit the data quite well by most indexes (chi-square 296.1, p-value=.00, PNFI=.560, GFI=.915, AGFI=.880, and RMSEA=.071). However, the comparative fit indexes were, close, but slightly off, of the commonly accepted criteria **(Jahanmir and Lages, 2016)**. Noteworthy, when RMSEA is lower than 0.158, the CFI should not be computed because it will be less than .900. Nevertheless, we chose to report it anyway to encourage future research to develop other variants of the items proposed by **Teece (2007)**; which may ultimately improve on this comparative indicator. This could improve fit, and extend the explanatory power, of the framework for innovative processes in Latin American firms (we extend this reflection in the **Discussion** section).

<<Insert **Table 8** about here>>

3.4. Regression model

We performed a linear regression analysis using Stata to analyze the relationship between innovation performance in Latin American firms and the three dynamic capabilities of innovative firms proposed by **Teece (2007)**: sensing, seizing, and reconfiguring. The basic theoretical model is as follows (with X' a vector of controls):

$$Performance = \beta_0 + \beta_1 \cdot Sensing + \beta_2 \cdot Seizing + \beta_3 \cdot Reconfiguring + X' \cdot \beta_4 + \varepsilon \quad (1)$$

Table 9 presents the mean, standard deviation, minimum and maximum, as well as a correlation table, for all variables we use in the regression analysis that are not dummies. A Ramsey (RESET) test shows the model (**Equation 1**) is well specified by using the three independent constructs (p-value .06 < .1), and the variance inflation factor (VIF) index was lower than 5.55 for all

independent constructs. Hence, the model does not present problems of multicollinearity **(O'Brien, 2007)**.

<<Insert **Table 9** about here >>

4. Results

Table 10 displays hierarchical regressions that assess the effects of the independent variables of interest (representing dynamic capabilities), and the controls described above, on innovation performance. **Models 1, 2 and 3** show the effects of the control variables on innovation performance; namely: (1) firm variables (size, age, and headquarters), (2) country dummies (Argentina, Brazil, Chile, Colombia, Mexico, Venezuela, and Peru as the omitted dummy), and (3) dummies for industry (agribusiness, retail, manufacturing, services and IT, and other industries). The variance of innovation performance that is explained by **Model 3** (including all the controls) is relatively low (R^2=.088). This suggests that firm variables, country, and industry sector were not particularly substantial to explain much of the variance in the innovative performance of Latin American firms.

Models 4 to 7 include the three theoretical constructs we developed following **Teece's (2007)** orchestration model. **Model 7** shows that, by including these three dynamic capability constructs, the R^2 increases from .088 (in Model 3) to .347, which indicates that dynamic capabilities matter substantially for innovation performance. In particular, **Models 4 and 7** show a positive and significant relationship between sensing and innovative performance ($p<.01$ in both models), which supports hypothesis 1 that the sensing of opportunities relates positively to innovation in firms located in Latin American countries. **Models 6 and 7** also evidence a significantly positive relationship between reconfiguring and innovative performance ($p<.01$ in **Model 6** and $p<.05$ in **Model 7**), which supports hypothesis 3 that the reconfiguration of tangible and intangible assets relates positively to innovative outcomes in Latin America. Finally, **Model 5** shows a significant relationship between seizing and innovative performance ($p<.01$). However, this relationship does not reach statistical significance in **Model 7**, once we include all the variables we are studying. Therefore, hypothesis 2 that the seizing of opportunities relates positively to innovation performance in firms located in Latin America was not supported.

<<Insert **Table 10** about here>>

Therefore, a combined analysis of the models in **Table 10** indicates that only the sensing of opportunities and the reconfiguring of resources were substantially significant constructs to explaining positive innovation performance outcomes in Latin American firms. Additionally, if we also consider the factor loadings of the items within these two constructs, we can see that the most influential microfoundation of the "sensing" dynamic capability was related to the firm's "business intelligence process for capturing ideas for R&D and innovation" (see item Sense3 in **Tables 2 and 4**). And, lastly, the "knowledge management process for R&D and innovation" was the most influential microfoundation of the "reconfiguring" dynamic capability (see item Reconfig3 in **Tables 2 and 4**).

