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Looking inside the determinants and the effects of entrepreneurial innovations projects in an emerging economy

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Abstract

Ongoing research agendas regarding the intersection between entrepreneurship and innovation in academia still demand analysis about the antecedents/consequences of enterprise-university collaborations. On the one hand, little is known about how enterprise-university collaborations manage their resources/capabilities to develop entrepreneurial innovation projects (antecedents), as well as how do enterprises-university collaborations capture economic benefits (consequences). On the other hand, regarding the context, there is also a gap concerning the effect of institutional voids on entrepreneurship/innovation strategies in emerging economies. This paper analyses the determinants and the consequences of entrepreneurial innovations projects within enterprise-university collaborations in an emerging economy. By using a sample of 514 Mexican enterprises, our proposed framework offers insights into the remarkable effect in the transformation of enterprises-universities' capabilities and state funds into the generation of economic value from entrepreneurial innovation projects. The contributes to the thought-provoking discussion about a future research agenda and implications for triple-helix actors in emerging economies.

Keywords: Enterprise-University Collaborations; Institutional voids; Entrepreneurial Innovations; Emerging economies; Triple-Helix; Dynamic capabilities; Institutional Economics

JEL: L26; I23; A23

1. Introduction

Ongoing research agendas regarding the intersection between entrepreneurship and innovation in the academia (Audretsch et al., 2019) still demand more analysis about the antecedents and the consequences of enterprise-university collaborations, as well as a better understanding of entrepreneurial innovations in the context of emerging economies (Autio et al., 2014; Lehmann and Menter, 2016; Feldman et al., 2019; Guerrero et al., 2019a).

Regarding the antecedents, the accumulation of knowledge has highlighted the motivations/aims, shared resources/risks, and innovation/business outcomes behind enterprises-universities collaborations (Perkmann et al., 2013). However, little is known about the adequate combination of enterprises-universities capabilities required for developing entrepreneurial innovation (Autio et al., 2014; Guerrero and Urbano, 2019b; Heaton et al., 2019). In this vein, there is also no consensus about the effect of public incentives for fostering entrepreneurship/innovation by engaging enterprise-university collaborations to develop entrepreneurial innovations (García-Quevedo, 2004; Zeng et al., 2010; Dimos and Pugh, 2016; Guerrero and Urbano, 2019b). Indeed, in emerging economies, there is also a gap concerning the effect of institutional voids on enterprise-university strategies towards entrepreneurship and innovation (Liedong et al., 2020). Therefore, new insights about the determinants of entrepreneurial innovation projects within enterprise-university are needed.

Regarding the consequences, the term "entrepreneurial innovations" has emerged without a consensus about the definition (Guerrero and Urbano, 2019b), but with certain particularities such as the generation/commercialisation of outstanding/novel innovations developed by entrepreneurs in co-creation with single/multiple triple-helix agents (Schumpeter, 1942; Von Bargen et al., 2003; Cohen, 2006; Norbäck and Persson, 2012; Autio et al., 2014; Guerrero and

Urbano, 2017; Malerba and McKelvey, 2018). However, little is known about how enterprises-university collaborations do manage the resources/capabilities to develop entrepreneurial innovation, as well as to capture a value-added (Klosften et al., 2019; Guerrero et al., 2019a,b). Therefore, new metrics/measures are still required to operationalise entrepreneurial innovations and their links with triple-helix agents across the Globe (Guerrero and Urbano, 2019b).

Regarding the context, the academic interest in understanding the dynamic roles and contributions of triple-helix actors have increased substantially[1], particularly in emerging economies, where institutional voids inhibit economic markets' functioning (Mahmood and Mitchell, 2004). Although institutional voids can characterise any economy, they are most prevalent in emerging markets (Puffer et al., 2010). The main reason is that institutional voids hamper the mechanisms that allow business/innovation partners to interact, causing higher transaction costs of entrepreneurial activity to rise, as well as diminish incentives for developing innovation and leveraging of unique talent, knowledge, and skills (Liedong et al., 2020, p.59). Therefore, institutional voids do not only influence entrepreneurial organisations' strategies but shape innovation governance. It may explain why institutional voids have been considered the primary justification of state intervention via subsidies/incentives to promote entrepreneurship and innovation via enterprise-university collaborations in emerging economies (Hall and Maffioli, 2008; Dimos and Pugh, 2016; Kochenkova et al., 2016; Guerrero and Urbano, 2017).

Inspired by these research gaps, this paper analyses the determinants and the consequences of entrepreneurial innovations within enterprise-university collaborations in the context of an emerging economy. By adopting the theoretical foundations of the triple-helix, dynamic

capabilities and institutional economic approaches, we proposed a conceptual model to explore this phenomenon in the context of an emerging economy (Mexico). The criteria for selecting the research setting were: (a) the identification of multiple universities that have transformed their capabilities and activities to mitigate the effect of institutional voids as well as have been opened to collaborate with industrial, commercial, and scientific agents (Guerrero et al., 2019a,b); (b) the efforts of public administration for implementing incentives and subsidies that promote the development of entrepreneurial innovations via enterprise-university collaborations (OECD, 2013); and (c) the evidence of enterprises that have captured favourable/adverse outcomes as part of entrepreneurial innovations developed within collaboration practices with diverse partners (Guerrero and Urbano, 2017). The methodological design consisted of a two-step method to explore the determinants and, simultaneously, the effects of innovation projects of 514 Mexican enterprises.

Our findings provide insights about the crucial role of enterprises' capabilities, universities' capabilities, and state support such as determinants of entrepreneurial innovations projects within enterprises-universities collaborations. Without sufficient enterprises' innovation capabilities as well as knowledge of universities' capabilities, enterprises will not be able to run entrepreneurial innovation projects in collaboration with universities, even though the state might provide additional incentives. Consequently, without these determinants, the expected economic return of entrepreneurial innovation projects will be uncertain for enterprises. Although the regional heterogeneity, our findings do not show robust insights about the effect of enterprises' perception of institutional voids on antecedents/consequences of entrepreneurial innovations projects with universities. The plausible explanation is the lowest variance in the measure of institutional voids across our research setting (only one emerging economy). In this regard, this paper contributes to the ongoing academic debates related to the role of academia

in entrepreneurship and innovation (Audretsch, 2014; Audretsch et al., 2019); to the determinants of entrepreneurial innovation projects within enterprise-university collaborations (Autio et al., 2014; Guerrero and Urbano, 2019b); to the consequences of entrepreneurial innovation projects within enterprise-university collaborations (Lehmann and Menter, 2016; Guerrero and Urbano, 2019a,b); and the effect of institutional voids on entrepreneurial innovation projects within enterprise-university collaborations (Puffer et al., 2010; Liedong et al., 2020).

The paper is organised as follows. Section 2 introduces the theoretical framework. In particular, the determinants and effects of entrepreneurial innovations are explained. Section 3 describes the methodology used in the study. Two methodological steps were designed to analyse the determinants as well as the effects of entrepreneurial innovation in the context of emerging economies. Section 4 addresses the results obtained in this study as well as the discussion about the most provocative findings. Section 5 presents the conclusions and implications for decision-makers as well as further research.

2. Theoretical framework

2.1 Entrepreneurial innovations

According to Guerrero and Urbano (2019b), the term "entrepreneurial innovations" has been identified in a few published studies without a consensus about what entrepreneurial innovations mean.

The conception of entrepreneurial innovations was introduced by Schumpeter (1942) as an inherent consequence of creative destruction as part of the entrepreneurs' transformation of means in novel and marketable innovations. Several decades later, with the rise of the

entrepreneurial society, Von Bargen et al. (2003, p. 315) and Norbäck and Persson (2012, p. 488) associated this terminology with the contribution of a small group of high-growth, innovative, and new companies on the transformation of the industries where they entered. In this perspective, Cohen (2006, p.1) argued that entrepreneurial innovations also contribute to the configuration of a sustainable society. Furthermore, Autio et al. (2014, p.1100) introduced the intersection of the entrepreneurship ecosystem and innovation ecosystem through multi-level processes, actors, and contexts that regulates where entrepreneurs are developing disruptions of existing industries. In this vein, Guerrero, and Urbano (2017, p.295) and Malerba and McKelvey (2018, p.15) expanded the entrepreneurial innovation understanding by introducing the relevance of learning and university-industry collaborations in the generation/diffusion of marketable innovations in the context of emerging economies.

