

THESES OF THE DOCTORAL (PhD) DISSERTATION

HIGHER EDUCATION INSTITUTIONS ENTREPRENEURSHIP ECOSYSTEM AND ITS INFLUENCE ON THE ENTREPRENEURIAL EDUCATION CASE STUDY NORTHEASTERN OF MEXICO

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2023

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INTRODUCTION, PROBLEM STATEMENT, OBJECTIVES AND HYPOTHESES

Over the past ten years, entrepreneurship has become an emerging trend, and Latin America and Mexico have also seen an increase in entrepreneurial activity. As a result, new organizations that do research and provide advice to people interested in launching their own enterprises have developed.

Entrepreneurship can be defined broadly as the process of developing a fresh idea or innovation into a workable commercial endeavor with the aim of creating economic value. To build, develop, and manage a company enterprise, this entails taking measured risks and making smart judgments. In particular, innovation is crucial to the entrepreneurial process because it encourages the creation of new services and products as well as the development of new processes and business models that have the potential to disrupt established markets. Innovation also encourages the development of new products and services.

Schumpeter (1934) stated that entrepreneurship is linked with invention and is a crucial engine of economic development. It makes it possible for business owners to find and capitalize on undiscovered market opportunities, leading to the creation of novel goods and services that can lead to the emergence of fresh markets and industries. Entrepreneurship can also result in the transformation of socially useful resources. This point of view sees business as the gateway for transforming resources into valuable results.

Audretsch et al. (2022) in their study mentioned the choice to start a business might be the result from one of two scenarios. The first is when someone starts a business in order to make money because they are unemployed or are afraid, they will become unemployed. The second scenario is when an individual identifies a promising opportunity and takes proactive steps to pursue it through the creation of a business. This dichotomy is commonly referred to as entrepreneurship by necessity versus entrepreneurship by opportunity (Nasiri & Hamelin, 2018).

Entrepreneurship by necessity contains a range of activities, such as street vending or starting a small business, which arises from the lack of formal employment opportunities. However, the concept of entrepreneurship driven by opportunity refers to the situation where

people who are already employed or studying choose to establish a business, capitalizing on the discovery of a profitable market gap.

The university ecosystem can provide an ideal atmosphere for promoting entrepreneurship by providing opportunities for students to explore diverse academic disciplines and ignite innovative thinking. Well-known companies such as Facebook, Google, Microsoft, Apple, and Twitter originated from universities, revealing how these institutions can foster successful ventures. To foster student entrepreneurship, universities often have dedicated support departments that provide free training and networking services to encourage and support their endeavors (González Flores & Molina Morejón, 2022).

The goal of this study is to examine actual panorama of the entrepreneurship ecosystem in Mexico, furthermore, to focus on the higher education institutions entrepreneurship ecosystem (HEIs) with a focus on the support departments and their role in creating, sustaining, and determining the success or failure of entrepreneurial projects, aiming to identify areas of opportunities for increasing the probabilities of success for ventures specifically in the Northeast of Mexico HEIs entrepreneurship ecosystem.

Furthermore, this study is intended to assist Higher Education Institutions in evaluating and assessing their entrepreneurship programs and their impact on their master's graduate students. Additionally, it could also be valuable for other stakeholders in the entrepreneurship ecosystem, including businesses and investors who could leverage the findings to identify or create new opportunities for generating businesses or addressing social, governmental, or environmental challenges.

1.2 Problem Statement

Mexico's economy and labor market have experienced a significant decline, resulting in a rise in entrepreneurial activity. Among the Mexican entrepreneurs 47% start businesses out of necessity (Molina, 2023). As a result of the limited options for a high-quality life in the national labor market, entrepreneurs are required to seek funding sources or specialized training. This highlights the importance of comprehending the factors that influence entrepreneurship and the supportive measures that can improve the success of entrepreneurial ventures. According to Villa Sánchez et al. (2021), entrepreneurs in Mexico are increasingly choosing self-employment as a means of achieving a better quality of life.

The difference between an entrepreneur who starts a business out of necessity and one who does it out of opportunity is, that the former typically launches their venture in a rushed and uneducated manner, whereas the latter takes a more deliberate approach to turn a promising idea into a thriving business, by proactively engaging with the entrepreneurship ecosystem, establishing connections with relevant stakeholders, and taking other similar measures.

