Regional entrepreneurial ecosystems in Mexico: a comparative analysis

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Abstract

Purpose – The entrepreneurial ecosystem approach tries to understand the mechanisms underlying new business creation and helps develop tools, governmental policies and support systems that enhance the outcomes of entrepreneurship activities. To ensure a better understanding of those mechanisms, this study aims to contrast regional policies in emerging economies that are designed to foster local new business creation and development.

Design/methodology/approach – One of the Global Entrepreneurship Monitor's surveys, the National Experts' Survey, was applied to a sample of $N = 675$ key informants in Mexico at ten entities, seven of whom were categorized as non-centrally located. The authors used non-parametric statistics to compare the differences between centrally and non-centrally located experts.

Findings – The main results indicate that non-centrally located experts perceive their regions to be in a worse position than centrally located experts in terms of government policies regulation, post-school education and commercial and physical infrastructure, but surprisingly in a better position regarding
financial access, general government policy, government programs, primary and secondary education, R&D transfer, market dynamism and openness and cultural and social norms.

Practical implications – These findings have policy implications for all levels of government in Mexico, which must prioritize the homologation of opportunities for people in both large and small cities.

Originality/value – The replication of a Chilean study contributes to the empirical literature of regional entrepreneurial ecosystems in emerging economies.

Keywords Mexico, Global Entrepreneurship Monitor, Entrepreneurial ecosystems, Regional policy

Paper type Research paper

1. Introduction

From the sociospatial perspective, entrepreneurship is a local phenomenon. Interdisciplinary approaches to entrepreneurship research, such as those using sociology, business or geography (Dubini, 1989; Bahrami and Evans, 1995; Sorenson and Audia, 2000; Ritsilä, 1999; Malecki, 2018), put focus on the importance of the relationships between entrepreneurs and their local economic and social contexts (Cavallo *et al.*, 2018). Nevertheless, the regional perspective of entrepreneurship remains underdeveloped. Evidence shows that the impact of business creation and development on economic growth may be different across nations (Sternberg and Wennekers, 2005), may vary over time (Acs and Amorós, 2008; Henrekson and Johansson, 2008; Acs *et al.*, 2009). Therefore, could be important differences across

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regions inside a country (Fritsch and Mueller, 2004; Amorós et al., 2013; Audretsch et al., 2017). This research is aimed at contributing to regional analysis from the *entrepreneurial ecosystems (EE)* perspective, examining whether entrepreneurial framework conditions are the same within a country, or regional location matters for entrepreneurship activity.

The concept of EE has recently emerged to offer a systematic view of entrepreneurship activity (Cavallo et al., 2018). The EE approach tries to understand the mechanisms underlying new firm creation dynamics and helps to develop tools, public policies and other support systems that enhance entrepreneurship activity outcomes. Therefore, the recent literature regarding EE has garnered special attention from the participants of the ecosystem, mainly entrepreneurial leaders and policymakers (Stam, 2015). In keeping with Spigel (2017), the EE is an umbrella concept encompassing various perspectives on the geography of entrepreneurship rather than a coherent theory. Hence, the extant literature has also produced a considerable number of frameworks that describe the main components and key attributes of an EE (Kuratko et al., 2017). Naturally, entrepreneurs are considered to be the beating heart of an ecosystem in all the frameworks. However, scholars are still discussing ways to measure EE so as to gain a comprehensive understanding of the subject matter (Reynolds et al., 2005; Isenberg, 2011; Feld, 2012; WEF, 2013; Mason and Brown, 2014; Stam, 2015; Cavallo et al., 2018). Indeed, several scholars have highlighted the need to understand entrepreneurship in broader settings, such as regional, temporal and social arenas (Autio et al., 2014; Zahra et al., 2014; Colombelli et al., 2017).

From the regional approach, the local factors associated with innovative entrepreneurship are the basis for strong EE (Acs et al., 2014). Some empirical studies (Fritsch, 2013; Tsvetkova, 2015; Mack and Mayer, 2015; Spigel, 2017) can be linked to Baumol's (1996, p. 899) proposal that "entrepreneurial behavior changes direction from one economy to another in a manner that corresponds to the variations in the rules of the game". These "rules of the game" are shaped for local context. Because of the relevance of entrepreneurship in the creation of jobs, economic growth and the development of many geographic entities – from small villages to regions and even entire countries (Luor et al., 2014) – governments must focus on creating and improving policies and programs that foster and enhance entrepreneurial activities attending to local and/or national priorities.

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While some research (e.g. *Global Entrepreneurship Monitor (GEM)* reports, World Bank's *Ease of Doing Business*, etc.) provides analysis of the entrepreneurship context between countries, some other studies highlight the differences in EE by city and by region (Harrison and Leitch, 2010; Qian et al., 2012; Isenberg and Onyemah, 2016; Audretsch and Belitski, 2017). Even though the literature on EE is growing, the still prevalent lack of comparison between regions of the same country in emergent economies is telling. Therefore, this research contributes to the advance and understanding of the regional literature on EE, particularly in Latin America, by conducting the replication of a study from Chile (Amorós et al., 2013) in Mexico. This research work deals with the different experts' perceptions of regional EE, from central to non-central regions. These perceptions are different because issues such as the government policies and programs, among other necessary conditions, change among country's regions. The experts' perceptions are important because they possess a substantial range of background information and knowledge regarding the necessary conditions for entrepreneurship, and they are selected on the basis of reputation and experience (Reynolds et al., 2005). As described by Amorós et al. (2013), this research relies on data from the GEM national team and that from Mexico, using longitudinal data for 2015-2018. These data represent the largest data-gathering project in the field of entrepreneurship in Mexico. GEM data provide us with an accurate measure of *entrepreneurial framework conditions* as the "oxygen of resources, incentives, markets, and

supporting institutions necessary for the growth of new firms" (Bosma *et al.*, 2008, p. 40). This research considers experts' perceptions of their local EE by ten entities in Mexico. Entrepreneurial framework conditions are clearly related to Baumol's (1996) proposal and are consistent with several components of the EE (Reynolds *et al.*, 2005; Isenberg, 2011; Feld, 2012; WEF, 2013; Mason and Brown, 2014; Stam, 2015; Cavallo *et al.*, 2018). As we stated, different countries and regions are expected to have different entrepreneurial framework conditions and, by consequence, different perceptions regarding the efficiency and efficacy of their EE. We hypothesize that better evaluations regarding EE will come from regions that have better access to structural and systemic conditions to facilitate the enhancement of entrepreneurship activities (Stam, 2015), generally economic center regions as the capital city.