Based on these theoretical foundations, in the context of emerging economies, entrepreneurial innovations could be understood as the primary motivation/outcome of enterprise-university collaboration projects (mostly supported by multiple triple helix-actors) that are looking for sharing resources, capabilities, and risks during the co-create novel and marketable innovations with a economic and societal impact that should be commercialised through entrepreneurial models (Autio et al., 2014; Guerrero and Urbano, 2017; Guerrero and Urbano, 2009a,b; Guerrero et al., 2019a). As a result of this collaboration projects, actors can develop multiple dynamic capabilities oriented to sensing, seizing, and transforming opportunities into entrepreneurial innovations that producing a sustainable performance (Teece et al., 1997; Teece, 2007, 2010, 2014).

2.2. Antecedents of entrepreneurial innovation projects in emerging economies

For enterprises located in emerging economies, the decision for developing collaborative projects with other organisations tends to be moved by the lack of technological capabilities and human capabilities, as well as by reducing costs that allow capturing projected returns (Kogut, 1988; Bayona et al., 2001; Becker and Dietz, 2004; Zeng et al.. 2010). Assuming the existence of enterprises that sharing resources/risks with others to gain maximum returns (Chesbrough, 2010; 2012), we believe that enterprises tend to develop innovative capabilities based on the quantity/quality of their collaborations with triple-helix actors involved in the entrepreneurship and innovation ecosystems (Perkmann et al., 2013).

Previous studies have recognised that enterprises typically adopt diverse collaborations patterns with scientific organisations, commercial organisations, and both types of organisations simultaneously (Yasmin and Otto, 2004). Research suggests that enterprises that only collaborate with scientific organisations intend to expand their general knowledge (Belderbos et al., 2004b) into new technological knowledge (Lundvall, 1992). Therefore, in the short term, these enterprise-university collaborations will develop dynamic technological capabilities useful for identifying, generating and transforming technologies/knowledge into entrepreneurial innovations applicable for multiple industries (Nieto and Santamaría, 2007; Guerrero and Urbano, 2017; Malerba and McKelvey, 2018).

Similarly, diversity in collaborations generates multiple economic benefits and higher value-added to the final clients (Chung and Kim, 2003; Teece, 2007). As a result, in the short term, these collaborations will be able to exploit dynamic commercial capabilities for identifying the most entrepreneurial, innovative and valuable opportunities to generate sustainable benefits across their value chain (Autio et al., 2014; Teece, 2014; Guerrero and Urbano, 2017). Indeed, diversity in partners (scientific and commercial) are also oriented to capture the most profitable

outcomes within the collaborations in terms of newest innovations (Becker and Dietz, 2004). In the short term, these collaborations will be characterised by sophisticated, advanced, and multiple capabilities that are useful for anticipating solutions for non-existing needs or generate opportunities to capture a highest value-added (Autio et al., 2014; Guerrero and Urbano, 2017; Malerba and McKelvey, 2018). Assuming that innovation capabilities represent the enterprises' experience/know-how acquired during the developing innovations (products/services or processes or both products and processes), enterprises have the capabilities to explore new business/innovative opportunities (sensing), to look for the most appropriated partner to complement their resources/capabilities (seizing) and to transform them into sustainable outcomes (Teece et al., 1997), we propose

H1: Enterprises with innovation capabilities are more likely to develop entrepreneurial innovation projects in collaboration with universities than enterprises without these innovation capabilities

Entrepreneurial innovations demand trust, awareness, and commitment within the collaboration. In the context of emerging economies, to mitigate the effect of institutional voids, any scientific organisation requires an integral transformation of individuals/structures into an entrepreneurial innovation vision where all member be part of a system based on the generation, transference, and commercialisation of sophisticated knowledge updated technologies, and the newest innovations (Clark, 2001; Klofsten and Jones-Evans, 2000; Lu and Etzkowitz, 2008; Etzkowitz et al., 2010; Mian et al., 2012; Guerrero and Urbano, 2009a).

Enterprise-university collaborations generate unique capabilities that are needed for producing economical, societal, and technological impacts. Previous studies have adopted a narrow view

of enterprise-university partnership just focusing on the commercialisation of research results (O'Shea et al., 2005; Wright et al., 2007; Grimaldi et al., 2011; O'Kane et al., 2014). However, according to the institutional economic theory, enterprise-university collaborations can contribute via entrepreneurial innovations to sustainable financial and economic performance through the generation of specific capabilities in their human capital during the development of knowledge capital and entrepreneurship capital (Guerrero et al., 2015). Therefore, entrepreneurial and innovative organisations like universities contribute through human capital, knowledge capital, technological capital, and entrepreneurial capital (Guerrero and Urbano, 2013; Audretsch, 2014; Urbano and Guerrero, 2014; Guerrero et al., 2014).

In this perspective, the entrepreneurial and innovative university acts such as node that connects all members enrolled in triple-helix; therefore, the university could be the driver of entrepreneurial innovations (Svensson et al., 2011). In this assumption, entrepreneurial and innovative capabilities are part of the university core activities: teaching, research, and commercialisation. During the development of core activities, universities also acquire specific capabilities that are useful to generate new business/innovative opportunities (sensing), to explore new ways to access the required resources/capabilities (seizing), as well as to transform them into commercialised technological outcomes (Teece, 2007, 2010, 2014). Therefore, interested enterprises in collaborating with universities for developing entrepreneurial innovations projects should very well know which universities' capabilities may complement their enterprises' capabilities to achieve the expected objectives/outcomes (Autio et al., 2014; Guerrero and Urbano, 2019a). Assuming that a better understanding of the university 'capabilities not only reinforces the trust, awareness, and commitment of enterprises to collaborate with universities but also represents the channel for improving technological

capabilities as well as complementing their human and commercialisation capabilities, we propose

H2: Enterprises with knowledge of universities' capabilities are more likely to develop entrepreneurial innovation projects in collaboration with universities than enterprises without knowledge of universities' capabilities

Another determinant of enterprise-university collaborations in the context of an emerging economy is the state intervention. Previous studies have generally recognised that emerging economies' administrations promote entrepreneurial innovation via enterprise-university collaborations as the most effective mechanism to improve regional competitiveness and economic growth (Mian, 2011; Guerrero and Urbano, 2019b). Traditionally, the government has been viewed as the dominant actor that provides subsidies for fostering enterprise-university collaborations (McAdam et al., 2012) and orchestrating the policies that promote entrepreneurship and innovation (Miller et al., 2014). Nowadays, the participation of government has changed to be considered as another actor instead of a funder. In this sense, the public administration participates in the configuration of triple-helix collaborations (Autio et al., 2014).

In emerging economies, it is not strange that governments aim to ensure the well-being and sustainable regional development through the enterprise-university collaborations (Kenney et al., 2004; Wang and Altinay, 2012; Urbano and Guerrero, 2013). Although the anecdotal evidence provided by previous studies (Dimos and Pugh, 2016; Kochenkova et al., 2016), the effectiveness of subsidies or public incentives could be estimated by the achievement of the objectives of entrepreneurial innovation projects. Assuming the existence of governmental

support fostering/improving enterprises-university collaborations as an alternative to capture additional funds for ensuring the entrepreneurial innovation projects, we propose

H3: Enterprises with access to governmental support for improving collaborations with universities are more likely to develop entrepreneurial innovation projects than enterprises without access to governmental support

2.3. Consequences of entrepreneurial innovation projects in emerging economies

Literature has primarily focused on external knowledge and innovation, devoting particular attention to performance issues. In today's economy, it is widely agreed that entrepreneurial innovation plays a significant role in established/new ventures that try to survive in the market, especially by improving entrepreneurial and innovation capabilities required to capturing the sustainable outcomes/performance (Ireland et al., 2009; Teece, 2012 and 2014; Guerrero et al., 2019b). By nature, enterprises seem most likely to highlight the tension of trying to exist and survive. Authors like Chesbrough (2010, 2012) and Zott et al. (2011) argue that an innovative business model performs two essential functions: creating value (activities that will yield a new product or service) and capturing a portion of that value (establishing unique resources with the series of activities in which a firm enjoys a competitive advantage). Therefore, either explicitly or implicitly, the entrepreneurial innovations projects connect strategic decisions with value creation to final clients (business/managerial strategy) through the mechanism employed to capture it (innovation/entrepreneurship strategy) and to convert it to sustainable profit (financial/economic strategy) (Zott and Amit, 2007).

