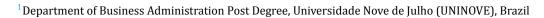# INNOVATION EFFORTS OF COMPANIES IN LATIN AMERICAN COUNTRIES

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ABSTRACT

In this study we examine the innovation efforts, accelerated internationalization, and relational triggers of companies in Latin American countries. It is the first time a study jointly and empirically assesses the perception of the seriousness of institutional obstacles and innovation efforts, considering as a unit of analysis a large number of firms from Latin American countries. We used a database from the World Bank (Environment Surveys) with 14,064 companies from 20 countries in Latin America, which answered questions related to their innovation efforts from 2006 to 2018. Introduction of new or significantly improved products and processes and investments in research and development (R&D) had the greatest validity and quality power in factor analysis performed for the construct "innovation efforts." We observed positive patterns of correlation between age, size, perception of the seriousness of institutional obstacles and innovation efforts. The results contribute to the structuring of professionalization, expansion, and maturation programs for Latin American businesses.

Keywords: Innovation Efforts, New Products and Processes, Investment in R&D, Latin America

1. INTRODUCTION

Firms' internal and external aspects align with economic progress and is a critical factor for innovative companies susceptible to current global issues, which involve interdependence, expectations of greater dynamics, internationalization, and synergy between stakeholders Dau (2012). It is necessary to adopt innovation efforts related to the firm's resources, to address these new global trends which include new products, processes, and investment in research and development (R&D) Dau (2013). Therefore, innovation efforts are recognized as an essential and mandatory condition for competitiveness and business longevity, enabling the establishment of

strategies that are more attentive to the institutional environment Solleiro and Castañón (2005).

Innovation and the institutional environment are issues relevant to Latin American countries, hence the significance, in companies, of the perception of institutional obstacles, many of them imperative and highly serious, such as access to finance, corruption, inadequately trained workforce, labor legislation, political instability, informal competition practices, fees, taxes, and transportation Sirmon et al. (2007); KAUFMANN and VICENTE (2011); Barasa et al. (2017); J. Wang (2018). This perception can affect the efforts of companies in relation to innovation, either through the effort to introduce new products and processes into the market, or through investment efforts in R&D Kafouros et al. (2015); Papazoglou and Spanos (2018).

Companies located outside the axis of developed countries tend to carry out relatively little innovation in their businesses Szogs (2008); however, they still need to make innovation efforts to remain competitive in relation to external threats and their internal competitors, and it is essential to consider institutional issues as a priority. Innovation efforts constitute a multifaceted phenomenon of investment and resource development Papazoglou and Spanos (2018), which companies orchestrate in the face of their perceptions of institutional obstacles North (1991). Exposure to international competitiveness and the interrelationships between actors and institutions can influence these efforts Padilla-Pérez and Gaudin (2014). The entire set of resources and abilities capable of leveraging innovation efforts should be highlighted, particularly, accelerated internationalization and relational triggers, since both can provide access to complementary resources in more stable institutional environments Kanter (2009); Lin and Darnall (2015).

Companies founded for a maximum of 15 years with at least 5% of their sales exported directly, displayed evidence of accelerated internationalization. Oviatt and McDougall (1994); Machado (2009); Waltrick (2015). The use of technology licensed from foreign companies or obtaining internationally recognized quality certification emerges in the use of relational triggers Padilla-Pérez and Gaudin (2014).

In this sense, the initiatives of some countries stand out, notably Latin American ones, which have implemented institutional reforms to make their institutional environments more conducive to the generation of innovative and internationally competitive companies Dau (2012), Dau (2013).

The Global Innovation Index (GII) Dutta et al. (2019) is an innovation index that ranks 129 economies worldwide based on 80 indicators that measure innovative activity. In the 2019 edition, Switzerland (1st) was considered the most innovative country in the world, followed by Sweden (2nd), United States (3rd), Netherlands (4th), and United Kingdom (5th). In Latin America, Chile (51st) is the leader in innovation, followed by Costa Rica (54th), Mexico (56th), Uruguay (62nd), and Brazil (66th). The other Latin American countries had the following classification in the GII: Colombia (67th), Peru (69th), Argentina (73rd), Panama (75th), Dominican Republic (87th), Paraguay (95th), Ecuador (99th), Honduras (104th), Guatemala (107th),

El Salvador, (108th), Bolivia (110th), and Nicaragua (120th). This publication did not classify some countries, including Cuba, Haiti, and Venezuela.

According to studies by the World Economic Forum (WEF), Latin American countries have been striving to improve competitiveness, economic growth, productivity, and infrastructure development, encouraging the creation of innovative businesses that attract international companies. The growth engines of these countries are changing due to international competition and the slowdown in the global economy. Integration initiatives, such as the Pacific Alliance, are examples of joint efforts towards regional integration and simplification of customs procedures, thereby improving the efficiency of regional trade Wef (2018).

Companies are creating and integrating new technologies to contribute to the reduction of institutional barriers, providing investments and training for improvements in the quality of education, provisioning of public services, and expanding jobs. This constitutes a vector of sustainable growth, immune to institutional problems in Latin American countries Wef (2018).