The replication of the study conducted in Chile, which was one of the first regional studies regarding entrepreneurship conditions in a Latin American country, provided us with the opportunity to explore and compare not only in terms of methodology but also in terms of contrasting the conceptual frameworks and not missing the lens of EE literature. We consider that this replication in the Mexican context is relevant for three reasons:

(1) Mexico is the second largest economy in Latin America in terms of GDP and population, after Brazil (the 15th largest economy in the world and the 10th most populated country according IMF 2018 data), and the third in terms of geographic area, after Brazil and Argentina. These characteristics, along with the fact that it is growing in terms of entrepreneurship activities, make Mexico very attractive in terms of empirical settings.

(2) Conducting research on emerging economies, particularly from Latin America, helps to fill the gap in the literature regarding this region (López and Alvarez, 2018).

(3) Both studies relied on data from the GEM project and used longitudinal data representing the largest data-gathering projects in the field of entrepreneurship in Latin America.

The use of these data for replications that reinforce (or propose modifications) of previous studies helps in the validation of the relevance of empirical and theoretical approaches (Gulati, 2007) and also in the generalizability and external validity of studies in different settings. The rest of the paper is organized as follows. Section 2 discusses the conceptualization of regional aspects of entrepreneurship. Sections 3 and 4 describe the methodology and the empirical exercise and results, respectively. Section 5 presents the discussion and gives some conclusions and implications for future research.

2. Theoretical development: regional aspects of entrepreneurship

From the various definitions of EE, we can distinguish the ones that explicitly mention the regional or local aspects of entrepreneurship-related geography (Spilling, 1996; Neck *et al.*, 2004; Cohen, 2006; Mason and Brown, 2014; Stam, 2015; Mack and Mayer, 2015; Spigel, 2017) from the ones that do not (Van de Ven, 1993; Isenberg, 2011; Roberts and Eesley, 2011; Qian *et al.*, 2012; Acs *et al.*, 2014; Audretsch and Belitski, 2017; Auerswald and Dani, 2017; Bruns *et al.*, 2017; Kuratko *et al.*, 2017). For example, Spigel (2017, p. 50) defines EE as a combination of social, political, economic and cultural elements within a region that supports the development and growth of innovative startups. According to Bruns *et al.* (2017, p. 1) the "EE is a multidimensional set of interacting factors that moderate the effect of entrepreneurial activity on economic growth" with a more general definition. Both types of

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definitions are consistent with the presence of dynamic elements or factors, although they may not be the same in this definition.

Hence, we identify two interesting avenues to improve knowledge regarding the "boundaries" of EE:

(1) analyze in depth the local–regional geographic level in the EE literature; and

(2) move toward a consensus in academic research regarding geography's relevance as a factor of EE.

The first avenue is related to identifying the precise boundaries of an ecosystem, which may be an impossible task (Iansiti and Levien, 2004) because of the remarkable differences in local economic and social contexts. In fact, EE literature has been criticized for its poor clarity concerning the level of analysis (Stam, 2015); however, empirical research at the city level (Saxenian, 2006; Mack and Mayer, 2015; Spigel, 2017) demonstrates the importance of location. For the second avenue, this research considers the entrepreneurial framework conditions of the GEM to be the correct EE factor measurements as it is the world's foremost study of entrepreneurship (Reynolds et al., 2005).

The regional level of analysis of EE must not be confused with other related concepts that consider location in the regional development literature, such as industrial districts, regional industrial clusters, regional and/or national innovations systems (Marshall, 1920; Pyke et al., 1990; Delgado et al., 2010; Arıkan and Schilling, 2011). Many of them are predecessors of EE research (Acs et al., 2017). However, there are some similarities with the regional development literature (Cavallo et al., 2018). It is considered useful to analyze EE by drawing upon regional development mechanisms, such as district, urban and localization economies (Acs et al., 2017). From the natural perspective of regions, geography provides boundaries that affect economic growth because of factors such as the development of transportation routes and the availability of natural resources that encourage firms to set up shop in specific regions where manufacturing costs are minimized (Marshall, 1895; Weber, 1909). As high-tech firms can deal with high-value input and output, the location factor may not be decisive (Cooper, 1993). However, when thinking of a start-up firm, other factors assume greater importance at that early stage, such as access to financial support and highly qualified human capital. As for qualified human capital, the levels in rural areas are significantly lower on average than they are in urban regions (Mueller et al., 2008; Van Stel and Suddle, 2008). This phenomenon may cause more people and firms to move to urban regions (Amorós et al., 2013), where the biggest city is generally the capital of the country and its surroundings. However, governments must prioritize the homologation of opportunities for people on the basis of whether they are in big cities or small cities. Small cities must be able to engage in several strategies to overcome their limitations and create vibrant entrepreneurial communities (Roundy, 2017).