Although the increase in the quantity of startups during the pandemic, regrettably, a considerable proportion of these businesses stay in their early stages and fail. Mexico is one of the Latin American countries that witnessed a higher number of businesses shutting down than those that emerged, despite the surge in entrepreneurial activity in 2020 and 2021. Data from the Study on the Demography of Business (EDN) conducted by the National Institute of Geography and Statistics INEGI (2021) reveals that even though during the same period, there was 24% increase in the number of new businesses that were established in Mexico, while 33% of existing businesses failed and disappeared.

In Mexico, the culture of entrepreneurship falls behind in comparison with other developed countries, and this is linked to the limited promotion of innovation and business creation in the education system (Liévano-Morales, 2021). In higher education, students are typically encouraged to join established companies as employees, rather than being encouraged to explore entrepreneurship as a practical career option. The current educational programs in Mexico do not focus on encouraging students to launch their own businesses during their studies or even after graduation, in consequence this is creating a gap in the culture of entrepreneurship. However, with the growing awareness and recognition of the economic and social benefits of entrepreneurship, there is a promising shift towards promoting and supporting entrepreneurial ventures in Mexico.

The Association of Entrepreneurs of Mexico (ASEM, 2022) revealed that in the 2021 the Mexican entrepreneurship ecosystem highlights several challenging factors. Among these, the difficulty in accessing financing support (32%) and excessive costs related to tax and labor structures (33%); in addition, the lack of education or training for starting a business (36%) is also a significant obstacle. Other challenges that entrepreneurs have to confront include corruption, which was mentioned by 24% of those surveyed, and crime and theft, indicated by 17% of respondents.

To address the issues mentioned earlier, entrepreneurs are looking for assistance from various stakeholders in the entrepreneurship ecosystem to make it easier for them to start and grow their businesses. As a result, it has become crucial to investigate the factors of the entrepreneurship ecosystem and how they influence the training of master's degree students (typically aged between 24-46 years old) in order to improve the entrepreneurial ecosystem in Mexico and better prepare students for higher-level job positions or starting their own businesses. This study intends to address research questions and provide solutions, primarily for educators and other stakeholders in the entrepreneurship ecosystem.

1.3 Research Questions

This research focuses on assessing the influence of Higher Education Institutions (HEI) to respond these questions:

1. How is the actual panorama of the Mexican entrepreneurship ecosystem?
2. Which Higher Education Institution ecosystem factors influence the mindset of entrepreneurship perceived by the master graduate students?
3. Which Internal or External ecosystem factors of the Higher Education Institutions are considered as important according to the master graduate students?
4. Do the External factors influence the Internal factors of the Higher Education Ecosystem?
5. Do the Higher Education Institutions factors influence the Entrepreneurship Education perceived by the master graduate students?
6. Are the Entrepreneurship Education curricula programs of the Higher Education Institutions preparing and supporting entrepreneurship perceived by the master graduate students?

1.4 Research Objectives

This research focuses on assessing the influence of Higher Education Institutions (HEIs) the research objectives are:

- Explore the actual Mexican entrepreneurship ecosystem

- Explore the Internal, External HEI factors and entrepreneurship education factors that influence master graduate students in applying for a degree in business/management fields in the Northeast (NE) of Mexico.
- Explore whether the Entrepreneurship education factors influence the entrepreneurship mindset of the graduated students in the NE of Mexico.
- Create a new framework of the Higher Education Ecosystem factors and their relationship with the Entrepreneurial Education to be applied in the NE of Mexico

1.5 Hypotheses

To achieve these research objectives, the dissertation prepared three main hypotheses:

- H1: There is a strong positive correlation between the level of the external entrepreneurship ecosystem factors in HEIs and the level of the internal entrepreneurship ecosystem factors in HEIs.
- H2: A strong external entrepreneurship ecosystem in HEIs is correlated with a higher level of entrepreneurship education.
- H3: A strong internal entrepreneurship ecosystem in HEIs is correlated with a higher level of entrepreneurship education.

1.6 The Structure Of The Research

Chapter One: Introduction; **Chapter Two:** Literature Review; theories and definitions, **Chapter Three:** Research Methodology, **Chapter Four:** Analysis Results and Findings. **Chapter Five:** Conclusion, Research limitations and Recommendations. **Chapter Six:** States the main conclusion and novel findings of the study (See, figure 1.).