In this perspective, entrepreneurial innovation projects enable an organisation to be more effective in creating and capturing value, using not only its resources but also sharing resources

and risks multiple partners enrolled in triple-helix (Autio et al., 2014). This fact allows enterprises to anticipate to uncertainties, innovate faster, and find entrepreneurial mechanisms to commercialise their innovations (Chesbrough 2010, 2012). As a result, the configurations of entrepreneurial innovation projects in different contexts generate new products and new organisational forms. Therefore, entrepreneurial innovation projects contribute to capturing the highest performance (Autio et al., 2014; Guerrero et al., 2019a). Assuming that enterprises expect to capture higher economic benefits from the entrepreneurial innovation projects' outcomes with universities, we propose

H4: Enterprises that develop entrepreneurial innovation projects in collaboration with universities are more profitable than enterprises that do not develop entrepreneurial innovation projects with universities

2.4. Proposed model

Figure 1 summarises the main determinants behind entrepreneurial innovation projects (Step 1). We analyse several determinant factors that could influence the enterprise's decision to participate or not participate in entrepreneurial innovation projects with universities. After an understanding of the determinants, we explored the effects of these entrepreneurial innovation projects on enterprises' performance (Step 2).

Insert Figure 1 here

3. Methodology

3.1. Research setting

Research is setting in Mexico with particular emphasis on enterprises-universities collaborations. As an emerging economy, since the publication of the Mexican Science and Technology Law, the National Council for Science and Technology (CONACYT) has implemented several incentive programs for encouraging growth, competitiveness, enterprise-university collaborations, innovations (new products/services, process) with value-added to strategic sectors, and the creation/protection of intellectual property (Diario Oficial, 2014). Similarly, the programs oriented to support entrepreneurship by the public administrations in collaboration with the Ministries of Education and Economy (Hernández et al., 2016). However, institutional voids such as corruption and criminal activity have inhibited the quality of institutions and the evolution towards knowledge and entrepreneurial society (Guerrero and Urbano, 2017). For a better understanding of the Mexican entrepreneurial and innovation ecosystems see the research developed by Guerrero and Urbano (2017).

3.2. Data Collection

Given the lack of information in emerging economies, we used data from the 2010 Mexican Survey of Enterprise-University. This survey[2] was administered by the Mexican Center for Research and Teaching in Economics (CIDE) and the Mexican Ministry of Education (SEP) (CIDE and SEP, 2010). The sample was estimated using the enterprise's population registered in the 2004 Economic Census[3] and the 2010 Mexican Business Information System (SIEM).[4] The population was more than 650,000 enterprises from all economic sectors. Therefore, the estimated sample includes 514 enterprises with a 5.32% margin of error and stratified by size, sector, and regions. The respondent was the CEO, and, in average, the enterprises' size is less than five employees (49%) or between 10 to 49 employees (36%) and either a commercial focus (48%) or service focus (37%). We also used secondary sources (official publications and reports) about the Mexican Innovation System.

3.3. Description of variables

The methodological design is divided into two steps. First, we explore the factors that determine the probability that enterprises develop entrepreneurial innovations projects in collaboration with universities. Second, we explore the effect of entrepreneurial innovation projects on enterprises' performance.

3.3.1. Stage 1: Analysing the determinants of entrepreneurial innovation projects in an emerging economy

Based on the literature review, Table 1 summarises the variables used in this step.

Insert Table 1 here

The dependent variable is *entrepreneurial innovation projects* is a dummy variable that captures when the enterprise develops both entrepreneurial and innovation projects in collaboration with universities (Guerrero and Urbano, 2009a,b). Conceptually, entrepreneurial innovations are the outcome of enterprise-university collaboration projects characterised by the generation of the newest innovations that should be commercialised by adopting the most innovative business model (Autio et al., 2014; Guerrero and Urbano, 2017; Guerrero et al., 2019a,b).

Regarding the exploratory variables, we use a set of determinants of entrepreneurial innovation projects within enterprises-universities. The first determinant factor is associated with the enterprises' innovation capabilities. Adopting previous studies (Yasmin and Otto, 2004; Nieto and Santamaría, 2007), we use three dummy variables to capture if the enterprises' innovation capabilities are derivated of their experience of developing innovation of products and

processes (*innovation in product and processes*), or only innovation in products (*innovation in products/services),* or only innovation in processes (*innovation in processes*). The second set of determinants is associated with the enterprises' knowledge of the university's capabilities (Guerrero et al., 2015; Klofsten et al., 2018; Guerrero and Urbano, 2019a,b). Using a factor analysis for reducing the number of variables, the enterprises' knowledge about the universities' capabilities within entrepreneurial innovation projects are measured in terms of *teaching capabilities* (contributing with qualified human capital), *research capabilities* (contributing with technological and knowledge capital), *and entrepreneurship capabilities* (contributing with entrepreneurship and commercialisation capital). The third determinant is measured by the governmental support towards university-industry collaborations (García-Quevedo, 2004; Dimos and Pugh, 2016; Kochenkova et al., 2016; Guerrero et al., 2019a,b) with subsidies or incentives that are fostering innovative projects (*external funds*).

Using a factor analysis for reducing the number of variables, we also considered several control variables that affect the enterprises' competitiveness: (a) external conditions like infrastructures (*external factors1)* and institutional voids *(external factors2);* and (b) internal conditions like non-technological resources (*internal factors1)* and technological resources *(internal factors2)*. Moreover, we controlled by the number of universities' collaborations per enterprise (*university number*), as well as per the university type like research universities (*research university*) or public universities (*public universities*). Finally, we controlled by the enterprises' size, age, sector, capital origin, and market orientation.

3.3.2. Stage 2: Analysing the effects of entrepreneurial innovation projects in an emerging economy

Based on the literature review, Table 2 summarises the variables used in this step.

Insert Table 2 here

Our dependent variable (*performance*) is a dummy that captures when the enterprises' profits consecutively increased during the last three years (Zeng et al., 2010; Perkmann et al., 2013). Given the limited access to objective metrics of performance provided by the secondary dataset, we decided to measure the enterprise performance using a dummy variable (one limitation of this study with a natural extension of improving this measure in future research). This dummy variable also highlights the potential high-growth orientation measured by the increment of profits in the last three years (Bosma, 2013).

Regarding the exploratory variables, we included our dummy variable *entrepreneurial innovation projects* that capture if the enterprise develops entrepreneurial innovation projects in collaboration with a university in the last three years (Autio et al., 2008, 2014; Guerrero and Urbano, 2017). It was the dependent variable in step 1; therefore, it allows us to capture the effect of the projects developed.

We also included several control variables. First, we included dummy variables associated with the enterprises' *innovation capacity* acquired from the innovation activities that were developed during the last three years (Carayannis et al., 2000); as well as per type of innovation (*innovation in product and processes, or innovation in product, or innovation in processes*) developed by these enterprises in the last three years (Yasmin and Otto, 2004; Nieto and Santamaría, 2007). Second, the state supports oriented to enterprise-university collaborations (García-Quevedo, 2004; Dimos and Pugh, 2016) via subsidies for developing innovative projects (*external funds*). Third, we also considered external factors (*external factors1, external factors2)* and internal factors (*internal factors1, internal factors2)* that affect competitiveness

described in step 1. Finally, we included variables related to size, age, sector, capital origin, and focus market.