In this context, we seek to improve the state of innovation strategies, specifically regarding innovation efforts in the face of institutional obstacles in Latin America, considering the potential influences of accelerated internationalization and relational triggers. Therefore, it is assumed that, in companies in Latin American countries, institutional challenges are latent, such as the search for legitimacy and adaptation to the obstacles of the institutional environment. In addition, in these countries, companies' innovation efforts are often due to accelerated internationalization and the use of relational triggers, that is, the company's ability to seek exposure to international competitiveness, based on commercial and technological partnerships, local and global Ramamurti (2012). Therefore, the general objective was to examine the innovation efforts, the accelerated internationalization, and the relational triggers of companies in Latin American countries.

Empirical research in academia that examines the relationship between institutional obstacles and companies' efforts to innovate in developing countries, such as Latin Americans, is deficient Lin and Darnall (2015). Few studies jointly consider relational and accelerated internationalization perceptions as potentiating forces of companies' innovation efforts in emerging economies Hunt et al. (2006). This may be associated with the systematic availability of data on companies' innovation efforts in these countries is recent, as a result of the late structuring of national innovation systems Ayyagari et al. (2012).

Although the relationship between investment in R&D, introducing new products and processes, and innovation is often seen, at the firm level as positive and beneficial Arundel et al. (2007), in developing countries, there are variations Crespi and Zuniga (2012). Studies in Asia, for example, have shown a positive association C. C. Wang and Lin (2013); evidence from Chile and Mexico does not support this result Crespi and Zuniga (2012). The study by Goedhuys (2007) revealed in African countries a positive relationship between R&D and product innovation in Tanzania.

Specifically in Kenya, for Kamau and Munandi (2009), investment in R&D was a key component for the innovation of textile companies.

In addition to internal resource management, companies in developing countries are continually challenged to address institutional dynamics, often characterized by high political instability, widespread corruption, and weak protection of property rights Bräutigam and Knack (2004). Bad governance still exists in most of these countries, resulting from the presence of inefficient institutions, which explains the irregular growth rates in these locations. Empirical studies, such as those by Glaeser et al. (2004) and by Acemoglu and Robinson (2008), confirm the critical role of institutions in terms of economic growth in developing countries.

In this research, the theoretical position is aligned with the new institutional economics (NIE), following studies such as those by Williamson (2000) and North (1991). Some works in the area of innovation have used the perspective of the new institutional economics, especially in national systems of innovation Nelson and Nelson (2002), political instability and innovation Bhattacharya et al. (2017), and institutional complexity Wu and Park (2019).

NIE focuses on the institutional environment and transaction costs (uncertainties), studying the evolution of institutions and their implications to guarantee stability in the exchange relationships between individuals by reducing market failures. Reducing uncertainties creates a more stable environment; therefore, in his theory, North (1990) proposes an explanation of the transformations of countries based on institutional changes based on the NIE.

In the study of the influence of the political environment on innovation activities, Bhattacharya et al. (2017) concluded that political uncertainty affected innovation-intensive industries; conversely, according to the authors, the political commitment was considered beneficial for the innovation environment. The institutional theory sought to explain why organizations have similar structures, strategies, processes, and behaviors, since, from the evolutionary perspective of innovation, the diversity of opinion of individuals in organizations, as well as institutional uncertainty and complexity tend to form different approaches, regarding R&D policies Bezerra (2010). The analysis of these dynamic and complex systems has become possible with the development and use of computational technology, which analyzes the functioning of decentralized and highly organized systems composed of a variety of individual components.

According to Nelson and Nelson (2002), the concept of NIE arises in the face of controversies between neoclassical and evolutionary economists about the treatment given to the analysis of technological advances. For them, ex-post competition determined technologies and therefore, did not follow an evolutionary process. However, the dynamics of country institutions and their effects on innovation continue to be poorly studied, and there is a lack of congruence about the relationships between institutional obstacles and innovation efforts.

As an empirical example, African countries, analyzed by Barasa et al. (2017), adopted the same industrialization model as developed countries, which generated less success in achieving technological progress. This was due to institutional obstacles, such as weak institutions and inadequate human capital, suggesting that controlling corruption and improving regulatory quality could improve these countries' rates of innovation.

Barasa et al. (2017) consider that innovation efforts depend not only on resources at the firm level but on the quality of the institutional environment (where the firm is located), showing that institutions play an important role in moderating the positive effect of resources on the company level in innovation.

In contrast, Guarascio and Tamagni (2019), in the context of a longitudinal study with Spanish manufacturing companies, could not correlate the persistence of innovation with sales growth, as they found some heterogeneities in the analyzed indicators and no statistically significant difference in the degree of autocorrelation of growth.

Recent studies reveal that positioning in R&D collaboration networks, that is, the company's position as a local or global recipient and/or supplier of knowledge and technology, substantially affects a company's productivity and maturity, regarding the generation of new knowledge incorporated into patents and new products Schilling and Phelps (2007); Hanaki et al. (2010).