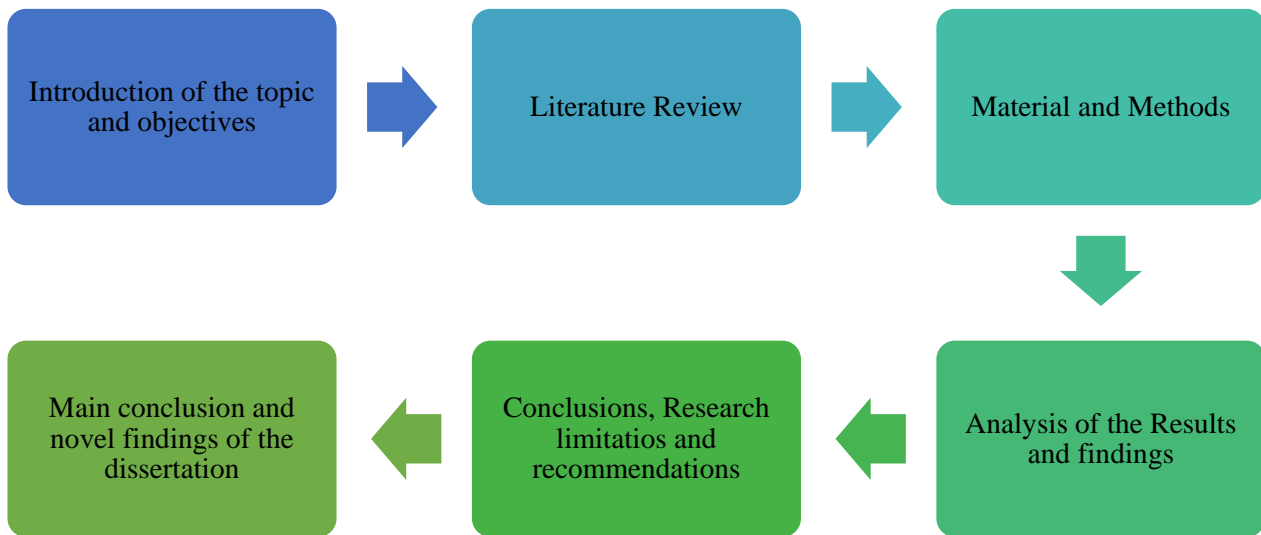


Figure 1 Research Structure

Source: own edit.

2. METHODOLOGY

The research methodology employed in this study consisted of both qualitative (exploratory and descriptive) and quantitative (relational, explanatory, and predictive) methods. The research was based on multiple sources of information including documentary sources, surveys, and the author's own experiences.

2.1 Stages of the process

There were three stages to the process:

- The first one consisted in explore diverse sources of information from national high impact reports about the entrepreneurship ecosystem in Mexico analyze it and discover the actual panorama of the Mexican EE.
- The second one required conducting a survey using the modified Delphi method, a method that entails two rounds of consultation assisted using questionnaires and Internet and in order to obtain consensus on a specific issue (Almenara & Moro, 2014). The FORMS tool from Microsoft 365 Applications for Enterprises, was used to create the nine optional questions in the first-round quiz. The panel included a total of 27 expert members, and the survey was sent through email.
 - In the Delphi second round of the survey was applied to 21 experts who decided to continue and collaborate with this research. The experts were invited to complete the identification remaining anonymous, including gender,

age, years of experience in the topic, and their role in relation to the Higher Education Institute/University.

- The survey was explicitly sent to experts in NE of Mexico who previously worked or participated in the former national program PRODEM, which was dedicated exclusively to deal with entrepreneurship ecosystem programs in national and regional ranges.
- The third stage of the methodology was the development of a theoretical framework, which was divided into three main constructs using structural equations and was completed with a survey.
 - The survey was created based on the Literature Review consulted based on the constructs used in the work of Mukesh and Pillai (2020) combining the work and theory of Guerrero and Urbano (2012) for the HEIs Entrepreneurship Ecosystem and Pittaway and Cope (2007) work for the Entrepreneurship Education.
 - The survey was sent to a specific focus group, which for me was important to address the opinion and experience from master graduates in any economic/business postgraduate master programs, selecting 156 individuals for the sample but the rate of responses was only 120 participants this number was good enough to get significant results. The tool used was the Partial Least Squares (PLS).

2.2 Delphi Method

In this research, the starting point was to define the concepts that would be used in the specific sample. The Delphi determined as the appropriate research method based on the literature review, and a modified Delphi method was applied to consult with a panel of experts. The Delphi method involves the discussion of a group of expert's opinions about a subject, conducted out in rounds of repetition and anonymity (De la Garza et al., 2015).

As shown by Hsu et al. (2007), the Delphi method uses questionnaires to gather information and aims to create consensus among the participants. Reguant Álvarez and Torrado Fonseca (2016) highlighted that when this method is broken down into steps that start with the

definition of the research problem and continue with the creation of the expert group, rounds of consultation, and information analysis.