For their study, Amorós et al. (2013) divided the regions into two, central and peripheral, whereas this research divides the regions into central and non-central. The peripheral regions were selected as concerning the effect of distance to the economic core, which means the opposite of the central and non-central regions because this research considers the distance to the center (Mexico City), in addition to demographics (total population) and economic indicators (regional GDP and its share of the national GDP). The literature highlights several advantages of central location, including highly educated people, a larger potential market and knowledge spillovers from universities and research institutions as explained by the agglomeration effect (Todling and Wanzenbock, 2003; Van Stel and Suddle, 2008). These advantages could be considered to be attractive for an entrepreneur but tend to divert attention from peripheral regions and some core activities, such as investment

(Roberts and Barley, 2004; Saxenian, 2006). Indeed, this explains the reasons for which governments try to foster entrepreneurial activities in peripheral regions by offering special incentives to attract investments and entrepreneurs to those regions (Frenkel *et al.*, 2003). In practice, governments can only interfere in EE by creating and improving policies and programs; however, there are other factors that would change the desired effects, which explains why many pro-entrepreneurship programs are not effective (Lerner, 2009). Nevertheless, there is evidence in support of the contention that an entrepreneurship policy should stimulate economic growth as a necessary condition for employment generation and poverty alleviation (Edoho, 2016).

Therefore, this paper is aimed at contributing to the EE literature at a regional level, particularly in Latin America, by analyzing the significant differences between the *centrally located experts* (CE) evaluations and the *non-centrally located experts* (NCE) evaluations on different EE in Mexico. It considers the before-mentioned regional aspects of entrepreneurship and the fact that urbanized regions are mostly economically stronger (Cannarella and Piccioni, 2006). In this context, we explore the perceptions and provide recommendations that may help in fostering entrepreneurial activities in both regions of Mexico, central and non-central. Consequently, this research work has policy implications that are discussed further on.

3. Empirical study and research methodology
3.1 The Mexican context
Mexico is one of the biggest countries in the world in terms of total area with 1,964,375 sq km (15th position worldwide) of which the land area comprises 1,943,945 sq km and the coastline spans 20,430 sq km (CIA, 2018). Mexico is also the 11th largest economy in the world and the second largest in Latin America (World Bank, 2018). Mexico's geographical location in North America, bordering the Caribbean Sea and the Gulf of Mexico, between Belize and the USA, and bordering the North Pacific Ocean, between Guatemala and the USA, makes Mexico a good case for this kind of study because it is also the only Latin American country in North America. In particular, the target locations of this study are ten out of 32 entities in Mexico. For data collection purposes, in this study, non-central regions are those located at the subnational/regional levels in the Northwest (Chihuahua), Northeast (Nuevo León and San Luis Potosí), Southeast (Yucatán) and West (Guanajuato, Jalisco, and Zacatecas) of Mexico, and central regions are those located in the metropolitan areas of Mexico City, Puebla and Querétaro. The capital of Mexico, Mexico City, is the fourth largest city in the world (United Nations, 2018) and accounts for 7 per cent of the country's population and 40 per cent of the economic activity. Puebla, with 5 per cent of the country's population, is a conurbation: (this metropolitan area is located only 138 km from Mexico City). Querétaro is part of the West region, but it is closer in distance to Mexico City and comprises 2 per cent of the country's population and economic activity; hence, we included it in "central".

NCEs reside and operate at the subnational level in the northwest, northeast, southeast and west of Mexico; these regions are more than 350 km from Mexico City. The northern regions have been related to higher levels of economic development and comprise the largest land area, with close commercial relations with the USA, and with their main economic activities being related to agriculture, cattle raising, logging, mining and manufacturing food, glass, beer, wood, steel, footwear, etc. The western regions are geographically diverse and include valleys, mountain chains and coastal plains; their main economic activities are related to agriculture, cattle raising, fishing, logging, mining and industries such as textiles, footwear, petrochemistry, sugar, tequila and food. The southeastern regions are big land

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areas surrounded by water. Their main economic activities are related to agriculture (with limitations), cattle raising, logging, and fishing. Most of the political, cultural and economic activities of Mexico are concentrated in the central region, although Mexico City is one of the smallest entities of the country by land area; its main economic activities are related to agriculture, cattle raising, logging, mining and industries such as textiles, food, transportation, automotive, petrochemistry, footwear, wood, cement, rubber, oil and machinery. In sum, many natural resource-based industrial sectors are the most prevalent elements that contribute to the Mexican economy, and geography has an influence on economic development, which is given by way of human capital (Esquivel, 2000). These geographic differences in local economic and social contexts account for the heterogeneous behavior of peripheral regions as opposed to central regions (Amorós *et al.*, 2013) that this research study considered. The economic, geographic and demographic profiles provide a clear distinction between the central region and non-central regions (see Appendix 1).

In terms of economic participation, the seven entities from the non-central regions contributed 24 per cent of the national GDP, and the three entities from the central regions contributed 24 per cent of the national GDP (INEGI, 2018; World Bank, 2018). Politically, when the ex-president of Mexico, Enrique Peña Nieto (EPN), took up his six-year mandate (2013-2018), he decreed the creation of the National Institute of Entrepreneurship (INADEM) on January 14, 2013. The INADEM, in summary, was an administrative division decentralized from the Ministry of Economy in Mexico that would regulate and create governmental policies and programs that could increase the contribution of new and existing firms to economic development and social welfare (Official Journal of the Federation of Mexico, January 14, 2013). This means that the INADEM was the main regulator of EE in Mexico during the sample period (2015-2018); however, this work of research must consider the fact that, in a four-year period (2014-2018), the Mexican government reduced the budget for entrepreneurial programs of the INADEM by 59 per cent (González, 2018, September 20). Recently, the incoming government of Andres Manuel López Obrador (AMLO), the mandate of which will last another six years (2019-2024), announced the dissolution of the INADEM in 2019 (Saldaña, 2018, December 24). Consequent to the analysis of the comparison between central and non-central regions in terms of EE, this study has several implications for Mexico's regional and national public policies, which are presented at the end of the paper.