3.3. Data Analysis

We ran several tests to check the multicollinearity among those variables (Greene, 2003). First, the descriptive and correlations do not evidence multicollinearity (Table 3 and 4). Indeed, the mean-variance inflation factor (VIF) is 1.82, indicating that the entire model is moderately correlated. The rule is that if VIF>10 then multicollinearity is high. The cut off of 5 is also commonly used to denote moderately correlation among independent variables (Aiken et al., 1991). Second, we did the means test for corroborating differences between enterprises that develop entrepreneurial innovation projects with universities and enterprises that do not develop entrepreneurial innovation projects. This test showed that all the means were significantly different within and between the groups. Third, since both dependent variables are dichotomous, we used two binominal logistic regression methods.

The binominal logistic regression estimates the probability of an event happening; in this case, the determinants (Model 1) and the consequences (Model 2) of entrepreneurial innovations within a university-enterprise partnership. The predicted proportion follows the logistic model of $Ln\ P/(1 - P_i) = \beta X_i$, where P_i is the probability of an enterprise deciding to develop entrepreneurial innovation projects after searching a link with university (Model 1) as well as the probability that their profits (Model 2) will be influenced positively from the development of entrepreneurial innovations projects in collaboration with universities (Hosmer and Lemeshow, 1989). The logarithmic odds of these events are held to be linearly affected by a vector of covariates X_i with coefficient vector β. Maximum likelihood estimations were used to calculate the logit coefficients, which denote changes in *the log odds* of the dependent

variable (Greene, 2003). We assessed the goodness of fit of the models using the Pearson Chi-square test, the rate of correct classification, and the *pseudo-R-square*. The significance of each independent variable was tested using Wald statistics.

The robustness test was developed with the structural equation modelling for corroborating the results obtained using the logistic regressions. This statistical technique allows the examination of a set of relationships between one or more independent or dependent variables, either continuous or discrete (Tabachnick and Fidell, 1996; Shook et al., 2004). This statistical technique also allows seeing the direct and indirect contributions, as well as testing potential mediation effects (Fox, 1980; Sobel, 1982; Cheung and Lau, 2008). To perform the SEM, we corroborate the correlations, reliability and validity of the constructs using the confirmatory factor analysis and the Cronbach alpha. These analyses showed acceptable parameters between 0.6 and 0.7. Additionally, we tested the correlation between constructs and we did not find a significant co-variance. We simultaneously tested Model 1 and Model 2 with the entire sample (Model 3).

Insert Table 3 & 4 here

4. Results and Discussion

4.1. Determinants of entrepreneurial innovations projects

Table 5 shows the determinants of entrepreneurial innovations projects.

Insert Table 5 about here

Regarding enterprises' innovation capabilities, 17% of the Mexican enterprises of the sample have manifested their participation in entrepreneurial innovations projects. Similarly, 27% of

these enterprises recognised the improvement of their capabilities through the implementation of innovation mixed practices, 38% through innovation in product/services, and 17% through innovation in processes. Model 1 shows that when Mexican enterprises are developing capabilities through their simultaneous participation in both the innovation product and innovation in processes. The probability of developing entrepreneurial innovation projects increases when enterprises have developed innovations' capabilities in products and processes [0.539; 0.100]. We do not find strong support about the effect of enterprises' capabilities associated with the development of only innovation in products/services or only innovation in processes. In this vein, capabilities innovations in products and process represent highest returns for enterprises interested to enhance innovation capabilities and to acquire resources/skills during the development of collaboration project (Yasmin and Otto, 2004; Nieto and Santamaría, 2007). Therefore, these results support H1.

Concerning the knowledge of university' capabilities, results show that having a better understanding of universities' research capabilities increases the probability of developing entrepreneurial innovation projects with universities [0.851; 0.001]. Similarly, having a better understanding of universities' teaching capabilities [0.420; 0.001] and universities' entrepreneurial capabilities [0.340; 0.001] increases the probability that Mexican enterprises develop entrepreneurial innovation projects with universities. Concretely, these findings demonstrate that Mexican enterprises are more interested in developing entrepreneurial innovation project when their partner (i.e., university) contributes to the most robust research and technological capabilities. Enterprises do not valuate the qualified human capital and the incubation capabilities provided by the university. A plausible explanation is that enterprises collaborate with another partner that could contribute to business capabilities (i.e., collaborate with other enterprises across their value chain). Intuitively, although we do not find evidence

per type of university (i.e., technological university, technological institutes, public university, private university, or research centre), previous findings debate that Mexican universities are facing a transformation process to become more entrepreneurial and innovative organisations (Guerrero and Urbano, 2013; McAdam et al., 2012). Therefore, these results support H2.

Concerning state intervention, the probability of participating in entrepreneurial innovation projects increased when the partnership has received public funds [2.796; 0.001]. In this regard, our findings provide insights that one critical determinant of entrepreneurial innovation projects is the support provided by the government. Although the role of the Mexican government has changed across time/spaces, our results debate the active role of government in the context of emerging economies (Miller et al., 2014). Indirectly, our findings are providing insights into the positive effects of public incentives towards the development of entrepreneurial innovations in the context of emerging economies (Guerrero and Urbano, 2019b). Therefore, these results support H3.

Our results show the effects of control variables. Regarding the enterprises' perception of institutional voids, our result does not show strong evidence about its effect on entrepreneurial innovation projects. Although Mexico's regional heterogeneity, this result may be capture lower variance on the enterprises' perception of institutional voids because there are located within the same emerging economy. Another explanation may be the measurement used in the survey for capturing this perception, as well as its transformation during our analysis. Notably, the probability that an enterprise participates in entrepreneurial innovation projects increases when enterprises perceive lacks in human and physical resources that are relevant for their competitiveness [0.406; 0.05] and when perceiving lacks on technological resources [0.450; 0.001]. Our findings are similar than previous studies (Bayona et al., 2001; Kogut, 1988) that

found that when enterprises perceived resource scarcity tried to appropriate value and resources through collaborations. Regarding an enterprise's size, respect large firms, the probability decreases when an enterprise is a micro-enterprise with less than five employees [-2.065; 0.001]. By their nature, Mexican enterprises are focused on survival, reducing costs without exploring alternatives to be more competitive (Ruelas, 2004). The probability of being involved in entrepreneurial innovation projects decreases when enterprises are enrolled in commercial activities [-1.476; 0.001]. Maybe the commercial orientation demands specific types of innovations and demands specific returns. Regarding the age and market orientation, the results do not provide strong evidence. A plausible explanation is that almost 80% of the sample is characterised by established firms oriented to the domestic market.

4.2. Consequences of entrepreneurial innovations projects

Table 6 shows the consequences of entrepreneurial innovations projects. In our sample, 33% of the enterprises have recognised an increment of profits in the last three years. By nature, their collaboration objective is reducing the tension of survival in uncertainty market. As a consequence, enterprises' strategies are oriented toward developing entrepreneurial innovation projects in collaboration with universities to capture the value-added that improves their performance.

Insert Table 6 about here

Model 2 shows the effect of entrepreneurial innovation projects on higher enterprises' performance. The probability that entrepreneurial innovation project with universities generate a significant effect on enterprises' performance depends on the enterprises' innovation capabilities, the enterprises' access to public support, and the enterprises' knowledge of universities' capabilities. First, the probability that the enterprises' performance increases

depends on the enterprises' innovations capabilities acquired in the three previous years. Second, based on our findings, the effect of entrepreneurial innovations on performance is conditioned by the state funds. It means that the probability that the enterprises gain higher performance increases when the enterprise-university collaboration has received public funds to support their entrepreneurial innovations projects. Third, our results also show that enterprises looking for collaborations not only to create value but also to capture a portion of this value in economic terms as well as improving their entrepreneurial innovation capabilities (Zott and Amit, 2007; Zott et al., 2011; Autio et al., 2014; Guerrero and Urbano, 2017). Therefore, these results support H4.