Adan (2018) in his work makes a compilation of the advantages and limitations of using the Delphi method in the following table 1 are pointed out.

Table 1 Delphi method: limitations and advantages

Advantages	Limitations
The subjective or experience-based opinion of a group of specialists will always be of higher quality compared to the opinion of a single specialist, due to the greater amount of information available to a group.	The results depend on the accuracy of the questions. That is, there is no doubt about its content because the interpretation must be unique.
Minimizes the influence of opinion leaders, allowing each participant to express themselves freely.	The length of the sentences must be carefully evaluated. The greater the number of words in a question, the greater the possibility of error in its interpretation.
The anonymity and confidentiality that must be maintained allows disagreement with opinions that are widespread and/or maintained over time as absolute truths. In the successive stages the participant will have the option to defend his position.	The bias of the participants due to their cultural background, age, and gender, can affect in some cases. For this reason, the choice of experts must be careful.
It is a useful method for decision making and its application is very wide in any field.	After the first round, some participants are tempted to join the score closest to that of the total group, without their own argument.
	It is an intuitive method rather than a rational one, but its value increases as the requirements to develop the method correctly in all its stages are met.

Source: own elaboration based on Adan (2018).

The goal of applying the Delphi method was to consult with the experts about an specific topic, for my research was important the opinion of a panel of experts based on the literature review consulted for the understanding and conceptualization of the Entrepreneurial Human Capital, the mission of the Entrepreneurial University, further to look for consensus on the definitions of the concepts presented, the continuation with the participation of the panel of experts for me was significant to know their opinion in two principal questions: What are

the most significant factors shaping the Entrepreneurship education, and what are Higher Education Institutions ecosystem's factors influence the Entrepreneurship Ecosystem?

According to the literature, the number of applicants in Delphi method can range from seven to 30, and the experts can be of two types: affected and specialists. The first type are individuals that the subject directly affects the outcome and the second type individuals who possess knowledge/expertise about the situation under study (Reguant Álvarez & Torrado Fonseca 2016).

2.2.1 Data Collection and Sample for Delphi method

In this case, the participants were 27 stakeholders that are considered under the second type who had experienced working, studying, and/or developing projects in higher education institutions (HEIs) belonging to the former Mexican Entrepreneurship National Program (PRODEM). In the first round participated 27 and in the 2nd 21 experts that decided to continue the study, the 1st and 2nd round were sent in the first quarter of 2022, after taking consensus from the first round, was sent the second round to the experts that decided to continue supporting this research.

From the 1st round Delphi came as a result for the question of Defining Entrepreneurial Capital the most voted option with the 78% of the votes:

“Entrepreneurial human capital contains a collection of competencies, resembling the ability to create ideas, find solutions, the ability to deal with complex circumstances in a determined place” (Bacigalupo et al., 2016).

To find the concept that in their experience adapts better with the definition of “The mission of the University”.

“Universities are important ecosystem players and need to be active in this collaboration they are crucial to a region's ecosystem; their participation in Entrepreneur Development strategies and programs ensures the connection of student programs and research commercialization activities” (Clarysse et al., 2011).

This research further was focused on analyzing the conceptualization and identification of the key factors in HEIs. Specifically, the study examined their opinions about conceptualizing HEIs ecosystems: external and internal factors and how in their experience

impacts and/or interconnects with the entrepreneurship education factors (adapted from the work of Mukesh and Pillai, 2020; combining the work and theories of Guerrero and Urbano, 2012 and Pittaway and Cope, 2007).

Figure 2 was created with the results of the Delphi HEIs factors and Entrepreneurship Ecosystem factors in the second round of the Delphi, the size of the circles corresponds to the responses about the interconnectedness of each factor in creating relationships with the Entrepreneurship Education according to experts' responses to surveys.