Marin and Bell (2010), Cantwell and Piscitello (2007), Manolopoulos et al. (2011) and Lehrer et al. (2011) confirm that the competitiveness of innovative companies from emerging countries is also affected by the internationalization of R&D activities. This is because the determinants of global competition are increasingly affected by companies operating abroad, with regard to the registration of intellectual property, potentializing great inventions, and technological innovations for emerging economies, which still seek to balance economic growth with sustainable development Dunning and Lundan (2009). The same occurs, as companies produce competitive advantage by developing and transferring knowledge, spreading it globally. Furthermore, when they explore the resources of international innovation systems Dunning and Lundan (2009), they end up developing original and sustainable products, rather than mere technological adaptation.

"Born globals" materialize when faced with the challenges of open innovation and internationalization, considering companies from emerging economies. These are companies that since their inception, are born internationalized, and, as a result, eliminate stages of the sequential process of internationalization Machado (2009).

Several studies show that innovative companies have become more competitive in their business abroad, especially when their portfolio contains products with high technological content and the potential capacities for absorbing external knowledge Oviatt and McDougall (1994). The born global phenomenon, as described in international literature, is not exclusive to companies in high technology sectors, however, in relation to these companies, the term is more recurrent and studied.

Born globals' competitive advantage lies in their ability to apply knowledge-intensive resources in the different countries in which they operate. Small and medium-sized companies that enter the international market often have gaps in physical, financial, and human resources; nevertheless, with a high degree of knowledge, they develop products. Ownership of assets in other countries is not an essential condition of these international ventures, since their main concerns are related to the added value of the product and not the assets acquired abroad Oviatt and McDougall (1994).

Several factors highlight the importance and urgency of born global: (a) the influence of many recent technological innovations, particularly in the field of means of communication and transport, in addition to microelectronics, biotechnology, and energy – technologies that have significantly reduced the costs of transactions of internationalized companies; (b) the growing number of people with experience in international business, as the ability to communicate, understand, and operate in different cultures and languages enhances the possibility of taking advantage of technological changes in international markets; (c) the growing specialization of markets and the emergence of niches that, due to technological advances, can be explored by smaller companies Oviatt and McDougall (1994).

These factors make it possible to generate competitive differentials for companies in developing countries and enable innovation efforts, capable of neutralizing institutional obstacles (political instability, corruption, little protection of property rights, and lack of governance) Bräutigam and Knack (2004). This is because born globals are subject to an accelerated internationalization process and, therefore, are exposed to institutionally more advanced and stable markets.

It is vital to consider that the emergence and support of a born global are also affected by innovative entrepreneurship; therefore, it is necessary to understand it from the perspective of international entrepreneurship. The entrepreneur is the key part of the model, as neither the strategy nor the internationalization processes would start without him acting. The entrepreneur's greatest interest is in action and innovation, making his vision dominate rational calculations. In this sense, the networks in which the entrepreneur is inserted serve to acquire the resources necessary for the intended actions Machado (2009).

In addition to the international insertion, some theoretical reflections also show the relevance of strategic alliances established with external agents for the generation of technological innovations. Specifically, Petruzzelli (2011) suggests that companies with accumulated experience in open innovation are more likely to establish alliances with universities.

Authors such as Anand and Khanna (2000), Sampson (2005), Hoang and Rothaermel (2010), and Lai et al. (2010) found that one of the determining factors for the generation of technological innovations is the experience in establishing strategic alliances. Learning from old alliances, a company refines its cooperation mechanisms, modifies its interactions, and reconfigures the allocation of resources to sub-

sequently achieve better performance in future alliances. By institutionalizing various experiences in relational routines and expanding its knowledge base, concerning the execution of the alliance, a company can then anticipate and respond to the contingencies of the alliances SONG and KIM (2006); Bruneel et al. (2010); Chiaroni et al. (2011).

2. MATERIALS AND METHODS

We utilized a quantitative explanatory investigation Hair et al. (2009); Creswell and Creswell (2017). Companies from emerging economies, specifically those from Latin American countries, are the unit of analysis since that is where institutional challenges are latent, such as the search for legitimacy and overcoming institutional obstacles. Furthermore, in these countries, companies' innovation efforts are often due to accelerated internationalization (born global) and the development of relational capacity, that is, the company establishing and systematizing strategic alliances with external national and international partners.

For the final sample of the survey, we only considered Latin American companies from the Enterprise Survey, of the World Bank, from 2006 to 2018. These countries answered questions related to their innovation efforts in the last three years, indicating if they performed product innovations, process innovations, or investments in research and development. The final sample included 14,064 companies from the Latin American countries Argentina, Bolivia, Chile, Colombia, Costa Rica, El Salvador, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela.

The World Bank and its partners in all geographic regions conduct the Enterprise Survey, covering small, medium, and large companies. They administer the surveys to a representative sample of companies in the formal and non-agricultural private economy. The research universe is defined consistently across countries and includes manufacturing, services, transport, and construction sectors. The universe does not include utilities, government, healthcare, and financial sectors. Since 2006, the World Bank and its partners have enacted the Enterprise Survey following a standardized set of indicators *https://www.enterprisesurveys.org/content/dam/enterprisesurveys/documents/Indicator-Descriptions.pdf* (2017), Bank (2018).