3.2 Data description

The GEM provides consistent data to develop an empirical study using the *National Experts' Survey*, one of the worldwide standard questionnaires of the GEM methodology (Levie and Autio, 2008). The National Experts' Survey provides information regarding the entrepreneurial framework conditions defined by Reynolds *et al.* (2005), and this information is consistent with several components of EE, e.g. financial support, government policies (general and regulation), government programs, entrepreneurial education (primary and secondary and post-school), R&D transfer, commercial and professional infrastructure, internal market (dynamics and openness), access to physical infrastructure and cultural and social norms. The National Experts' Survey uses information that is based on the informed judgment of experts regarding the status of each entrepreneurial framework condition in their own countries and/or regions. National and regional experts were selected on the basis of reputation and experience with EE. Nevertheless, the GEM Mexico National team tried to ensure that experts with a substantial range of backgrounds and knowledge were chosen in each region, with each country's national GEM team doing the same with its selection of experts in each region. Although the national teams were responsible for using their own networks and contacts within Mexico to select four individuals who were experts in each of

the nine entrepreneurial framework conditions (Reynolds *et al.*, 2005) by entity and by year, technically, the sample is a convenience sample.

In the case of Mexico, since 2015, a specific regional approach has followed those in other countries such as Chile, Germany, Spain and the UK. The GEM Mexico National team has replicated the National Experts' Survey in each of the previously defined regions within the country. Each year, the key informant experts were personally interviewed and asked to complete the National Experts' Survey self-administered questionnaire. As described in the GEM methodology (Reynolds *et al.*, 2005) and the original study that we want to replicate (Amorós *et al.*, 2013), these experts were selected following a strict protocol:

- Every year, regional sub-teams were instructed to select at least four experts considered to be particularly knowledgeable in each of the general entrepreneurial framework conditions (nine entrepreneurial framework conditions times four experts = 36 respondents). Each team has a list with more than 36 experts just in case some of them cannot complete the interview owing to their schedules as active professionals. This way, another key informant who has similar experience and knowledge could replace them.

- The expected four respondents per category consisted of the following characteristics: at least one entrepreneur, at least two suppliers of the entrepreneurial framework conditions and at least one observer, such as an academic with specific expertise in the area. In some cases, more than 36 respondents and central regions were repeated at least for two years (see Appendix 2).

- Selection criteria for regional interviews were related to their regional location and the resonance of their business or professional activity in the local economic development of the sub-national regions.

- Once contacted with a detailed explanation of the GEM project, virtually, all experts agreed to participate in the interview and complete the questionnaire. For subsequent years, the regional teams were encouraged to contact experts from previous years as respondents for the self-completed questionnaire. The typical rotation was approximately 25 per cent of new experts each year.

3.3 Sample characteristics

The pool of data covered the period of four years, 2015-2018, of regional National Experts' Survey surveys in Mexico with a total of $N = 675$ experts comprising 266 CE and 409 NCE. CE comprises individuals who reside and develop their entrepreneurship activities in Mexico City, Puebla or Querétaro. NCE resides and develop their entrepreneurship activities at the sub-national levels in seven different entities, namely, Chihuahua, Guanajuato, Jalisco, Nuevo León, San Luis Potosí, Yucatán and Zacatecas. A description of the entire sample and the two subsamples, CE and NCE, is provided in Table I. Tests were conducted to evaluate similarities in the samples. Pearson's chi-squared test revealed that the samples were not significantly different, except for the gender composition between CE and NCE.

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3.4 Measures

The National Experts' Survey is divided into sections that evaluate nine general categories: financial support, government policies, government programs, entrepreneurial education, R&D transfer, commercial and professional infrastructure, internal market, physical infrastructure and cultural and social norms. Empirical studies (Levie and Autio, 2008, p. 248)

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Sample characteristics	Total	% of total	CE	% of total	NCE	% of total
Demographics						
Average age	44.7	Years	46.9	Years	43.2	Years
Male	492[a]	72.9[b]	210	78.9	282	68.9
Female	183	27.1	56	21.1	127	31.1
Educational attainment						
Vocational professional	14	2.1	6	2.3	8	2.0
University/College	206	30.5	77	28.9	129	31.5
MA, PhD	455	67.4	183	68.8	272	66.5
Primary entrepreneurial framework condition expert specialization						
Financial support	77	11.4	31	11.7	46	11.2
Government policies	73	10.8	28	10.5	45	11.0
Government programs	72	10.7	28	10.5	44	10.8
Education and training	77	11.4	30	11.3	47	11.5
R&D transfer	77	11.4	32	12.0	45	11.0
Commercial and professional Infrastructure	75	11.1	31	11.7	44	10.8
Market openness	72	10.7	29	10.9	43	10.5
Access to physical infrastructure	76	11.3	29	10.9	47	11.5
Cultural and social norms	76	11.3	28	10.5	48	11.7
Expert specialization						
Entrepreneur	393	58.2	154[a]	57.9[b]	239[a]	58.4[b]
Investor, financer, banker	135	20.0	55	20.7	80	19.6
Policy maker	233	34.5	91	34.2	142	34.7
Business and support services provider	331	49.0	124	46.6	207	50.6
Educator, teacher, entrepreneurship researcher	249	36.9	92	34.6	157	38.4

Table I.
Sample composition
(*N* = 675)

Notes: CE = centrally located experts; NCE = non-centrally located experts. [a]Valid cases for each variable; [b]percentage based on total valid cases for each variable

have shown that government policies, entrepreneurial education and the internal market present two sub-divisions each. Hence, in total, there are 12 entrepreneurial framework conditions to evaluate. These 12 factors are measured using multi-item scales that contain between two and eight questions. The questions are answered on a nine-point Likert scale (where "completely false" = 1 and "completely true" = 9). The standard National Experts' Survey has 82 questions that also measure other items related to the entrepreneurial environment in the country (region). The complete National Experts' Survey is available on the GEM project webpage (www.gemconsortium.org)[1].