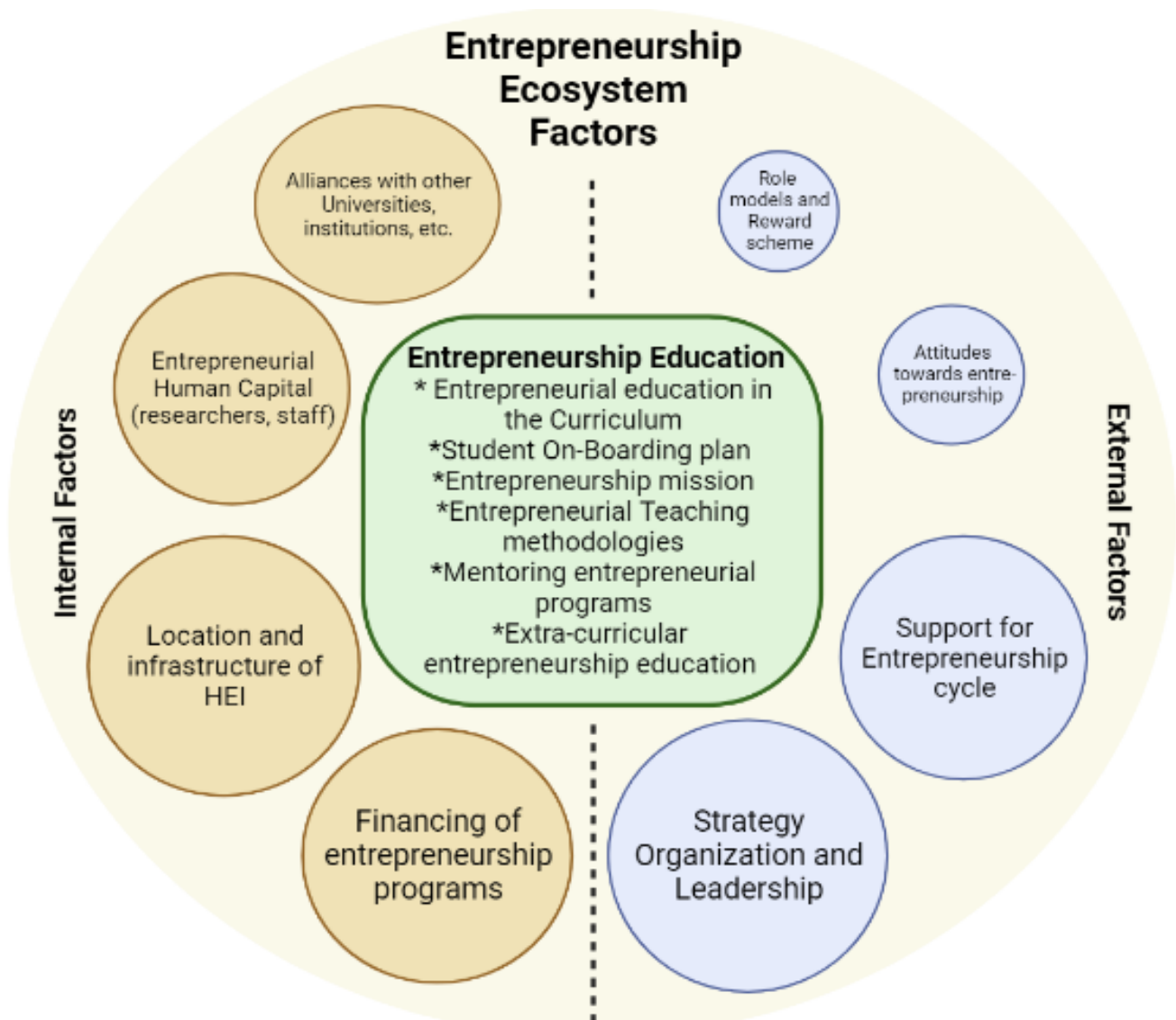


Figure 2 HEIs Ecosystem and EEd conceptualization.

Source: Own edit, based on the results from the last 2nd round, of the Delphi applied to the panel of experts.

2.3 Partial Least Squares

For the second part of the research was used the Partial Least Squares (PLS) method was utilized; this methodology is a statistical tool that has been increasingly used in entrepreneurship research and analysis. PLS methodology can be particularly useful in identifying the key factors that drive business success and in understanding the complex relationships among these factors.

In the research work of Hair et al. (2011), the PLS methodology is particularly useful in entrepreneurship research because it allows researchers to examine a large number of variables simultaneously, making it possible to identify the most important factors that contribute to business performance. The PLS methodology is also flexible and can accommodate different types of data, including both categorical and continuous variables.

Rauch and Frese (2007) employed the PLS methodology to examine the correlation between entrepreneurial orientation and business performance in their research. Their findings revealed a beneficial impact of entrepreneurial orientation on business performance, which was facilitated by the strategic flexibility of the firm.

Martínez Ávila and Fierro Moreno (2018) made some annotations about the use of PLS method shown in the following table 2.