Other studies have been produced based on data from the World Bank's Enterprise Survey, focusing on the research by Khan et al. (2021), which found consistent evidence on the impact of funding restrictions on the introduction of organizational and marketing. They identified that the impact of funding constraints is strongest for incremental innovation, emphasizing the need to consider the degree of fundamentals of innovation when assessing the financial innovation nexus. This suggests a crucial role for financing in developing countries to promote various types of innovation, in particular incremental and organizational innovations.

The study by Riaz and Cantner (2020), which also used data from the World Bank's Enterprise Survey, estimated the relationship between the institutional (judicial and political) and monetary (small and large) dimensions of corruption with the innovative activities of the companies from 16 developing and emerging economies. The research revealed that both small and large monetary dimensions of corruption are positively correlated with the main indicators of innovation in SMEs, with large companies more often victims of corruption monetary policy. Judicial corruption was positively associated with most innovation indicators, stressing gaps in the judicial system. Furthermore, political corruption benefits both SMEs and large companies in most of their innovative activities. Table 1 details items, descriptions, and variable transformations.

Table 1 Aggregate summary of variables and transformations performed

Variables	Items	Descriptions	Transformations*
Innovation efforts	IE1	Introduction of new products in the last three years.	0 = no introduction of new or significantly improved products or services in the last three years; 1 = introduction of new or significantly improved products or services in the last three years.
	IE	Introduction of new processes in the last three years.	0 = no introduction of a new or significantly improved process in the last three years; 1 = new or significantly improved process introduced in the last three years.
	IE3	Investment in R&D in the last fiscal year.	0 = no investment in R&D in the last fiscal year; 1 = presence of investment in R&D in the last fiscal year.
	IO1	Access to finance	0 = not an obstacle; 1 = is a
	IO2	Corruption	
	IO3	Inadequately trained workforce	
	IO4	Labor legislation	
	IO5	Political instability	
	IO6	Informal bidding practices	
	IO7	Fees and Tax	
	IO8	Transport	

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		Table 1 continued	
Accelerated internationalization	AI	Company founded for a maximum of 15 years with at least 5% of their sales exported directly.	0 = company with no evidence of accelerated internationalization; 1 = company with evidence of accelerated internationalization. Evidence of accelerated internationalization refers to the company: (a) founded with a maximum of 15 years and (b) at least 5% of sales exported directly.
Relationships triggers	RT	Using technology licensed from foreign companies or obtaining internationally recognized quality certification.	0 = company with no evidence of use of relational triggers; 1 = company with evidence of use of relational triggers. Evidence of use of relational triggers refers to (a) use of technology licensed from foreign companies or (b) of obtaining internationally recognized quality certification.
Business Characteristics	AGE	Company's age in years.	AGE = number of years since foundation, considering the year of data collection.
	SIZ	Size, according to the total number of employees.	1 = small size: 5-19 workers; 2 = medium size: 20-99 workers; 3 = large size: 100+ workers.

Source: the authors

*Transformation of data obtained from the World Bank's Enterprise Survey, from 2006 to 2018.

The starting point for the data analysis procedure was the preparation of microdata, including cleaning and standardization, from the treatment of lost data (missing data) and atypical observations (outliers). In the analysis of missing data, we found no blank cells regarding the instruments. In the descriptive analysis of the variables, in addition to the mean and standard deviation, we observed absolute and relative frequencies. The Likert scale was set between 0 and 4, with 0 corresponding to "not an obstacle" and 4 attributed to "it is a very serious obstacle" for the variable (institutional obstacles).

Factor analysis created the variable indicators. To accomplish this, we put the variables through a validation process, through which we evaluated the following: (a) the dimensionality, verified by the criterion of the parallel lines; (b) reliability, verified when the indicators Cronbach's Alpha (CA) and composite reliability (CR) (Chin, 1998) present values greater than .70, or values greater than 0.60, in the case of exploratory research Hair et al. (2009); and (c) the adequacy of the sample to the

model, using the Kaiser-Meyer-Olkin (KMO) indicator, which verifies the proportion of variance in the data common to all variables. The values of this measure vary between 0 and 1, and the use of factor analysis is adequate for the data when the KMO is greater than or equal to .50. In the specific case of the variable (innovation efforts), formed by dichotomous items, the tetrachoric correlation calculated the indicators to address the binary structure (Drasgow, 2004).

To relate the categorical variables for characterization with the indicators "institutional obstacles" and "innovation efforts", we utilized the Mann-Whitney test Hollander et al. (2013). Spearman's correlation verified the correlation between numerical or ordinal variables and indicators, Hollander et al. (2013) which is a limited measure between -1 and 1, the closer the coefficient is to -1, the greater the negative correlation; and the closer the coefficient is to 1, the greater the positive correlation. We used R (version 3.5.0) as the analysis software.