Replicating the same procedures described by Amorós *et al.* (2013), this work of research measured the internal consistency of each entrepreneurial framework condition, using the Cronbach's α measure[2]. Cronbach's α is commonly used to indirectly indicate the degree to which a set of items from a test or survey measures a single unidimensional latent construct. On the basis of the assumption that intercorrelation among specific questions (each section of the National Experts' Survey) measures the same construct, this statistical indicator tells us whether it is possible to apply a variable reduction procedure such as the use of means or other component measures (the likes of factor analysis or principal component analysis). The theoretical range of the Cronbach's α is 0-1. The Cronbach's α test was conducted for each of the 12 entrepreneurial framework conditions[3]. The results of these analyses are presented in Table II. As we can see, most of the α coefficients are above the recommended 0.70 (Nunnally, 1978), providing evidence of acceptable reliability and consistency with the

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Scales	No. of items	Cronbach's α	
Financial support	8	0.794	Regional entrepreneurial ecosystems
Government policy: general	3	0.834	
Government policy: regulation	4	0.803	
Government programs	6	0.865	
Entrepreneurial education: primary and secondary	3	0.881	
Entrepreneurial education: post-school	3	0.834	
R&D transfer	6	0.845	
Commercial infrastructure	5	0.867	
Internal market: dynamics	2	0.935	
Internal market: openness	4	0.810	
Physical infrastructure	5	0.805	**Table II.**
Cultural and social norms	5	0.888	Scale reliability

cross-national use of the National Experts' Survey. Therefore, we can use variable reduction procedures to analyze the 12 entrepreneurial framework conditions as described in the next section.

3.5 Method
The methodology to analyze differences between CE and NCE involved the same two main steps. We strictly followed the same procedures described in Amorós *et al.* (2013). The first step involved calculating summarizing variables of the entrepreneurial framework conditions using *principal component analysis* (PCA) and the second involved evaluating differences between the perceptions of experts located in the central region and those located in non-central regions. As previously described, we first calculate the Cronbach's α for each of the 12 entrepreneurial framework conditions and then proceed to the PCA. The PCA is useful because it is a well-established statistical standard tool in modern data analysis[4] for examining complex data that can help us to reduce dimensionality by using a linear combination of optimally weighted observed variables (orthogonal components[5]) (Stevens, 1992; Dunteman, 1994; Lagona and Padovano, 2007). The result of the PCA is a set of summarizing new constructs containing most of the variation within the data (Jolliffe, 2002). Indeed, in a previous internal consistency validation process of the total questionnaire, we proceed to perform the Bartlett and Kaiser–Meyer–Olkin (KMO) tests to check whether the coefficients of the potential new variables are different than 0. The KMO statistic is 0.902, above the 0.5 acceptable, indicating that PCA is viable with our sample (Dziuban and Shirkey, 1974); in addition, a high level of significance ($p < 0.01$) is obtained from the Bartlett (below 0.5) test (Tobias and Carlson, 1969). In this research study, as well as that by Amorós *et al.* (2013), the PCA was preferred because it calculates the linear combination of original variables (questions from the National Experts' Survey) into a new variable, which, in this case, comprises the 12 new entrepreneurial framework condition values per expert, accounting for as much information and variation exhibited in the original variables as possible (Hair *et al.*, 1995).

Once we calculate the PCA, we test the differences between the perceptions of CE and NCE; thus, normality tests were conducted to determine whether the values obtained from the experts' responses were normally distributed. The results of these tests (Kolmogorov–Smirnov and Shapiro–Wilk) revealed that most of the 12 entrepreneurial framework conditions considered were not normally distributed for both groups. Therefore, the Mann–Whitney U non-parametric test for means comparisons was selected as the most appropriate

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method by which to compare both groups (Amorós *et al.*, 2013). The Mann–Whitney U test has been reported as being considerably more efficient and robust than the *t*-test when sample distributions are not normal (Conover, 1998).

4. Results

The results of the Mann–Whitney U test are reported in Table III. In total, two significant differences were found between the two groups regarding the studied entrepreneurial framework condition. Government programs ($z = −2.613, p = 0.009$) and R&D transfer ($z = −2.009, p = 0.045$) were perceived to be more favorable in non-central regions. Then, NCE also had better perceptions than their CE counterparts with regard the general government policy, as well as government programs, which means that the government had higher priorities at the local level of government to support new businesses. For instance, the INADEM concentrated on specific sectors of the economy that were outside of the main central economic activities (Official Journal of the Federation of Mexico, 2013, January 14), and the local governments had their own budgets to support other types of programs, which improved the perceptions of NCE.

These results also reflect the relevance and effectiveness of having region-based policies and programs (Amorós *et al.*, 2013) and to consider each region as an independent EE. Nevertheless, with respect to the regulation of governmental policies, we found the opposite perceptions to be worst for NCE; thus, local governments lack control of the policies and programs that they performed well. Conversely, R&D transfer had surprisingly better

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Scales	Group	Valid cases	Mean	SD	Mean ranges	Mann–whitney U	Z
Financial support	CE	266	3.95	1.25	327.93	51,719.5	−1.084
	NCE	409	4.06	1.28	344.55		
Government policy: general	CE	266	4.70	2.04	323.58	50,562.5	−1.549
	NCE	409	4.95	2.07	347.38		
Government policy: regulation	CE	266	3.89	2.04	344.92	52,557.0	−0.743
	NCE	409	3.73		333.5		
Government programs	CE	266	4.93	1.73	313.7	47,933.0	−2.613***
	NCE	409	5.29	1.74	353.8		
Entrepreneurial education: primary and secondary	CE	266	2.87	1.55	327.65	51,643.0	−1.117
	NCE	409	3.07	1.78	344.73		
Entrepreneurial education: post-school	CE	266	5.65	1.71	348.27	51,664.0	−1.104
	NCE	409	5.51		331.32		
R&D transfer	CE	266	4.03	1.61	319.31	49,426.0	−2.009**
	NCE	409	4.30	1.63	350.15		
Commercial infrastructure	CE	266	4.72	1.89	341.46	53,477.0	−0.372
	NCE	409	4.66	1.76	335.75		
Internal market: dynamics	CE	266	4.86	2.31	335.03	53,606.0	−0.321
	NCE	409	4.93	2.14	339.93		
Internal market: openness	CE	266	3.77	1.53	328.45	51,855.5	−1.027
	NCE	409	3.93	1.63	344.21		
Physical infrastructure	CE	266	6.62	1.67	348.54	51,593.0	−1.133
	NCE	409	6.47	1.71	331.14		
Cultural and social norms	CE	266	5.40	2.00	334.2	53,387.0	−0.408
	NCE	409	5.47	1.91	340.47		