Table 2 PLS method: advantages and limitations

Advantages	Limits
It is objective, it only depends on the experimental results.	It only serves to fit linear models
It is reproducible, provides the same equation, no matter who performs the analysis.	It requires having at least ten measurements under the same experimental circumstances.
Provides a probabilistic estimate of the equation that represents some experimental data.	Such results must be described by a known probability distribution. The most common is the normal or Gaussian distribution.
Provides small error intervals	Some calculation software is required, otherwise it is very annoying.
PLS is known for its ability to handle complex relationships and multiple variables simultaneously	

Source: own elaboration based on the work of Martínez Ávila and Fierro Moreno (2018).

For the case of study will be use the constructs used in the work of Mukesh and Pillai (2020) in which they developed a theoretical framework that combines two widely cited theories to explain the relationship between the environment of Higher Education Institutions (HEIs) and Entrepreneurship Education (Eed). The authors drew on the strengths of studies by Guerrero and Urbano (2012) and Pittaway and Cope (2007) on Eed to create an integrated framework. The authors identified several external factors in the entrepreneurship ecosystem of HEIs, including promotional activities, attitude toward entrepreneurship, support for entrepreneurship, and governance structure. These factors were used as variables in the study conducted by Mukesh and Pillai (2020) and reported in their research.

Regarding the internal entrepreneurship ecosystem in HEIs, the variables encompassed are the capacity to link startups with industry, faculty and instructional support, physical infrastructure and amenities, and monetary backing for entrepreneurship. For the variables or factors in the entrepreneurial education, will be consider for this study: the degree of entrepreneurial education in academic program, extracurricular activities, department philosophy on entrepreneurship, mentoring and coaching programs for entrepreneurs, the student orientation, this conceptual framework was retrieved from the work of Pittaway and Cope (2007) and entrepreneurial teaching methodologies from Guerrero and Urbano (2012).

To conduct this research, a questionnaire was developed and distributed via email in the first quarter of 2022. The case study was concentrated specifically on graduates who completed a master's degree in Torreon Coahuila between 2020-2021. The questionnaire was sent to a total of 156 individuals, with the assistance of the "follow-up graduates' program" department in each faculty. Six private and one public high education institutes were selected for the study, all of which offer master's degrees in areas such as economy, management, business, and finance.

The participants were more than the minimum sample size of 111 needed for a 95% confidence level, which is sufficient for statistical calculations in the results and discussion sections. The questionnaire that was used included multiple-choice questions that were designed based on the literature review previously mentioned.

The questionnaire that was used included multiple-choice questions that were designed based on the literature review and related to entrepreneurial ecosystem factors. The

questions were arranged as closed questions, and students were asked to respond on a Likert scale from 1 to 5.

The following table 3 describe the constructs to use in the questions of the questionnaire and is being used as a framework for the dissertation:

Table 3 Questions for Indicators-Variables and Framework for the Dissertation

F1 External entrepreneurship ecosystem in HEIs	EPAH	Entrepreneurship promotional activities by HEIs
	HATE	HEIs attitude towards entrepreneurship
	HSE	HEIs support for entrepreneurship
	HGS	HEIs & Governance structure
F2 Internal entrepreneurship ecosystem in HEIs	HACSI	HEIs ability to connect startups with industry
	HTS	HEIs' teaching and staff
	HPIF	HEIs physical infrastructure and facilities
	HFSE	HEIs financial support for entrepreneurship
F3 Entrepreneurship education in HEIs	DEEC	Degree of entrepreneurial education in curriculum
	SOE	Student orientation on entrepreneurship
	DPE	Department philosophy on entrepreneurship
	ETM	Entrepreneurial teaching methodologies
	MCPE	Mentoring and coaching programs for entrepreneurs
	EARE	Extra-curricular activity relating to entrepreneurship

Source: own elaboration based on the work of Mukesh and Pillai, 2020; Guerrero and Urbano, 2012 and Pittaway and Cope 2007; although with the same approach the title of the factors F1 and F2 has been modified for this research.

The complexity of the topic required a careful approach, and as a result, this research relied on a conceptual framework and a specific methodology. Figure 3, which depicts a structural equation model, was utilized to illustrate two sub-models. By utilizing this methodology, the research was able to establish a clear and comprehensive understanding of the relationships between variables and their indicators (Wong, 2019).

In figure 3. It is observed the structural model with all the constructs applied in the research.