3. RESULTS AND DISCUSSIONS

The descriptive analysis of the categorical variables for the characterization of the sample, presented below (Table 2), allows us to conclude that the most frequent countries are Mexico (14.2%), Argentina (13.0%), and Colombia (12.1%), followed by Peru (11.10%) and Chile (9.0%), and together they represent 59.40% of the total sample, which is, 8,356 companies of the total 14,064. Most data were collected in 2006 (40.6%), 2010 (29.30%), and 2017 (13.20%), representing 83.10% of the total sample, which translates to 11,680 of the total 14,064 companies. According to the classification of the World Bank's Enterprise Survey, we found that most companies were small (5 to 19 workers) (39.1%) and medium-sized (20 to 99 workers) (36.4%), representing 75.50% of the total sample, that is 10,621 companies, out of a total 14,064. Most companies did not use technology licensed from foreign companies (85.8%) and did not have internationally recognized quality certification (77.1%) and, consequently, did not have evidence of the use of relational triggers (69.2%), which may be associated with the predominance of the small size of the companies in the sample, and their likely restriction of resources. Most companies (92.9%) did not have evidence of accelerated internationalization.

Table 2 Descriptive analysis of the characterization - category variables

Categorical variables		N	%
Country	Argentina	1822	13.0%
	Bolivia	521	3.7%
	Chile	1265	9.0%
	Colombia	1704	12.1%
	Costa Rica	264	1.9%
	El Salvador	854	6.1%
	Ecuador	512	3.6%
	Guatemala	731	5.2%

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Table 2 continued			
	Honduras	441	3.1%
	Mexico	1999	14.2%
	Nicaragua	526	3.7%
	Panama	322	2.3%
	Paraguay	568	4.0%
	Peru	1566	11.1%
	Dominican Republic	199	1.4%
	Uruguay	702	5.0%
	Venezuela	68	0.5%
Year	2006	5709	40.6%
	2010	4118	29.3%
	2011	1544	11.0%
	2016	503	3.6%
	2017	1853	13.2%
	2018	337	2.4%
Size of company	Small size: 5-19 workers	5497	39.1%
	Medium size: 20-99 workers	5124	36.4%
	Large size: 100 or more workers	3443	24.5%
Use of technology licensed from foreign companies	No	12072	85.8%
	Yes	1992	14.2%
Quality certification	No	10847	77.1%
	Yes	3217	22.9%
Internationally recognized	No	13060	92.9%
	Yes	1004	7.1%
Accelerated internationalization	No	9731	69.2%
	Yes	4333	30.8%

Source: the authors

Table 3 **Descriptive analysis of numerical variables for characterization**

Numerical variables	Mean	SD	Min.	1ºQ	2ºQ	3ºQ	Max.
Company age	26.26	20.30	1.00	12.00	21.00	34.00	210.00
Proportion of total sales exported directly (%)	9.60	23.20	.00	.00	.00	4.00	100.00

Source: the authors

The descriptive analysis of the numerical variables for the characterization of the sample, presented below (Table 3), indicates that (a) the average age of the companies was 26.26 years, with a standard deviation of 20.30, with a minimum age of one year and a maximum of 210 years; (b) the average of the total proportion of sales exported directly was 9.60%, with a standard deviation of 23.20%, with the minimum observed proportion of 0% and the maximum of 100%.

The descriptive analysis of the items of the composite variable "perception of the seriousness of institutional obstacles", listed below (Table 3), allows us to infer that almost half the companies (47.4%) judged that access to financing (IO1) is not an obstacle or is a minor obstacle and almost half the companies (48.8%) judged that corruption (IO2) is a main or very serious obstacle. Almost one-third of the com-

panies (30.8%) judged that an inadequately trained workforce (IO3) is a moderate obstacle. Almost half the companies (46.3%) judged that labor legislation (IO4) is not an obstacle or is a minor obstacle and 40.4% of the companies judged that political instability (IO5) is a main or very serious obstacle. 41.3% of the companies judged that informal competition practices (IO6) are a main or very serious obstacle; while almost one-third of the companies (31.3%) judged that fees and taxes (IO7) are a moderate obstacle. More than half of the companies (54.3%) judged that transport (IO8) is a major or very serious obstacle.