5. Discussion

Teece's (2007) general framework of dynamic capabilities "orchestration" poses dynamic capabilities as the foundation of enterprise-level competitive advantage. Our study tests this framework in the context of Latin America. For example, a model including the three classes of dynamic capability (sensing, seizing and performance) plus controls explain more than 30% of the variance in innovation performance, in our sample (**Model 7 in Table 10**). Although only the sensing and reconfiguring constructs were positively and significantly associated with innovation outcomes, the theoretical framework provided by **Teece (2007)** was useful to measure the development of dynamic capabilities, and their associated micro-foundational routines. Several authors have put forth the idea that dynamic capabilities can be conceived as organizational routines that allow firms to deploy new resource configurations that enable sustained competitive advantage **(Eisenhardt and Martin, 2000; Winter, 2003; Zollo and Winter, 2002)**. Our results point in the same direction, suggesting that when Latin American firms implement this kind of micro-foundational routines, their innovation process allows them to improve performance in four fronts: (1) development of new products and services, (2) profitability, (3) market share, and (4) market diversification (see "performance" in **Table 2**).

In, particular, when firms are able to sense opportunities using procedures such as a structured business intelligence process that captures ideas for R&D and innovation, and are also able to reconfigure their tangible, and specially their intangible, assets by tapping into knowledge management processes, they can continuously maintain organizational-environmental alignment and increase their capacity to formulate and implement initiatives that have a direct impact on innovation outcomes. This finding has been associated in the strategy literature with the process of developing new capacities by involving and integrating a larger number of different types of activities inside the organization **(Cormican and O'Sullivan, 2004)**. In the absence of these types of formal structures, firms located within Latin American countries would not be able to carry out new innovation initiatives effectively.

Noteworthy, although seizing opportunities related positively to innovation performance in our sample, its effects were not statistically significant. There can be two explanations for this result: (1) the instrument (i.e., the questions) we administered does not fully account for region-specific variables reflecting the seizing of opportunities, and/or (2) Latin American firms exhibit low levels of investment in activities related to the seizing of innovation opportunities (**Chaston and Scott, 2012**). The comparative fit indexes of our CFA (**Table 8**) partially support the first explanation (CFI=.785, TLI=.723, and NFI=.722 all lower than the 0.950 threshold). However, the second explanation is supported by a conceptual argument that has more substantive implications for management studies in developing countries. In particular, **Table 10** shows that having foreign headquarters relate positively to innovation performance (**Models 2 and 3** show a significant relationship with p-value<.05); which is no longer significant ones we account for specific dynamic capabilities. This can be interpreted as indicating that at least part of the innovation-enabling microfoundations are likely to be localized in foreign headquarters.

According to **Lessard et al., (2016)**, there are three types of multinational enterprises (MNE): (1) meta-national, (2) transnational, and (3) common multinational. The meta-national enterprise develops its capabilities in any of the firm's locations, the transnational enterprise relies on sensing and seizing by its subsidiaries, and the common multinational enterprise builds its capabilities at home and then projects them abroad. **Lessard et al., (2016)** state that meta-national enterprises are adapted to innovate globally because they sense and seize knowledge and resources

from anywhere in the world and from a wide variety of different partners with which they interact. Our results suggest that most firms in our sample are not complete meta-nationals because they lack fully developed seizing capabilities, moreover, the ones having headquarters abroad may be behave more like a common multinational, therefore forgoing some crucial capabilities.

Latin American firms' capabilities tend to be downstream oriented, which means they import technologies, simplify manufacturing processes, and adapt designs to deliver products at a lower cost; in a similar fashion to those innovation processes exhibited by Chinese firms **(Chascon and Scott, 2012; Ghemawat and Hout, 2016)**. Typical examples are car manufacturing firms in Mexico (Ford Motor Company), Brazil (Fiat Chrysler Automobiles) and Argentina (PSA Peugeot), whose headquarters are located in the United States, the United Kingdom, and France. This innovation process benefits corporations that rely on mature technologies **(Rodriguez et al. 2013)**. Despite **Ghemawat and Hout's (2016)** claim that these types of firms have ordinary capabilities but not the dynamic capabilities that being a meta-national would require, we find that Latin American firms have dynamic capabilities, at least those focused on sensing and reconfiguring resources. Such capabilities should be useful whether a firm is at the frontier of innovation but also if it is more focused on transferring and adapting technology from developed countries.