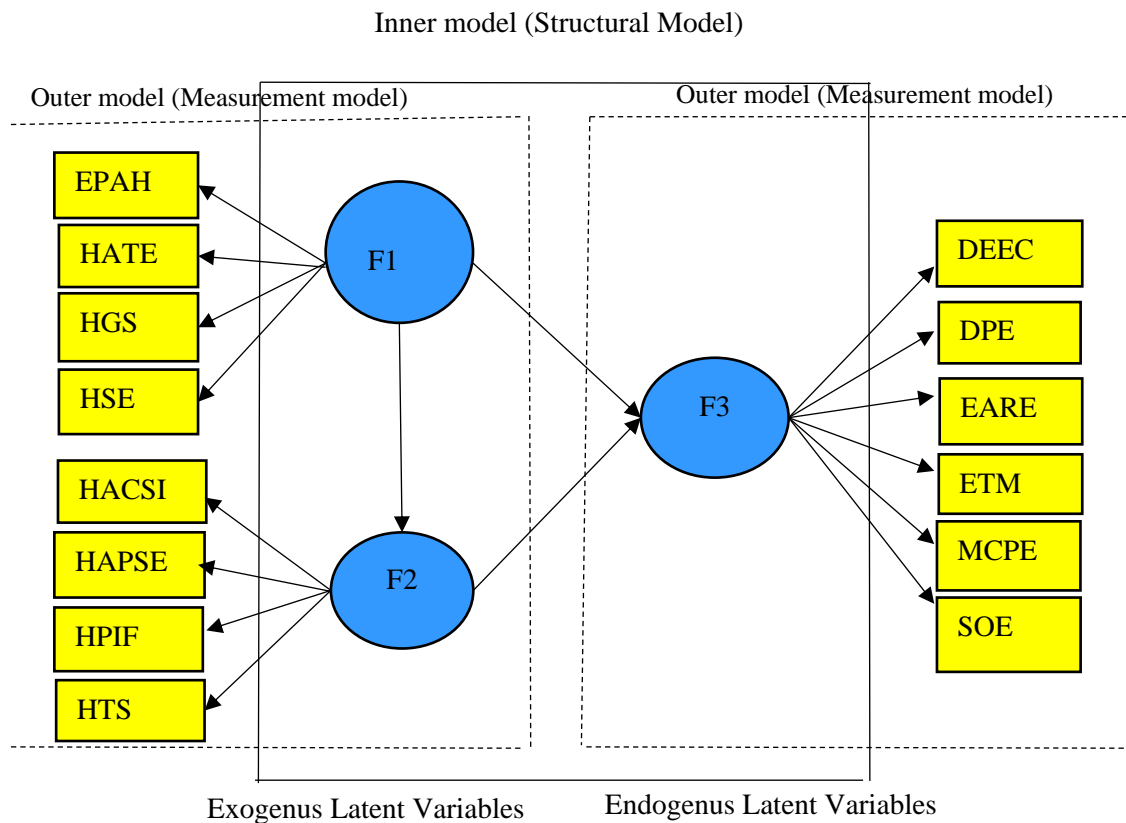


Figure 3 Structural model of the research.

Source: own elaboration.

2.3.1 Population object of study and data collection

The focus of this the study is based on individuals who have completed a master’s program in the fields of business, management, or finance, specifically those that include entrepreneurship in their academic curriculum. I was interested in gaining insights about the perceptions and feedback of the graduates regarding the entrepreneurial ecosystem factors and the effectiveness of entrepreneurship education in shaping the entrepreneurial mindset holistically of the people surveyed. This research will use a case study approach that focuses on graduates from the North-East region of Mexico (specifically in Torreon, Coahuila) who completed their master’s program between 2020-2021. In table 4 is listed the higher education institutions that participated in the survey, as well in table 5 is shown the population sample to have the confidence level for the sample.

Table 4 List of participants from the population sample

Name of higher education institute	Type of institution	Women	Men	Total
Enseñanza E Investigación Superior, A.C.	Private	26	28	54
- Master in Businesses Management focus in Quality and Productivity		8	15	23
-Master in Businesses Management focus in Finance		11	10	21
-Master in Businesses Management focus in Marketing		4	2	6
-Master in Businesses Management focus in Human Resources		3	1	4
Instituto Internacional De Administración Estratégica	Private	3	2	5
-Master in Strategic Management		3	2	5
Universidad Autónoma De La Laguna	Private	8	0	8
-Master in Management		8	0	8
Universidad Del Desarrollo Profesional	Private	5	4	9
-Master in Businesses Direction		5	4	9
Universidad Iberoamericana - Torreón	Private	10	7	17
-Master in Project Management		3	1	4
-Master in Executive Management		5	3	8
-Master in Sociocultural Management		2	3	5
Universidad Autónoma De Coahuila	Public	11	16	27
-Master in Management with focus in Finance and Human Capital		0	0	0
-Master in Executive Management		9	12	21
-Master in Business Taxation		2	4	6
Total		64	57	120

Source: author's own elaboration.