Table 4 **Descriptive analysis of the items of the compound variable "institutional obstacles"**

Composed variable	Item			N	%
Institutional obstacles	IO1	It is not an obstacle.		3808	27.1%
		It is a minor hurdle.		2858	20.3%
		It is a moderate obstacle.		4040	28.7%
		It is a major hurdle.		2251	16.0%
		It is a very serious obstacle.		1107	7.9%
	IO2	It is not an obstacle.		2835	20.2%
		It is a minor hurdle.		1979	14.1%
		It is a moderate obstacle.		2392	17.0%
		It is a major hurdle.		3348	23.8%
		It is a very serious obstacle.		3510	25.0%
	IO3	It is not an obstacle.		2797	19.9%
		It is a minor hurdle.		2752	19.6%
		It is a moderate obstacle.		4332	30.8%
		It is a major hurdle.		3126	22.2%
		It is a very serious obstacle.		1057	7.5%
	IO4	It is not an obstacle.		3815	27.1%
		It is a minor hurdle.		2697	19.2%
		It is a moderate obstacle.		4328	30.8%
		It is a major hurdle.		2216	15.8%
		It is a very serious obstacle.		1008	7.2%
	IO5	It is not an obstacle.		2948	21.0%
		It is a minor hurdle.		2149	15.3%
		It is a moderate obstacle.		3282	23.3%
		It is a major hurdle.		3390	24.1%
		It is a very serious obstacle.		2295	16.3%
	IO6	It is not an obstacle.		2509	17.8%
		It is a minor hurdle.		2128	15.1%
		It is a moderate obstacle.		3612	25.7%
		It is a major hurdle.		3256	23.2%
		It is a very serious obstacle.		2559	18.2%
	IO7	It is not an obstacle.		2443	17.4%
		It is a minor hurdle.		2125	15.1%
		It is a moderate obstacle.		4400	31.3%
		It is a major hurdle.		3403	24.2%
		It is a very serious obstacle.		1693	12.0%
	IO8	It is not an obstacle.		4376	31,1%
		It is a minor hurdle.		3256	23,2%

Table 4 continued		
It is a moderate obstacle.	3442	24,5%
It is a major hurdle.	1859	13,2%
It is a very serious obstacle.	1131	8,0%

Source: the authors.

Subtitles. Access to finance (IO1), corruption (IO2), inadequately trained workforce (IO3), labor legislation (IO4), political instability (IO5), informal competition practices (IO6), fees and taxes (IO7), transport (IO8).

The descriptive analysis of the items of the composite variable "innovation efforts", presented below (Table 5), allows us to infer that: (a) most companies (60.9%) introduced new or significantly improved products or services in the last three years (IE1); (b) more than half the companies (53.3%) introduced a new or significantly improved process in the last three years (IE2), and (c) most companies (61.7%) did not invest in R&D in the last fiscal year (IE3).

Table 5 Descriptive analysis of the items of the composite variable innovation efforts"				
Composed variable	**Item**		**N**	**%**
Innovation efforts	IE1	No	5499	39.1%
		Yes	8565	60.9%
	IE2	No	6562	46.7%
		Yes	7502	53.3%
	IE3	No	8679	61.7%
		Yes	5385	38.3%

Source: the authors.

Subtitles. Introduction of new or significantly improved products or services in the last three years (IE1); introduction of a new or significantly improved process in the last three years (IE2); investments in R&D in the last fiscal year (IE3).

Summarizing the descriptive data, we observed, regarding innovation efforts, that most companies in the sample (60.9%) introduced new or significantly improved products or services in the last three years, and half (53.3%) introduced a new or significantly improved process in the last three years. However, the majority (61.7%) did not invest in R&D in the last year.

Regarding the perception of institutional obstacles, the Latin American companies that considered transportation (54.3%), corruption (48.8%), political instability (40.4%) and informal competition practices (41.3%) as the main or very serious obstacle; as a moderate obstacle the pointed fees, and taxes (31.3%) and the workforce with inadequate training (30.8%); and, finally, as a minor obstacle or obstacle, access to finance (47.4%) and labor legislation (46.3%).

Most companies did not use technology licensed from foreign companies (85.8%) and did not have internationally recognized quality certification (77.1%). Hence, most companies did not have evidence of the use of relational triggers (69.2%), which may be associated with the predominance of the small size companies in the sample and their likely restriction of resources. Another relevant aspect was that most

companies (92.9%) had no evidence of accelerated internationalization, that is, the number of companies with a maximum of 15 years of foundation and at least 5% of sales was not significant in the sample.

3.1 FACTOR ANALYSIS

The factor analysis of first-order constructs (innovation efforts and institutional obstacles) aimed to verify the need to exclude any item (question) that was not contributing to the formation of the constructs. Items with factor loadings smaller than .50 should be eliminated since by not contributing significantly to the formation of the latent variable, they undermine the reach of the basic assumptions for the validity and quality of the indicators, created to represent the concept of interest Hair et al. (2009).

Table 6 Factorial analysis of the constructs

Construct	Item	Initial model			Final model		
		FL[1]	Com[2]	Weight	FL[1]	Com[2]	Weight
Institutional Obstacles	IO1	.54	.30	.18	.54	.30	.19
	IO2	.69	.48	.23	.71	.51	.25
	IO3	.61	.38	.21	.61	.37	.22
	IO4	.64	.41	.22	.64	.41	.23
	IO5	.70	.49	.24	.72	.51	.26
	IO6	.49	.24	.17	.50	.25	.18
	IO7	.68	.46	.23	.68	.47	.24
	IO8	.44	.20	.15	-	-	-
Innovation efforts	IE1	.86	.74	.41	.86	.74	.41
	IE2	.86	.74	.41	.86	.74	.41
	IE3	.79	.63	.38	.79	.63	.38

Source: the authors.
[1]Factor loading; [2]commonality; access to finance (IO1); corruption (IO2); workforce with inadequate training (IO3); labor legislation (IO4); political instability (IO5); informal competition practices (IO6); fees and taxes (IO7); transport (IO8); introduction of new or significantly improved products or services in the last three years (IE1); introduction of a new or significantly improved process in the last three years (IE2); investments in R&D in the last fiscal year (IE3).