Table III.
Mann–Whitney U
test results

Notes: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$ (two-tailed)

significant perceptions of NCE than it did from CE, which means that, even though most of the best universities are centrally located, university research in non-central regions still continues to be performed at a good level, and there are probably significant numbers of scientific parks, firms and entrepreneurs conducting high-level R&D.

For the rest of the entrepreneurial framework conditions, even though there are no significant differences, it is interesting to discuss ways in which some experts' perceptions are better for non-central regions when compared with central ones. Financial support had better NCE perceptions than CE perceptions, and this entrepreneurial framework condition includes issues such as the perception of the adequacy of debt and equity funding and funding from private individuals, venture capitalists, initial public offerings (IPOs) and government subsidies, which we expected would be better in central regions as is the case with many Latin American countries (Romani *et al.*, 2009; Amorós *et al.*, 2013).

Regarding entrepreneurial education, our findings showed that, at primary and secondary school levels, perceptions were slightly better at NCE as well; however, at the post-school level, the perceptions were better in CEs. These are very well explained by the agglomeration effect in regional development literature that says that urban regions ("central" in our case) include, among others, a higher density of highly educated people and knowledge spillovers from universities and research institutions (Todling and Wanzenbock, 2003; Van Stel and Suddle, 2008). This means that most (if not all) best universities are centrally located.

The expected disparity of infrastructure (Amorós *et al.*, 2013) also is not evident in the Mexican case, where NCE had better perceptions than CE in commercial and physical infrastructure. On the Mexican presidential mandate of EPN, during which all our sample was collected, public investment in infrastructure declined by 24 per cent (Migueles, 2018b, August 8), representing fewer and smaller infrastructure projects in the non-central regions because the central regions are always accorded higher priority because of the population density and economic contribution. Basically, the quality, costs and accessibility of basic utilities and communication services for new and growing firms. These are issues that include specific perceptions regarding the adequacy of support for new and growing firms provided by the available physical infrastructure (roads, utilities, communications, etc.). They also include the adequacy of the support provided by commercial and business service providers, such as lawyers, accountants, consultants, economists, market analysts and survey vendors, as well as entrepreneurs that need them (Reynolds *et al.*, 2005), was weaker for the NCE perceptions.

The internal market showed differences that are more favorable for NCE than they are for CE regarding more perceived market dynamism and openness. The better market dynamism could be explained because a small incremental change in central regions can go unnoticed by the population; however, in non-central regions, any change in the market can be critical for many actors, including new and growing firms (Amorós, *et al.*, 2013). Market openness, which has to do with more researchers at universities, business associations, chambers of commerce and government agencies related to the economy and its development, is more accessible and available in non-central regions than ever before. There is evidence in Latin America that entrepreneurship support programs and goods market efficiency are the factors that positively influence the creation of university spinoffs (Montiel-Campos, 2018), informing us to expect more business creation in non-central regions where there are established universities with entrepreneurship support mechanisms for the case of Mexico.

Finally, in our study, we found that cultural and social norms were better perceived by NCE than by CE. There are studies that consider cultural and social norms to be a

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significant influence present in local communities (Wach, 2015) that can change how business is conducted and force firms to adapt to local sociocultural requirements. We can also interpret it as people living in non-central regions, who find greater motivation, and there are aspirational factors involved with culture. Probably, if there is a case of a local successful entrepreneur, then more people would like to pursue an entrepreneurial opportunity, whereas in central regions, it is more difficult to be amazed by small successes. All these results should revive the debate regarding the need to understand EE in a broader range of settings (Autio et al., 2014; Zahra et al., 2014; Colombelli et al., 2017) by considering the important dimension of geography and how competition between central regions and non-central regions pitted against them inside a country differ in terms of economic and social contexts, including entrepreneurship.

5. Discussion

According to the United Nations (2018), 55 per cent of the world's population lives in urbanized areas. For North America, this is 82 per cent, and for Latin America and the Caribbean, this is 81 per cent. Mexico is no exception. Consequently, the three entities in our sample that constitute the central region are comparable to the sum of the seven entities from the defined non-central regions in terms of population and contribution to national GDP. Mexico (like many other Latin American countries, for example, Chile) has historically highly concentrated socioeconomic and political areas, particularly around the capital of the country. The exponential expansion of the Mexico City metropolitan area over the past 20 years and the creation of a "Megalopolis" that includes other cities around Mexico City (which is our focus of analysis and includes Puebla and Querétaro) make very relevant the study and comparison of non-central locations and the main metropolitan area of the country. Hence, we were expecting better perceptions from the central regions that have better access to systematic and structural conditions to enhance entrepreneurship activities (Stam, 2015). Moreover, small cities may not have some of the same key components as EE in large urban centers (Roundy, 2017). In the non-central regions, most of the entrepreneurial framework conditions are also derived from the agglomeration effects (Todling and Wanzenbock, 2003; Van Stel and Suddle, 2008). Nevertheless, our findings indicate that *NCEs perceive their regions as being in a worse position than CE in terms of government policy regulation, post-school education and commercial and physical infrastructure; however, surprisingly they perceive their regions as being in a better position regarding financial access, general government policy, government programs, primary and secondary education, R&D transfer, market dynamism and openness* and *cultural and social norms*. Those eight entrepreneurial framework conditions were better perceived by NCE as opposed to four entrepreneurial framework conditions that were better perceived by CE. In contrast with Amorós et al. (2013), where five entrepreneurial framework conditions were better perceived by NCE and seven entrepreneurial framework conditions were better perceived by CE, we highlight that the results show an inverse proportion, with most of the best perception levels of entrepreneurial framework conditions in non-central regions in Mexico rather than in central regions as is the case with Chile. Better results were expected in central regions for financial support for instance (Amorós et al., 2013). Because the central areas of a country contain many of the financial industry activities (Romani et al., 2009), our results are very relevant. Our main findings contribute to the debate whether policies or entrepreneurship programs are one size fits all, that is, whether they fit all contexts; thus, it is always relevant to understand the specific (regional) nature of the systematic and structural conditions where entrepreneurship activities flourish. However, we highlight that each country must focus its efforts on the homologation of entrepreneurial opportunities in all regions. The