To wit, both Chinese and Latin American multinationals are not (yet) meta-nationals because they are uncompetitive in advanced capital goods such as industrial automation, and are generally stuck at the lower end of many high-tech markets. In fact, Latin American firms tend to be more focused on short-term goals, such as absorbing imported technologies, with 51% of them investing less than 5% of their annual turnover on innovation (see **Table 1**) and creating low-cost versions of designs developed elsewhere to satisfy needs within South America (71.3% of the sample, see **Table 1**) and North and Central America (21.2% of the sample). China and some Latin American countries, such as Brazil and Mexico, are following similar patterns of innovation driven by the availability of high-skilled population at low cost coupled with an attractive market **(Rodriguez et al., 2013)**.

6. Conclusion

Our analysis of the microfoundations of innovation performance focused on organizational processes and routines in a developing region with globally dispersed sources of invention, innovation, and manufacturing capacity. We evaluated processes and routines that **Teece (2007)** postulated as microfoundations of dynamics capabilities. Our results support the hypothesis that firms should emphasize activities related to sensing opportunities and asset reconfiguration in order to improve on innovation-related outcomes. Nonetheless, Latin American managers still must figure out how to implement processes related to the seizing of innovation opportunities, such as the ability to delineate business models to grasp those opportunities. According to **Teece (2007)**, successful firms must build and utilize all three classes of capabilities, and often employ them simultaneously.

While several studies have examined the beneficial effects of encouraging managers to pursue new innovations **(Knight and Cavusgil, 2004)**, ours considered the role of micro-foundational organizational structures that enable that kind of behavior. Furthermore, the specific microfoundations we studied are commonly implemented as some form of process or routine by firms. Therefore, this paper also provides scholars with empirical evidence of the positive effect of implementing formal structures to improve the sensing of opportunities and the reconfiguring

of assets in the context of Latin American firms. We do not go into the details of specific knowledge management systems or organizational designs, but our study suggests that providing some form of structure for activities, such as business intelligence for capturing ideas for R&D/innovation or mechanisms for aligning innovation projects to market trends, can pay off greatly in terms of innovative outcomes.

Studying dynamic capabilities in the Latin American context has contributed to our knowledge in this field. Latin America, has been characterized as an unstable region, developing at a considerable rate, and so it can be thought of as a type of high-growth dynamic environment. Probing on the presence of dynamic capabilities, and associated microfoundations, in this environment has helped us to gain valuable insights about the workings of the innovation process in not-fully developed markets with great potential. In particular, our findings and discussion related to the presence of innovation-enabling microfoundations for the sensing and reconfiguring capabilities, and the apparent absence of the seizing capability.

The study has three main limitations, which open opportunities for future work. First, our findings are limited to the specific context of Latin American countries, in particular to firms located in Chile, Brazil, Argentina, Colombia, Mexico, Peru, and Venezuela. Future research could attempt to build a sample of firms that is fully representative of the entire Latin American region, and/or administer our instrument in other developing regions of the world, such as the Middle East, Asia or Africa. Second, the questions, and/or the five-point Likert scales, we used may have had limitations for capturing the seizing of opportunities dimension. Future studies could reformulate some of the constructs we used by exploring with new items that may be more likely to elicit this dimension in a given regional context. Moreover, future research may examine whether other innovation-related outcomes, such as financial and other quantitative indicators, are impacted by the arrangements of dynamic capabilities that are reported by firms. Third, and finally, because our survey was cross-sectional, we could not investigate the long-term impacts of the microfoundations of dynamic capability on innovation performance. Future research could attempt to gather longitudinal data to assess the sustainability of superior innovative performance, and competitive advantage, that could be afforded by the implementation of dynamic capabilities.

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List of Tables

7. **Table 1.** Sample description

		Mean	
Firms size and age	Number of full-time employees	3,809	
	Age [years]	39	
		Number of firms	**% of total**
Countries	Argentina	39	5.4%
	Chile	119	17.2%
	Brazil	119	17.2%
	Mexico	118	17.1%
	Colombia	94	13.6%
	Peru	85	12.3%
	Venezuela	147	21.3%
Headquarters Location	Outside Latin America	176	24.4%
	Local/Domestic	544	75.6%
Main market	South America	514	71.3%
	North and Central America	153	21.2%
	Asia	22	3.0%
	Europe	28	3.9%
	Oceania	2	0.2%
Sector	Agribusiness	38	5.3%
	Retail	92	12.8%
	Manufacturing	191	26.5%
	Services & IT	329	45.6%
	Other	71	9.9%
Innovation investment	<= 5%	367	51.0%
[% of annual turnover]	6% - 10%	111	15.4%
	11% - 20%	76	10.5%
	>20%	56	7.8%
	DK/NA	110	15.3%

Note: Sample size = 721. Percentages calculated based on answers to the survey.