Presents that all items, of all constructs, had a factor loading greater than .50, except for item IO8 (transport), from the construct "institutional obstacles", which we removed from the analysis.

Then, analyzing the final model, all items had significant weight and factor loadings above 0.50, revealing the quality of the variables and their formative items, namely (a) innovation efforts - introduction of new or significantly improved products or services in the last three years (IE1); introduction of a new or significantly improved process in the last three years (IE2); investments in R&D, in the last fiscal year (IE3), and (b) institutional obstacles – access to finance (IO1), corruption (IO2), inadequately trained workforce (IO3), labor legislation (IO4), political insta-

bility (IO5), informal bidding practices (IO6), and fees and taxes (IO7).

The items with the highest factor loadings (FL) for the "innovation efforts" construct are the introduction of new or significantly improved products or services in the last three years (IE1) (FL .86); introduction of a new or significantly improved process in the last three years (IE2) (FL .86); and investments in R&D in the last fiscal year (EI3) (FL .79). For the construct "institutional obstacles", the items with the highest factor loadings are political instability (IO5) (FL .72), corruption (OI2) (FL .71), fees and taxes (OI7) (FL .68), labor legislation (IO4) (FL .64), inadequately trained workforce (OI3) (FL .61), access to financing (IO1) (FL .54), and informal competition practices (IO6) (FL .50).

The verification of the validity and quality measures of the constructs below (Table 7) demonstrate the acceptable levels of all constructs presented: (a) Cronbach's alpha (CA) and/or composite reliability (CR) above .60, (the required levels of reliability); (b) proper adjustment of the factor analysis, since all KMOs were greater than or equal to .50, and (c) unidimensionality, by the acceleration factor criterion.

Regarding the descriptive analysis of the indicators extracted from the factor analysis below (Table 8), the mean of the "institutional obstacles" indicator was 1.89, with a standard deviation of .84 and the mean of the "innovation efforts" indicator was .51, with a standard deviation of .37.

Table 7 **Constructs validation**

Construct	Items	AS[2]	CR[3]	KMO [5]	DIM [5]
Institutional obstacles	7	.75	.77	.75	1
Innovtion efforts	3	.63	.81	.64	1

Source: the authors
[2]Cronbach's Alpha (CA); [3]compound reliability (CR); [4]adequacy of the sample (AS); [5]dimensionality (DIM)

Table 8 **Descriptive analysis**

Indicator	Mean	SD	Min.	1ºQ	2ºQ	3ºQ	Max.
Institutional obstacles	1.89	.84	.00	1.30	1.92	2.51	4.00
Innovation efforts	.51	.37	.00	.00	.65	.69	1.00

Source: the authors

3.2 COMPARISON OF VARIABLES IN RELATION TO INSTITUTIONAL OBSTACLES AND INNOVATION EFFORTS

Table 9 is the comparison of categorical variables for characterization, with institutional obstacles, considering paired samples collected at random. As for the indicator of perceived severity of institutional obstacles, there was a significant difference: (a) (p-value = .027) between companies that used technology licensed from foreign

companies and companies that did not, with these having the lowest average of the indicator; (b) (p-value = .015) between companies that had and did not have internationally recognized quality certification, with these having the highest mean of the indicator.

Table 9 Comparison of categorical characterization variables in relation to insttutional obstacles

Source		N	Mean	EP	1ºQ	2ºQ	3ºQ	p-value[1]
Use of technology licensed from foreign companies	No	500	1.87	.04	1.28	1.88	2.53	.027
	Yes	500	1.99	.04	1.41	2.07	2.58	
Recognized quality certification	No	500	1.97	.04	1.39	2.02	2.62	.015
	Yes	500	1.85	.04	1.29	1.85	2.43	
Accelerated Internationally	No	500	1.85	.04	1.29	1.88	2.42	.198
	Yes	500	1.91	.04	1.33	1.94	2.52	
Relational triggers	No	500	1.84	.04	1.22	1.92	2.47	.177
	Yes	500	1.92	.04	1.36	1.93	2.51	

Source: the authors
[1] Mann-Whitney Test.

Table 10 is the comparison of categorical variables for characterization, to innovation efforts, considering paired samples collected at random. Regarding the "innovation efforts" indicator, there was a significant difference (p-value < .001) between companies concerning: (a) the use of licensed technology from a foreign company – those that made this use had a higher mean; (b) internationally recognized quality certification – those who had this certification had a higher average of the indicator; (c) evidence of accelerated internationalization – those that had such evidence had a higher average of the indicator; (d) evidence of relational triggers – those that had such evidence had a higher mean of the indicator.