replication in Mexico of the study in Chile (Amorós *et al.*, 2013) helped us to continue understanding this regional approach in the EE literature and to validate the relevance of continuing to test empirical studies in different settings (Gulati, 2007), which led to the filling of the gap in the literature to generalize and validate that location matters for entrepreneurs in Mexico, Chile, Latin America and virtually all other countries.

5.1 Implications

This paper has some conceptual but also practical implications for policymakers. First, it contributes to the underdeveloped field of entrepreneurship in non-central regions of emerging economies in Latin America. Second, it provides additional insights to the EE literature, through the case of Mexico, showing how its government policies and programs are relevant when are analyzed under regional approach. These are explained by the fact that not all policies or entrepreneurship programs fit all contexts (regions), implying that policymakers have to understand the specific (regional) nature of the systematic and structural conditions that enhance entrepreneurial activities. The creation of the INADEM, which affected the experts' perceptions of it as a regulator of the EE that was responsible for increasing the contribution of new and existing firms to the economic development and social welfare, is a case in point (Official Journal of the Federation of Mexico, 2013, January 14) and showed an evident decentralization strategy. Consequently, to contribute to the homologation of entrepreneurial opportunities from big to small cities, it is highly important to have policies that promote the decentralization of commercial and physical infrastructure in tandem with better regulation of all the governmental policies, and it is also highly important to incentivize universities to establish their facilities in non-central regions or at least improve the attraction of students to those regions.

In the coming years, the dissolution of the INADEM in 2019 (Saldaña, 2018, December 24) could change all these perceptions regarding the regional EE in Mexico. However, the new government has also announced plans to decentralize the economy from Mexico City by first moving some state secretariats and 2.5 million people out (Migueles, 2018a) and providing an attractive scenario to conduct further research. However, increasing the number of experts interviewed by each entity and adding more regions would help to increase the reliability of the National Experts' Survey and the results for them to continue contributing to the most recent EE literature.

5.2 Limitations and future research

Following Amorós *et al.* (2013), this work of research contributes to the underexplored field of entrepreneurship in Latin America and, specifically, the case of Mexico. Our work has some limitations that are relevant for future research. The procedure used to select experts following GEM's methodology was not random. This could cause some biases; however, as previous research highlights, in many Latin American countries, there are no harmonized indices or measures that approximate to EE dynamics. In our case, the key informants' expert information could describe "the unique situation of entrepreneurship within their own country" (Reynolds *et al.*, 2005, p. 224). As in the case of Chile, a number of Mexican experts year-by-year validate the feasibility of the entrepreneurial framework condition constructs, which is also consistent with such validation in other countries that participate in the GEM project. As the GEM methodology remarks, many of the interviewees came from the most important sectors within the economic activity of the country from both central and non-central regions. Many experts, such as public policy officials and academics working in higher education institutions, make an important contribution to validate our findings.

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Further research could increase the number of experts, and adding more regions in Mexico would help to increase the reliability of National Experts' Survey and the results. Finally, this replication, with different context settings and under the lens of EE emergent literature, adds value to previous regional entrepreneurship research. We suggest that this study be replicated (scaled up) to other larger emergent economies such as the BRICS[6] economies or other emergent economies that are part of the OECD. As Amorós *et al.* (2013 p. 129) state:

> Expanding the cohort to additional countries, either elsewhere in Latin America or on other continents, will corroborate the effects of different entrepreneurial framework conditions on peripheral and central regions around the world.

We also believe that replicated studies also contribute to the expanding entrepreneurship knowledge and, in general, enhance the transparency of economics and management studies[7] (Honig *et al.*, 2018). Therefore, this research study was limited to emerging economies in Latin America but increases knowledge on regional development.

Notes

1. See also Reynolds *et al.* (2005) and Amorós *et al.* (2013) for an extended explanation of GEM's National Experts' Survey questions.

2. α was developed originally to test the reliability of psychometric tests (Cronbach, 1951). It is used in many social sciences to test the reliability of scales that come from standard surveys.

3. Alpha's calculus procedures are continually improved (Zinbarg *et al.*, 2005), and most common statistical software use the latest procedures. In our case, we used SPSS V. 24.

4. PCA was mainly developed by Hotelling (1933), but like many multivariate methods, it was not widely used until the advent of statistical computer software. In our case, we use SPSS V. 24.

5. For comprehensive technical explanations, mathematical proofs and PCA linear algebra, see Shlens (2009).

6. The acronym BRICS stands for Brazil, Russia, India, China, and South Africa. The BRICS countries maintain policies and develop institutions that are supportive of growth (see Wilson and Purushothaman, 2003).