8. Table 2. Summary of constructs and questions used in the study

Dimension/ Construct	Survey question/statement	Teece (2007)'s Microfoundations / Main authors	Item name
Sensing	There are clear criteria and process for selecting the best innovation projects	Processes to direct internal R&D and select new technologies	Sense1
	The participation of external agents (clients, suppliers, consultants, etc.) is valued in the strategic discussion of the company	Processes to tap supplier and complementor innovation	Sense2
	The company has a structured business intelligence process that captures ideas for innovation, research and development	Processes to tap developments in exogenous science and technology	Sense3
	The company has mechanisms for aligning different innovation projects to market trends	Processes to identify target market segments, changing customer needs, and customer innovation	Sense4
Seizing	The company has developed significant changes in marketing concepts/strategies to apply new solutions to customers in new markets	Delineating the customer solution and the business model	Seize1
	The company has clear protocols to select management techniques within the company to improve routines and practices	Selecting enterprise boundaries to manage complements and control platforms	Seize2
	The company has incentive/award mechanisms for employees who perform new ideas	Building loyalty and commitment	Seize3
	The company has clear protocols to distribute responsibilities and decision-making power	Selecting decision-making protocols	Seize4
Reconfiguring	The innovations implemented by the company come from a broad participation of employees of different functional areas	Decentralization and near decomposability	Reconfig1
	The company encourages employees' autonomy to work on their own ideas and projects, or on colleagues', to foster innovation	Co-specialization	Reconfig2
	The company has a structured knowledge management process related to innovation and research and development	Knowledge management	Reconfig3
	The top management of the company encourages its employees to innovate	Governance	Reconfig4
Performance	The innovation process expands the range of goods or services	Teece, 2007; Hult, 2004	Perform1
	The innovation process improves the firm's profitability	Hult, 2004	Perform2
	The innovation process allows the firm to increase its market share	Birkinshaw, 2008	Perform3
	The innovation process allows the firm to enter new markets	Teece, 2007	Perform4

Note: Questions are shown in English. However, they were created and administered in Spanish in the survey.

9. Table 3. Cronbach' alpha value for each dimension of dynamic capability

Dimension	Cronbach's Alpha	Number of items
Sensing	0.76	4
Seizing	0.86	4
Reconfiguring	0.79	4
Performance	0.87	4

Note: Cronbach's alpha above 0.7 is the usual standard for internal-consistency reliability.

10. Table 4. Correlation squared (factor loading) and critical ratio of each item

Dimension	Item	Estimate	SE	CR	*p*
Sensing	Sense4	1			
	Sense3	1.146	0.042	27.562	***
	Sense2	0.596	0.046	13.012	***
	Sense1	0.763	0.041	18.739	***
Seizing	Seize4	1			
	Seize3	1.007	0.043	23.589	***
	Seize2	0.925	0.034	27.483	***
	Seize1	0.895	0.037	24.199	***
Reconfiguring	Reconfig4	1			
	Reconfig3	1.223	0.051	23.913	***
	Reconfig2	0.882	0.048	18.522	***
	Reconfig1	0.99	0.043	22.859	***
Performance	Perform4	1			
	Perform3	0.898	0.036	25.228	***
	Perform2	0.907	0.043	21.101	***
	Perform1	0.935	0.044	21.108	***

*** *p<0.01*, ** *p<0.05*, * *p<0.1*. Note: See Arbuckle (2005). CR = Critical Ratio

11. **Table 5.** Reliability analysis of each dimension of dynamic capability

Dimension	CRI	AVE
Sensing	0.841	0.577
Seizing	0.883	0.701
Reconfiguring	0.868	0.551
Performance	0.882	0.651
Total Scale	**0.964**	

Note: CRI: Composed Reliability Index, AVE = Average Variance Extracted.

12. Table 6. Comparison of average variance extracted with the square of the dimension correlations

	Sensing	Seizing	Reconfiguring	Performance
Sensing	0.58			
Seizing	0.46	0.70		
Reconfiguring	0.55	0.71	0.55	
Performance	0.29	0.21	0.24	0.65

Note: The diagonals contain the average variance extracted, which is the average amount of variance in items (López, Boluda & Manzano, 2000). AVE should be smaller than the squares of the correlations among the dimensions (Fornell

& Lacker, 1981; Hair et al., 1999; Farrell, 2010).