Regarding the control variable, although the expected regional heterogeneity, the enterprises' perception of institutional voids, our results do not show insights about the effect on enterprises' performance. The potential explanation behind this result is that the positive/negative effect is disseminated by the lower differences in the enterprises' perceptions of institutional voids across Mexico.

4.3. Robustness tests

Figure 2 and Table 7 show the determinants and the consequences of entrepreneurial innovations projects using structural equation modelling as a robustness test.

Insert Figure 2 and Table 7 about here

As a robustness test, the structural equation analysis helps to confirm the patterns observed to test our hypotheses (Model 3). Regarding the determinants, the results show a positive and direct effect of the enterprises' innovation capabilities on entrepreneurial innovations projects

[0.704; p<0.001] supporting H1. This variable shows a positive and indirect effect on enterprise performance [0.320; p<0.001]. Second, results also show the positive effect of the university's capabilities as the determinant of entrepreneurial innovations project [1.875; p<0.001, as well as their indirect effect on enterprise performance [0.750; p<0.001]; supporting H2. Indeed, we found a positive effect of state support on entrepreneurial innovations projects [2.749; p<0.001], as well as an indirect effect on enterprise performance [1.940; p<0.001]; supporting H3. Finally, results also show the contribution of entrepreneurial innovations projects on enterprises' performance [1.549; p<0.100]; supporting H4.

5. Conclusions

The objective of this paper was to provide insights into the determinants and the consequences of entrepreneurial innovations projects within enterprise-university collaborations in an emerging economy. Based on the theoretical basis of triple-helix, dynamic capabilities and institutional economic approaches, we developed hypotheses about the effect of enterprises' innovation capabilities (H1), the knowledge of universities' capabilities (H2), and the access to state support (H3) on the likelihood of enterprises for developing entrepreneurial innovation projects in collaboration with universities, as well as the effect of these entrepreneurial innovation projects on enterprises' performance (H4). In this regard, this paper contributes to the ongoing academic debate on entrepreneurship and innovation.

The first contribution relates to the role of academia in entrepreneurship and innovation (Audretsch, 2014; Audretsch et al., 2019). Our results show that the universities' capabilities were relevant determinants for developing simultaneously entrepreneurial and innovation projects within enterprises-universities collaborations. In our empirical setting, for confidential agreements, it was very complicated to identify the universities' name to include objective

measures of their capabilities. However, the enterprises' perception of universities' capabilities helps us to understand the relevance of knowing/understanding which are potential contributions of universities into entrepreneurial innovations projects based on their capabilities. In this regard, Klofsten et al. (2019) and Guerrero and Urbano (2019a) highlighted the lack of insights about the identification/management of capabilities that universities have acquired from their core activities: teaching capabilities, the research capabilities, and knowledge commercialisation capabilities. Although than previous studies have contributed with relevant insights about the motivations and determinants of enterprise-university collaborations (Perkmann et al., 2013), a better identification/measurement of universities' capabilities allows us to test and legitimise their contribution on the development of entrepreneurial initiatives with an innovative impact in collaboration with diverse agents, as well as innovation initiatives with an entrepreneurial impact in diverse contexts (Colombo et al., 2019; Feldman et al., 2019).

The second contribution relates to the determinants of entrepreneurial innovation projects within enterprise-university collaborations (Autio et al., 2014; Guerrero and Urbano, 2019b). Our results show that enterprises' innovation capabilities, knowing universities' capabilities, and the access to additional state funds increase the probability that enterprises develop entrepreneurial innovation projects in collaboration with universities. In our theoretical/empirical analyses, adopting the theoretical foundations of dynamic capabilities and triple-helix approaches, we assumed that enterprises, universities, and the state acquire capabilities during the development of their core activities. In this vein, these organisational' capabilities are useful to explore/exploit new business/innovative opportunities (sensing), to try new ways to access to the required resources/capabilities for developing these opportunities (seizing), as well as to transform them into commercialised technological outcomes (Teece,

2014). Therefore, it helps to operationalise the contribution of each triple-helix agents on the development of entrepreneurial innovations by adopting the dynamic capabilities perspective (Heaton et al., 2019). At the same time, the study provides insights into the operationalisation of entrepreneurial innovations within a collaboration partnership between enterprises and universities towards projects with a unique entrepreneurial and innovative orientation (Guerrero and Urbano, 2019a), as well as provide insights into the positive effect of state incentives towards entrepreneurial innovations (Dimos and Pugh, 2016; Guerrero and Urbano, 2019b).

The third contribution relates to the consequences of entrepreneurial innovation projects within enterprise-university collaborations (Lehmann and Menter, 2016; Guerrero and Urbano, 2019a,b). Previous studies have shown the regional contributions of industry-university collaborations (Lehmann and Menter, 2016) as well as the impact of cooperation networks on enterprises' innovation performance (Zott and Amit, 2007; Zeng et al., 2010). In this vein, our study show insights about the economic benefits captured by the enterprises' from the development of entrepreneurial innovations projects within enterprise-university collaborations. Although the lack of longitudinal dataset, our study tested the economic benefits of entrepreneurial innovation projects with universities captured by enterprises in the last three years. Therefore, a natural extension of this study should be testing the effects of entrepreneurial innovations by using longitudinal case studies or panel datasets.

The last contribution relates to the effect of institutional voids on entrepreneurial innovation projects within enterprise-university collaborations (Liedong et al., 2020). By considering the particularities of emerging economies in terms of institutional voids and how they could affect entrepreneurship and innovation strategies, we introduced as a control variable the measure of

"institutional voids" that captured the perception of enterprises about their positive/negative effects of institutional voids on their strategies. Our results do not provide significant insights into the effect of this variable on both the antecedents and the consequences of entrepreneurial innovation projects within an enterprise-university collaboration. Potential explanations emerged from this result. On the one hand, by considering that we analysed enterprises located in one emerging economy, the perception about the institutional voids (corruption, criminality) could be generalised across all enterprises. We may assume the existence of heterogeneity at the regional level. However, given the confidential agreements, we do not have access to regional level information to avoid the potential identification of enterprises. Although our results do not provide significant insights, the state orientation towards supporting entrepreneurial innovation via enterprise-university collaborations is reducing the transactional costs generated by institutional voids that diminish organisational incentives for developing innovation and leveraging of talent (Mahmood and Mitchell, 2004; Puffer et al., 2010; Liedong et al., 2020). This issue could also explain the effect captured by the institutional voids proxy.

This study has several limitations that provide research opportunities. *The first limitation* was the use of secondary datasets for exploring this phenomenon. Concretely, the lack of information in emerging economies limitate the implementation of quantitative analysis. A natural extension of this research requires an in-depth exploration of entrepreneurial innovation projects using qualitative/quantitative longitudinal analysis of the determinants and the impacts. *The second limitation* was the number of observations and the proxies used in our models. It is the most common problem faced by previous studies that have used secondary sources. In this vein, we need to improve the measures of performance with an objective and lagged measures, as well as include variables that capture the organisational and regional dimensions. *The third limitation* was the restriction in the implementation of sophisticated

methods. Given the nature of the dependent variables, we adopted logistic regressions. However, panel data analysis demands longitudinal datasets that allow capturing the effects and implementing robustness tests. *The fourth limitation* was the theory development also restringed by the nature of our dataset. More theory development combining several theoretical approaches and empirical testing across the globe are still needed to advance in this academic field. In this sense, theoretical perspectives such as the knowledge spillover theory, institutional theory, endogenous economic theory, and dynamic capabilities could help to understand the dynamic entrepreneurial and innovation process (Audretsch and Lehmann, 2005; Audretsch et al., 2016; Chang et al., 2011; Huizingh, 2011; Thornton et al., 2012; Landström et al., 2013). Therefore, future research should consider the theoretical foundations of these approaches for exploring the determinants and the impacts of entrepreneurial innovations. *The fifth limitation* was the lack of a dynamic vision of time/context. As an agent who recognise opportunity, mobilise resources and create value, enterprises have the responsibility of creating organisations as well as building capacities to sustain regional economic development (Feldman, 2014). It means that enterprises obtain benefits from their contexts, but enterprises are also agents of change who also transform their contexts. The literature recognises that knowledge-intensive scenarios are good examples to understand the reciprocal relationship between triple-helix agents (Etzkowitz and Leydesdorff, 2000; Lu and Etzkowitz, 2008; McAdam et al., 2012; Cunningham et al., 2014; Miller et al., 2014; Audretsch et al., 2019). However, it requires an evolutionary process that demands time and contextual dimension. For this reason, future research should also consider an evolutionary perspective that also combines the ecosystem approach for a better understanding of reverse relationships between triple-helix agents and the context.