Table 10 Comparison of categorical characterization variables in relation to innovation efforts

Source		N	Mean	EP	1ºQ	2ºQ	3ºQ	p-value
Use of technology licensed from foreign companies	No	500	.49	.02	0.00	.34	.68	<.001
	Yes	500	.68	.01	0.34	.68	1.00	
Quality certification	No	500	.47	.02	0.00	.34	.68	<.001
	Yes	500	.66	.02	0.34	.68	1.00	
Accelerated internationalization	No	500	.51	.02	0.00	.66	.68	<.001
	Yes	500	.62	.02	0.34	.68	1.00	
Relational triggers	No	500	.48	.02	0.00	.34	.68	<.001
	Yes	500	.66	.02	.34	.68	1.00	

Source: the authors
[1] Mann-Whitney Test.

Below we present the correlation between numerical and ordinal variables and the indicators "institutional obstacles" and "innovation efforts" (Table 10). We observed that there was a significant correlation: (a) (p-value < .050) and positive (r > .00) between the indicator "institutional obstacles" and the variables "year of collection", "company size", and "age of the company". Thus, the greater any of these variables, the greater the indicator tends to be and vice versa; (b) (p-value < .001) and negative (r < .00) between the indicator "innovation efforts" and the "year of collection", that is, the more recent the year of collection, the lower the indicator tends to be and vice versa; (c) (p-value < .050) and positive (r > .00) between the other variables and the indicator "innovation efforts"; thus, the greater any of these variables, the greater the indicator tends to be and vice versa.

Table 11 **Correlation between numerical and ordinal variables and the indicators "institutional obstacles" and "innovation efforts"**

Source	Institutional obstacles		Innovation efforts	
	r^1	p-value	r^1	p-value
Year	.07	<.001	-.11	<.001
Company size	.02	.009	.23	<.001
Company age	.02	.004	.06	<.001
Proportion of total sales exported directly	.01	.077	.20	<.001

Source: the authors
[1]Spearman's Correlation.

4. CONCLUSIONS AND RECOMMENDATIONS

The descriptive analysis of the sample allowed us to conclude that the most frequent countries are Mexico (14.2%), Argentina (13.0%) and Colombia (12.1%), followed by Peru (11.10%) and Chile (9 .0%), and together they represent 59.40% of the total sample, which is 8,356 companies out of a total of 14,064. The average age of the companies analyzed was 26.26 years old; and according to the classification of the Enterprise Survey, of the World Bank, we found that most companies were small (5 to 19 workers) (39.1%) and medium-sized (20 to 99 workers) (36 .4%), representing 75.50% of the total sample, which is 10,621 companies out of a total of 14,064.

Considering the factor analysis performed, it was possible to conclude that the items with the highest validity and quality power for the construct "innovation efforts", are the introduction of new or significantly improved products or services in the last three years old; the introduction of a new or significantly improved process in the last three years; and, finally, investments in R&D, in the last fiscal year.; For the "institutional obstacles" construct, they are political instability, corruption, fees and taxes, labor legislation, inadequately trained workforce, access to finance, and informal competition practices.

We identified significant and distinctive innovation efforts in the groups of Latin American companies with internationally recognized quality certification; evidence of use of foreign licensed technology; accelerated internationalization, and finally, evidence of use of relational triggers. However, it was the group without internationally recognized quality certification that had the highest average perception of the severity of institutional obstacles.

In the analyzed data, we observed a significant and positive correlation between age, size, perception of the severity of institutional obstacles, and efforts to innovate. Thus, the greater the age and size of a Latin American company, the greater its perception of the seriousness of institutional obstacles and its efforts to innovate.

This research offers unprecedented contributions to academia and business since it is the first time that a study jointly and empirically assesses the perception of the seriousness of institutional obstacles and innovation efforts, considering a unit of analysis as an increased number of firms from Latin American countries. It also contributes with inter and intra-group analyses, which indicate in which groups of Latin American companies the innovation efforts are more significant and distinctive – a significant aspect for the development of pro-market and pro-internationalization public policies. This study demonstrates positive patterns of correlation between age, size, perception of the seriousness of institutional obstacles, and innovation efforts, emphasizing the importance of structuring professionalization, expansion, and maturation programs for Latin American businesses.

There are two limitations to this study. The first is as the survey was performed with companies of all types and sizes, many of them were unable to specify the degree of innovation of the efforts made; in this way, the indicated innovation measure can be criticized, because, perhaps, it represents an incipient innovation effort. However, small and medium companies represent a portion that cannot be disregarded for the economy of Latin American countries, and this measure, despite being simple, is important because, currently, it is the possible measure for this type of company. The second limitation is regarding the frequency of the study, the World Bank's Enterprise Survey requires a large number of resources and due to this, it cannot be performed every year, resulting in a picture of countries with two or three focal years in the sample. Future studies could complement the results indicated by this research, remedying these limitations, by analyzing secondary data, available every year, such as, for example, patents submitted by country and by year.

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