13. Table 7. Estimation of correlation confidence intervals to assess discriminant validity

			Correlation	SD Covariation	Min	Max
Sensing	<-->	Seizing	0.681	0.051	0.581	0.781
Sensing	<-->	Reconfiguring	0.742	0.047	0.650	0.834
Sensing	<-->	Performance	0.541	0.052	0.440	0.643
Seizing	<-->	Reconfiguring	0.840	0.052	0.738	0.942
Seizing	<-->	Performance	0.461	0.052	0.359	0.563
Reconfiguring	<-->	Performance	0.494	0.048	0.400	0.588

Note: To determine discriminant validity, it must be demonstrated that the confidence intervals of the correlations do not contain the number 1. This is because we want to be sure that each construct is measuring something different from the other constructs (Anderson & Gerbing, 1988; Bagozzi, 1994).

14. **Table 8.** Goodness of fit analysis

Statistical adjustment	Measurement model	Criteria	Source
Absolute fit indexes			
Chi-square	296.136	-	
p-value	0.000	< 0.050	Jahanmir & Lages (2016), Batista & Coenders (2000)
CMIN/DF	3.1	< 3.000	Jahanmir & Lages (2016), Bagozzi & Yi (1998)
Comparative fit indexes			
CFI	0.785	≥ 0.950	Jahanmir & Lages (2016), Batista & Coenders (2000)
TLI	0.723	≥ 0.950	Jahanmir & Lages (2016)
NFI	0.722	≥ 0.950	Jahanmir & Lages (2016), Batista & Coenders (2000)
Parsimony adjustment			
PNFI	0.560	Close to 1	Jahanmir & Lages (2016)
Additional indexes			
GFI	0.915	> 0.900	Bagozzi & Yi (1998), Manzano & Zamora (2010)
AGFI	0.880	> 0.800	Etezadi-Amoli & Farhoomand (1996)
RMSEA	0.071	≤ 0.080	Batista & Coenders (2000)

Note: CMIN/DF = Minimum discrepancy over its degrees of freedom, CFI = Comparative Fit Index, TLI = The Tucker-Lewis coefficient, NFI = Normed Fit Index, PNFI = Parsimony Adjustment to the NFI, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, and RMSEA = Root Mean Square Error of Approximation.

Table 9. Descriptive statistics of variables used in the regression analysis

Variable	Mean	SD	Min	Max	1	2	3	4	5
Performance	0	1	-2.518	1.264	1.000				
Sensing	0	1	-2.637	1.897	0.541	1.000			
Seizing	0	1	-2.285	1.850	0.461	0.681	1.000		
Reconfiguring	0	1	-2.431	1.958	0.494	0.742	0.840	1.000	
Employees	3,809	15,076	5	202,885	0.065	0.150	0.043	0.092	1.000
Firm's age	39	37	1	211	0.045	0.162	0.059	0.113	0.350

Table 10. Linear regression models of several independent variables on innovative performance

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Employees	3.73e-06*	2.41e-06	2.56e-06	-6.92e-07	2.46e-06	1.16e-06	-2.31e-07
	(1.93e-06)	(2.02e-06)	(2.11e-06)	(1.34e-06)	(1.50e-06)	(1.32e-06)	(1.23e-06)
Firm's age	0.00068	0.00038	3.92e-05	-0.0015*	-0.0004	-0.0010	-0.0014*
	(0.0010)	(0.0010)	(0.0011)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Foreign headquarter		0.214**	0.209**	0.0497	0.121	0.104	0.0493
		(0.0870)	(0.0872)	(0.0746)	(0.0787)	(0.0758)	(0.0729)
Country							
Argentina		0.340*	0.346*	0.139	0.187	0.250	0.147
		(0.204)	(0.208)	(0.184)	(0.184)	(0.182)	(0.180)
Brazil		0.729***	0.655***	0.389***	0.373***	0.364***	0.332**
		(0.153)	(0.158)	(0.133)	(0.139)	(0.134)	(0.131)
Chile		0.266*	0.225	0.114	0.187	0.169	0.123
		(0.145)	(0.146)	(0.120)	(0.127)	(0.123)	(0.118)
Colombia		0.664***	0.603***	0.204	0.266*	0.284**	0.169
		(0.168)	(0.168)	(0.146)	(0.151)	(0.142)	(0.141)
Mexico		0.637***	0.603***	0.395***	0.336**	0.419***	0.360***
		(0.156)	(0.156)	(0.126)	(0.133)	(0.128)	(0.124)
Venezuela		0.726***	0.705***	0.386***	0.445***	0.433***	0.354***
		(0.145)	(0.146)	(0.124)	(0.129)	(0.124)	(0.120)
Sensing				0.523***			0.370***
				(0.032)			(0.052)
Seizing					0.429***		0.054
					(0.037)		(0.058)
Reconfiguring						0.467***	0.159**
						(0.035)	(0.064)
Industry effects	NO	NO	YES	YES	YES	YES	YES
Observations	721	720	720	720	720	720	720
R-squared	0.005	0.072	0.088	0.329	0.255	0.286	0.347
F	3.574	6.075	4.759	26.26	15.95	18.78	25.44
R-squared adj.	0.0020	0.0606	0.0699	0.315	0.239	0.271	0.332