Even though the results of this study apply to our research setting, some implications for triple-helix agents emerged of this study. *For policymakers,* this study exhibits the determinants of enterprises-universities participation in entrepreneurial innovation projects. Contextualising these results within an emergent economy, if policymakers expect a transition towards a knowledge-based economy, they should enhance not only public supports towards on collaborations between enterprises-universities but also enhance collaboration with other organisations (e.g. private investors, educational system actors, labour market regulators, research centres, incubators). The orchestration of multiple actors could enhance capabilities, resources, and mitigate the effects of institutional voids (e.g., corruption, criminal activity, insecurity). Moreover, the paper provides some insights into the positive effect of public policies that could legitimise the role of public intervention. *For enterprise managers,* this study offers insights about the best mechanisms/practices for generating/capturing value through entrepreneurial innovation practices. In particular, managers could be able to evaluate the costs and the benefits of participating in sustainable innovative and entrepreneurial projects that enhance capabilities, reduce risks, sharing resources, and income expectations through collaborations with scientific actors. *For university managers*, could adopt the entrepreneurial university model as a good practice for transforming organisations and enhancing teaching, research, and entrepreneurial capabilities. Becoming an entrepreneurial university could be actively contributing to the well-being and regional development through entrepreneurial innovations processes in collaboration with multiple societal and economic agents. Therefore, this practice could be a benchmark reference to develop similar strategies because legitimising the role of universities in societies.

Endnotes

[1] The higher education organisations, the government and the enterprises across industries have been critical participants in the configuration of entrepreneurial and innovation ecosystems (McMullen and Dimov, 2013; Autio et al., 2014; Paleari et al., 2015; Acs et al., 2018; Colombo et al., 2019; Urbano et al., 2019).

[2] For further information about the methodological issues, please consult CIDE and SEP (2010).

[3] In Mexico, the Economic Census is collected every five years. For this reason, the most updated and available information used for calculating the sample was the Economic Census of 2004.

[4] The SIEM primarily comprises data of Mexican companies. The Law of Business Chambers regulates it, its Confederations provide the legal framework, and the Ministry of Economy defines the rules of operation annually.

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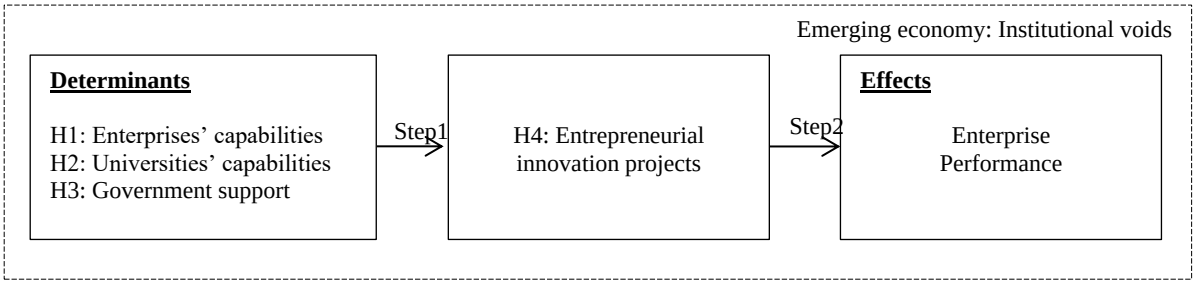
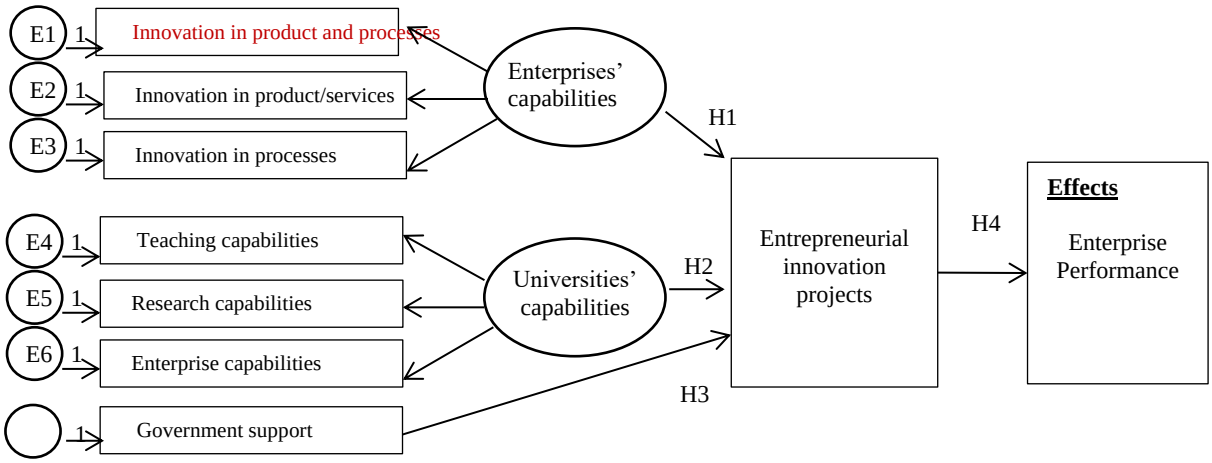


Figure 1: Determinants and effects of entrepreneurial innovation projects

Source: Authors



[Standardized estimates; CMIN/DF 2.50; GFI 0.891; CFI 0.874; RSEA 0.051]
Level of statistical significance: *** $p \leq 0.001$, ** $p \leq 0.05$, * $p \leq 0.10$.

Figure 2: Structural equation modelling

Source: Authors

Table 1: Description of variables (step 1)

	Dimension	Variable	Description
DV	Entrepreneurial innovation projects		Dummy: the enterprises' entrepreneurial innovation projects with universities
IV	Enterprises' innovation capabilities	Innovation in product and processes	Dummy: if the enterprise developed innovations in products and processes
		Innovation in product/services	Dummy: if the enterprise only developed innovations in products/services
		Innovation in processes	Dummy: if the enterprise only developed innovations in processes
IV	University capabilities	Teaching capabilities	Knowledge about the university's teaching capabilities provided to the industry: human capital through professional practices, students' stays, social services, labour market, etc.
		Research capabilities	Knowledge about the university's research capabilities that provided to the industry: technological capital through academics' stays, R&D services, technological services
		Entrepreneurship capabilities	Knowledge about the university's entrepreneurship capabilities that provided to the industry: entrepreneurship capital through business creation programs, incubation services, alliances with strategic actors
IV	Government support	External funds	Dummy: if the enterprises received public financial support
CV	University	University number	Dummy: simultaneous collaboration with multiple universities
		Research university	Dummy: collaborate only with a research university
		Public university	Dummy: collaborate only with a public university
CV	Competitiveness Factors	Infrastructures (External factor1)	Perception about the role of infrastructures (physical, educational, clusters) on the enterprise competitiveness
		Institutional voids (External factor2)	Perception about the role of institutional voids (security, corruption) on the enterprise competitiveness
		Non-technological resources (Internal factor1)	Perception about the role of internal human, physical resources on the enterprise competitiveness
		Technological resources (Internal factor2)	Perception about the role of internal technological resources on the enterprise competitiveness
CV	Enterprise	Young enterprise	Dummy: young enterprises created in the last five years
		National capital	Percentage of the enterprise's capital that is national
		Domestic market	Percentage of the enterprise's production/services that are intended for the domestic market
		Size	Categorical: 1= Micro; 2=Small; 3=Medium;4= Large
		Sector	Categorical: 1 = Industry; 2 = Commerce; 3 = Services