7. All data and procedures are full available under request to the authors.

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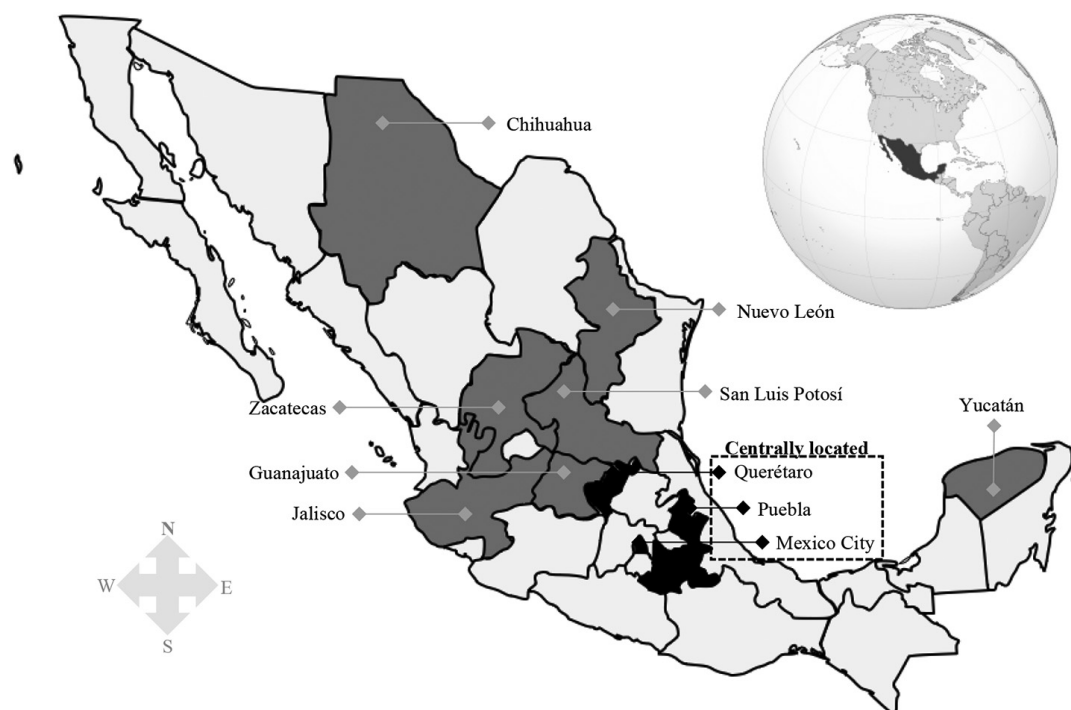
Figure A1.   AQ: 3

Region	Male	Female	Total [a]	Regional GDP [b]	(%) National GDP
Non-centrally located					
Chihuahua	1,759,753	1,809,726	3,569,479	US$706,773	3.02
Guanajuato	2,832,687	3,032,090	5,864,777	US$914,368	3.90
Jalisco	3,853,584	4,026,955	7,880,539	US$1,466,416	6.26
Nuevo León	2,550,573	2,581,365	5,131,938	US$1,559,139	6.66
San Luis Potosí	1,321,029	1,402,743	2,723,772	US$450,391	1.92
Yucatán	1,030,107	1,072,152	2,102,259	US$300,411	1.28
Zacatecas	771,809	809,766	1,581,575	US$197,171	0.84
Total	14,119,542	14,734,797	28,854,339	US$5,594,669	23.88
Centrally located					
Mexico City	4,259,051	4,726,288	8,985,339	US$3,409,016	14.55
Puebla	2,949,444	3,233,876	6,183,320	US$715,143	3.05
Querétaro	995,355	1,048,496	2,043,851	US$484,806	2.07
Total	8,203,850	9,008,660	17,212,510	US$4,608,965	19.68

Table AI.

Notes: [a] 2015 population and economic indicators in Mexico by selected locations; [b] Millions of Mexican pesos (2017 current prices)

Ta2   Appendix 2. Experts' characteristics and numbers per region

Some examples of people who can act (or be adequate) as experts in each entrepreneurial framework condition:

- *Financing*: bankers, public managers of financial programs or subsides, venture capitalists, business angels, entrepreneurs and business people in general.
- *Policies*: public charges related to economic and enterprise environment, with taxes, development agencies and entrepreneurs subject to these policies.
- *Programs*: public charges related to government programs, public agencies, business associations, development agencies, entrepreneurs and people to whom the programs are addressed.
- *Education*: all types of professors/teachers (school, college, university and professional or vocational education), public charges related to education or entrepreneurs.
- *R&D transfer*: personnel of industry, innovation, development and growth, public or private agencies, scientific parks personnel, university researchers, engineers, some types of entrepreneurs.
- *Commercial and business services*: lawyers, accountants, advisors/consultants, economists, market analysts, survey vendors, entrepreneurs that need them and providers of them in general.
- *Market openness*: market analysts, some researchers at universities or business schools, business associations, chambers of commerce, government agencies related to the economy and its development and entrepreneurs.
- *Physical infrastructure*: all types of business and enterprise providers (gas, water, telephony and electricity), engineering, real estate, government agencies related to infrastructure, industrial parks and entrepreneurs.
- *Cultural and social norms*: business associations, press, the media in general, customers, providers, sociologists, entrepreneurs, foundations and trade unions.

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Location	Financial support	Government policies	Government programs	Education and training	R&D transfer	Commercial and professional infrastructure	Market openness	Access to physical infrastructure	Cultural and social norms	Total
Chihuahua	4	4	5	4	4	4	4	5	6	40
Guanajuato	17	16	15	17	16	16	17	17	19	150
Jalisco	4	4	4	4	4	5	4	4	4	37
Mexico City	8	8	8	9	9	9	8	8	8	75
Nuevo León	4	5	4	4	4	4	4	4	4	37
Puebla	9	8	8	9	8	9	9	8	8	76
Querétaro	14	12	12	12	15	13	12	13	12	115
San Luis Potosí	4	4	4	4	4	4	4	4	4	36
Yucatán	9	8	8	9	9	7	6	9	7	72
Zacatecas	4	4	4	5	4	4	4	4	4	37
Total	77	73	72	77	77	75	72	76	76	675

Table AII.
Primary entrepreneurial framework condition specializations subsamples by region