4

*** *p<0.01,* ** *p<0.05,* * *p<0.1.* Robust standard errors in parentheses.
Note: Industry effects includes dummies for retail, manufacturing, services (no IT), IT services, and other industry.

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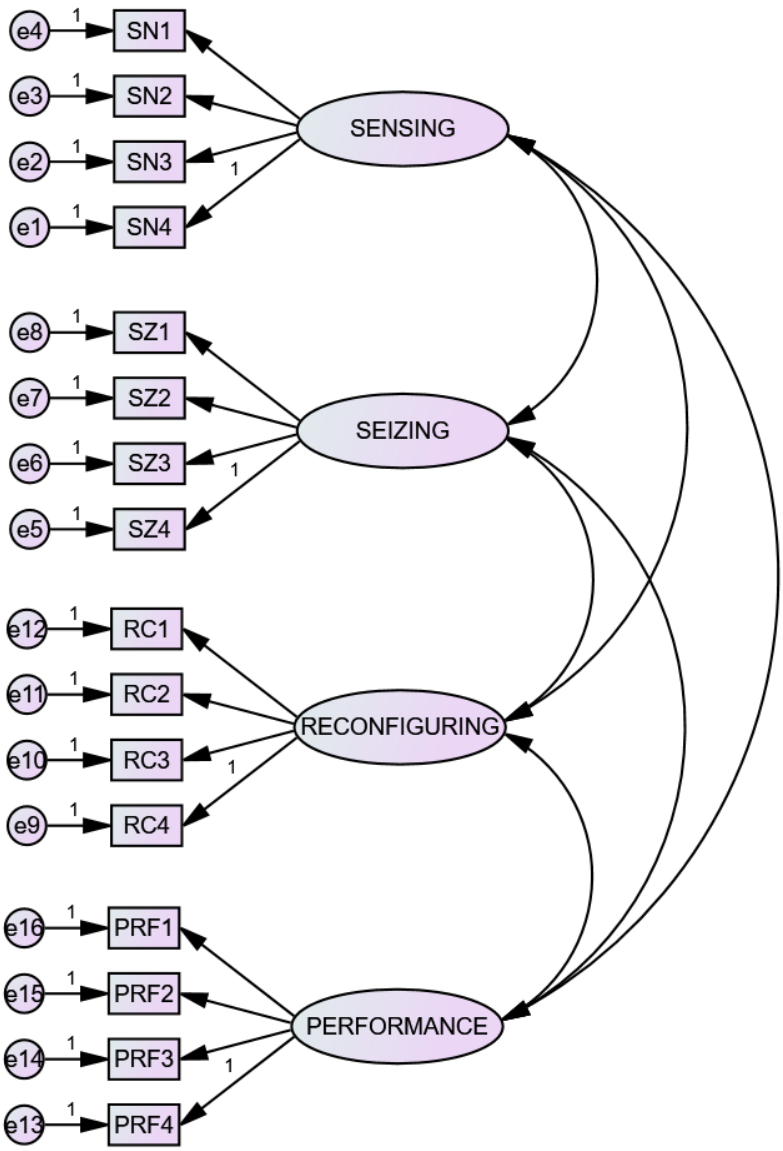

Figure 1. Proposed measurement model to test **Teece's (2007)** framework of microfoundations of dynamic capabilities in Latin American firms.
Source: Own elaboration using AMOS 22.