Note: DV = Dependent variable; IV = Independent Varible; CV = Control Variable

Table 2: Description of variables (step 2)

	Dimension	Variable	Description
DV	Enterprise	Performance	Dummy: if profits increased in the last three years
IV	Enterprise-University	Entrepreneurial innovation projects	Dummy: the entrepreneurial innovation projects with the university in the last three years
CV	Enterprise capabilities	Innovation capacity	Dummy: if the enterprise introduced innovations in the last three years
		Innovation in both product and processes	Dummy: if the enterprise introduced innovations in both product and processes in the last three years
		Innovation in product/services	Dummy: if the enterprise only introduced innovations in products in the last three years
		Innovation in processes	Dummy: if the enterprise only introduced innovations in processes the last three years
CV	Government support	External funds	Dummy: if the enterprises received public financial support in the last three years
CV	Competitiveness Factors	Infrastructures (External factor1)	Perception about the role of infrastructures (physical, educational, clusters) on the enterprise competitiveness in the last three years
		Institutional voids (External factor2)	Perception about the role of institutional voids (security, corruption) on the enterprise competitiveness in the last three years
		Non-technological resources (Internal factor1)	Perception about the role of internal human, physical resources on the enterprise competitiveness in the last three years
		Technological resources (Internal factor2)	Perception about the role of internal technological resources on the enterprise competitiveness in the last three years
CV	Enterprise profile	Young enterprise	Dummy: young enterprises created in the last five years
		National capital	Percentage of the enterprise's capital that is national
		Domestic market	Percentage of the enterprise's production/services that are intended for the domestic market
		Size	Categorical: 1= Micro; 2=Small; 3=Medium;4= Large
		Sector	Categorical: 1 = Industry; 2 = Commerce; 3 = Services

Note: DV = Dependent variable; IV = Independent Varible; CV = Control Variable

Table 3: Descriptive and correlation analysis (step 1)

	Variables	Min	Max	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Entrepreneurial inovation projects	0	1	.17	.38	1																							
2	Innovation mix	0	1	.27	.44	.162***	1																						
3	Innovation in products	0	1	.38	.49	.031	-.170***	1																					
4	Innovation in process	0	1	.17	.38	.058	-.080*	-.038	1																				
5	Teaching capabilities	-1.95	2.27	.00	1.00	.163***	.119**	-.002	-.023	1																			
6	Research capabilities	-3.16	1.10	.00	1.00	.146***	.057	.002	.007	.000	1																		
7	Entrepreneurship capabilities	-1.59	2.81	.00	1.00	.126***	.067	.097**	-.019	.000	.000	1																	
8	External funds	0	1	.04	.18	.394***	.101**	-.013	.055	.111**	.031	.021	1																
10	Universities number	0	1	.52	.50	.195***	.034	.078*	.039	.135***	.290***	.173***	.120**	.762***	1														
11	Technological universities	0	1	.06	.24	-.071	.014	-.009	.028	.032	-.005	-.063	-.048	-.140***	-.263***	1													
12	Research universities	0	1	.05	.22	-.057	-.019	.003	-.031	-.044	-.016	-.103**	-.044	-.127***	-.240***	-.058	1												
13	Public universities	0	1	.08	.27	-.116**	.013	-.084*	-.040	.034	.063	-.037	-.057	-.187***	-.310***	-.076*	-.069	1											
14	Private universities	0	1	.09	.29	.004	.027	.016	-.042	-.077*	.083*	-.001	-.023	-.202***	-.326***	-.079*	-.072*	-.094**	1										
15	Research centers	0	1	.00	.06	.055	.033	-.018	-.008	-.010	.025	.002	-.012	-.016	-.065	-.016	-.014	-.019	-.020	1									
16	External factors 1	-2.01	2.61	.00	1.00	.033	.031	-.035	-.017	-.015	-.051	.019	.092**	.011	.003	-.065	.098**	-.011	-.015	.007	1								
17	External factors 2	-2.72	2.44	.00	1.00	.039	.033	.016	-.005	-.098**	.046	.065	.056	.039	.039	.031	.041	-.012	-.029	-.012	.000	1							
18	Internal factors 1	-2.28	1.99	.00	1.00	.085*	-.034	-.025	.043	-.065	.042	.036	.066	.000	.020	-.072	.030	-.055	.057	.026	.604***	.167***	1						
19	Internal factors 2	-2.13	2.66	.00	1.00	.142***	.145***	.026	.012	.080*	.054	.078*	.151***	.180***	.144***	.001	-.003	.020	-.116	-.021	.243***	.263***	.000	1					
20	Size	1	4	1.70	.83	.279***	.115**	.023	.103**	.049	.101**	.022	.185***	.154***	.080*	-.016	-.023	-.002	.000	.023	.095*	-.099**	.057	.002	1				
21	Young enterprise	0	1	.24	.43	-.076*	-.108**	-.005	-.042	-.027	.044	.036	-.059	-.085*	-.019	.046	-.070	-.038	-.004	-.036	.023	-.149***	.000	-.015	-.128***	1			
22	Sector	1	3	2.23	.68	-.001	.034	.013	-.067	.007	.052	.012	-.003	.046	.047	.010	-.013	-.008	.054	.071	.069	.007	.051	-.016	-.121***	.053	1		
23	National capital	0	100	92.19	23.33	-.118**	-.037	.005	-.107**	.026	.022	-.047	-.020	-.077	-.053	.050	-.075*	.060	.045	.021	-.056	.144***	-.112**	.001	-.140***	-.073*	.079*	1	
24	Domestic market	0	100	85.88	30.37	.000	-.065	-.033	-.036	.061	-.033	-.014	.026	-.040	-.089*	-.029	.002	.024	.017	-.022	.149***	.057	.075*	.062	-.042	-.002	.013	.160***	1

Note: Level of statistical significance: *** $p \leq 0.000$, ** $p \leq 0.05$, * $p \leq 0.10$.

Table 4: Descriptive and correlation analysis (step 2)

	Variables	Min	Max	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Performance	0	1	.33	.47	1																
2	Innovation capabilties	0	1	.61	.49	.079*	1															
3	Innovation in products and processes	0	1	.27	.44	.050	.487***	1														
4	Innovation in products	0	1	.38	.49	.068	.228***	-.170***	1													
5	Innovation in processes	0	1	.17	.38	.000	.108	-.080*	-.038	1												
6	Entrepreneurial innovation projects	0	1	.17	.38	-.011	.195***	.162***	.031	.058	1											
7	External funds	0	1	.02	.13	.094**	.108**	.154***	.019	-.018	.296***	1										
8	Research university	0	1	.02	.14	.020	.085*	.106**	.014	-.019	.312***	.626***	1									
9	External factors1	-2.01	2.61	.00	1.00	.153***	.057	.031	-.035	-.017	.033	.023	.030	1								
10	External factors2	-2.72	2.44	.00	1.00	-.034	-.023	.033	.016	-.005	.039	.035	.047	.000	1							
11	Internal factors1	-2.28	1.99	.00	1.00	.132**	-.012	-.034	-.025	.043	.085*	.018	.033	.604***	.167***	1						
12	Internal factors2	-2.13	2.66	.00	1.00	.098**	.171***	.145***	.026	.012	.142***	.081*	.052	.243***	.263***	.000	1					
13	Size	1	4	1.70	.83	.013	.137***	.115**	.023	.103**	.279***	.121**	.154***	.095**	-.099**	.057	.002	1				
14	Young enterprise	0	1	.24	.43	.016	-.010	-.108**	-.005	-.042	-.076*	-.042	-.080*	.023	-.149***	.000	-.015	-.128**	1			
15	Sector	1	3	2.23	.68	-.091**	.006	.034	.013	-.067	-.001	-.002	-.089**	.069	.007	.051	-.016	-.121**	.053	1		
16	National capital	0	100	92.19	23.33	-.026	-.019	-.037	.005	-.107**	-.118**	.045	-.013	-.056	.144***	-.112**	.001	-.140***	-.073*	.079*	1	
17	Domestic market	0	100	85.88	30.37	-.051	-.005	-.065	-.033	-.036	.000	-.031	-.095**	.149***	.057	.075*	.062	-.042	-.002	.013	.160***	1

Note: Level of statistical significance: *** $p \leq 0.000$, ** $p \leq 0.05$, * $p \leq 0.10$.

Table 5: Logistic regression [determinants of entrepreneurial innovation projects – Model 1]

Variables	Model 1a				Model 1b				Model 1c			
	B	**S.E.**	**Sig**	**Odds**	**B**	**S.E.**	**Sig**	**Odds**	**B**	**S.E.**	**Sig**	**Odds**
Enterprise innovation capabilities												
Innovation in product and processes					0.539	0.32	*	1.71	0.519	0.23	*	1.68
Innovation in products/services					0.199	0.56		1.22	0.108	0.56		1.11
Innovation in processes					0.029	1.08		1.03	0.237	1.08		1.27
University capabilities												
Teaching capabilities					0.420	0.17	***	1.52	0.507	0.16	***	1.66
Research capabilities					0.851	0.32	***	2.34	0.931	0.32	***	2.54
Enterprise capabilities					0.340	0.14	**	1.40	0.347	0.14	**	1.41
Government supports												
External funds					2.796	1.08	***	2.58	2. 749	1.08	***	2.58
Control variables												
Competitiveness												
Infrastructures (External factor1)	-0.365	0.19	**	0.69	-0.319	0.22		0.22	-0.292	0.22		0.75
Institutional voids (External factor2)	-0.011	0.15		0.99	-0.057	0.17		0.17	-0.089	0.18		1.09
Non-technological resources (Internal factor1)	0.406	0.18	**	1.50	0.430	0.21	**	0.21	0.366	0.21	*	1.44
Technological resources (Internal factor2)	0.450	0.14	***	1.57	0.192	0.16		0.16	0.224	0.17		1.25
University profile												
University number					0.257	0.15	*	1.29				
Research university									1.241	0.54	**	1.14
Public university									-1.796	0.91	*	0.17
Enterprise profile												
Size: Large (ref)												
Micro	-2.065	0.57	***	0.13	-1.163	0.64	*	0.31	-1.184	0.64	*	0.31
Medium	-1.275	0.54	**	0.28	-0.470	0.63		0.63	-0.481	0.63		0.62
Small	-0.446	0.58		0.64	0.186	0.67		1.20	0.210	0.67		1.23
Young enterprise	-0.458	0.35		0.63	-0.499	0.41		0.61	-0.555	0.41		0.57
Sector: Services (ref)												
Industry	0.057	0.35		1.06	0.341	0.40		1.41	0.359	0.40		1.43
Commerce	-1.476	0.33	***	0.23	-1.369	0.37	***	0.25	-1.365	0.37	***	0.26
National capital	-0.009	0.01	*	0.99	-0.010	0.01	*	0.99	-0.011	0.01	*	0.99
Domestic market	0.004	0.00		1.00	0.004	0.01		1.00	0.004	0.01		1.00
Constant	0.796	0.77		2.22	-0.707	0.90		0.49	-0.568	1.00		0.57
-2 Log likelihood			365.871				301.117				296.066	
Cox & Snell R Square			.154				.257				.264	
Nagelkerke R Square			.259				.432				.445	
Chi-square			83.252				148.006				153.057	
Sig.			***				***				***	
N			514				514				514	

Note: Level of statistical significance: *** $p \leq 0.000$, ** $p \leq 0.05$, * $p \leq 0.10$.

Table 6: Logistic regression [effects of entrepreneurial innovation projects on enterprise performance – Model 2]

Variables	Model 2a				Model 2b				Model 2c			
	B	**S.E.**	**Sig**	**Odds**	**B**	**S.E.**	**Sig**	**Odds**	**B**	**S.E.**	**Sig**	**Odds**
Enterprise-University												
Entrepreneurial innovation projects	0.32	0.13	*	1.38	0.39	0.12	*	1.48	0.59	0.16	*	2.68
Control variables												
Government support												
External funds					1.99	0.62	**	1.90	1.94	0.52	**	1.90
Enterprise capabilities												
Innovation capacity					0.32	0.13	*	1.38				
Innovation in product and processes									0.75	0.37	**	2.11
Innovation in products/services									0.26	0.24		1.30
Innovation in processes									0.02	0.76		1.02
Enterprise profile												
Size: Large (ref)												
Micro	0.41	0.51		0.13	0.52	0.53		1.69	0.49	0.53		1.62
Medium	0.24	0.51		0.28	0.26	0.53		1.30	0.22	0.53		1.25
Small	0.40	0.56		0.64	0.64	0.57		1.90	0.59	0.58		1.80
Young enterprise	0.05	0.23		0.63	0.02	0.24		1.02	0.05	0.24		1.05
Sector: Services (ref)												
Industry	0.66	0.31	**	1.06	0.76	0.32	**	2.13	0.78	0.32	***	2.18
Commerce	0.11	0.22		0.23	0.05	0.23		1.05	0.07	0.23		1.07
National capital	0.00	0.00		0.99	0.00	0.00		1.00	0.00	0.00		1.00
Domestic market	-0.01	0.00	*	1.00	-0.01	0.00	*	0.99	-0.01	0.00	*	0.99
Competitiveness												
Infrastructures (External factor1)	0.23	0.13	*	1.25	0.23	0.13	*	1.26	0.24	0.14	*	1.27
Institutional voids (External factor2)	-0.17	0.11		0.84	-0.16	0.11		0.85	-0.18	0.11		0.84
Non-technological resources (Internal factor1)	0.21	0.13		1.23	0.22	0.13	*	1.25	0.23	0.13	*	1.25
Technological resources (Internal factor2)	0.19	0.11	*	1.21	0.16	0.11		1.18	0.17	0.11		1.19
Constant	-0.85	0.63		0.43	-0.93	0.68		0.40	-0.88	0.69		0.41
-2 Log likelihood			606.85			595.39					593.106	
Cox & Snell R Square			.053			.075					.079	
Nagelkerke R Square			.074			.104					.109	
Chi-square			27.12			38.57					40.862	
Sig.			**			***					.002	
N			514			514					514	

Note: Level of statistical significance: *** $p \leq 0.000$, ** $p \leq 0.05$, * $p \leq 0.10$.

Table 7: Structural equation modelling [determinants and consequences of entrepreneurial innovation projects – Model 3]

	Relationships			Model 3		
				Coef.	S.E.	P
H1	Entrepreneurial innovations	<---	Enterprise capabilities	0.704	0.136	***
H2	Entrepreneurial innovations	<---	University capabilities	1.875	0.344	***
H3	Entrepreneurial innovations	<---	Government support	2.749	1.080	***
H4	Enterprise performance	<---	Entrepreneurial innovation projects	1.549	0.800	*
Enterprise capabilities	Innovation in product and processes	<---	Enterprise capabilities	3.051	0.057	***
	Innovation in product/services	<---	Enterprise capabilities	1.620	0.192	***
	Innovation in processes	<---	Enterprise capabilities	0.952	0.052	***
University capabilities	Teaching capabilities	<---	University capabilities	1.416	2.479	***
	Research capabilities	<---	University capabilities	3.035	0.660	***
	Entrepreneurial capabilities	<---	University capabilities	1.019	0.400	**

The direct and indirect effect

H	Relationships	Entire Sample	
		Direct	Indirect
H1	Enterprise capabilities → Enterprise performance	0.704 ***	0.320 ***
H2	University capabilities → Enterprise performance	1.875 **	0.750 **
H3	Government support → Enterprise performance	2.749 **	1.940 **