Table 5 Population Sample.

Concept	Percentage	Number
Confidence Level:	95%	
Margin of Error:	5 %	
Population Proportion:	44 %	
Population Size:	-	156
Result Sample size	-	111

Source: retrieved from González Flores & Molina Morejón (2022).

2.3.2 Indicator reliability

The following figure 4 shows the Histogram Outer Loadings, where two of the variables of the factor F1 External entrepreneurship ecosystem and two of Entrepreneurship Education in HEIs were discarded for having factorial load values below 0.7 (González Flores & Molina Morejón, 2022).

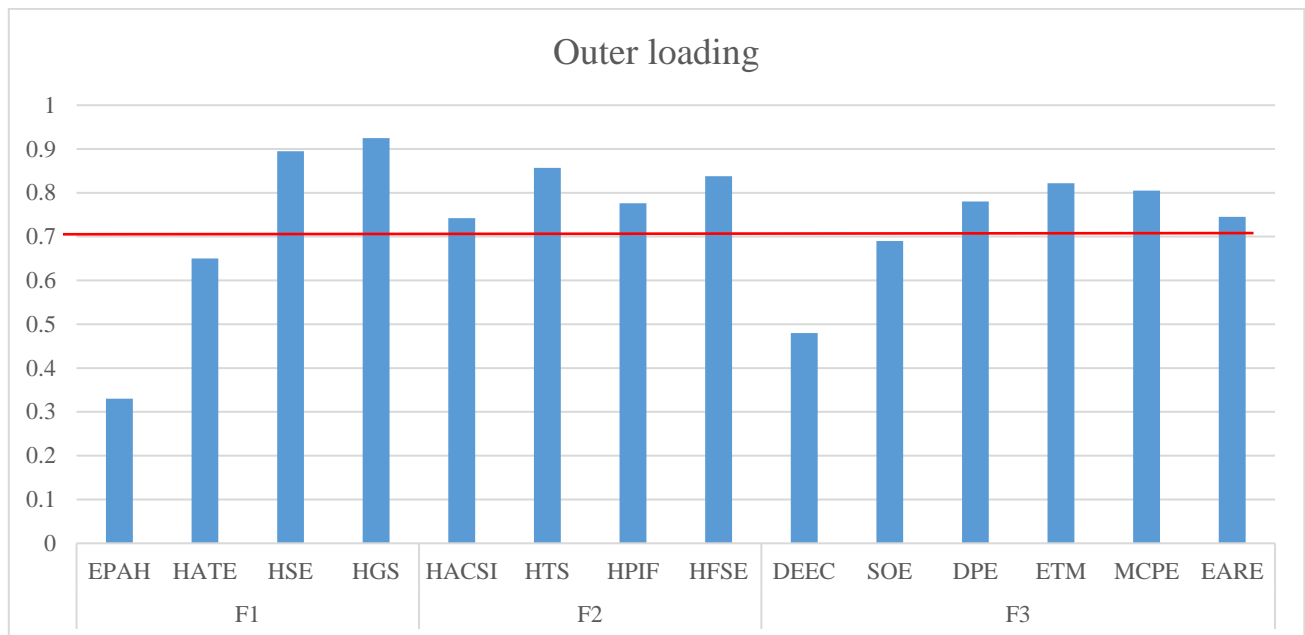


Figure 4 Histogram Outer Loadings

Source: retrieved from González Flores & Molina Morejón (2022). Observe that were dropped variables: EPAH; HATE; DEEC, SOE.

The authors González Flores and Molina Morejón (2022), in their work highlighted that convergent validity is the extent to which the construct converges to explain the variance of its indicators. As observed in table 6; the mean-variance extracted, the average variance extracted (AVE) for all the indicators of each construct is greater than 0.50, which indicates that the construct explains 50% or more of the variance of the indicators that make up the construct (Hair et al., 2011). In this matrix, the four variables that were eliminated for having a low factor load no longer appear. The “AVE” number should be 0,5 or higher to remain significant to the research (Bagozzi & Yi, 1988).

Table 6 Convergent validity

Latent Variable	Indicators	Loading	Indicator reliability	alpha de Cronbach	rho_A	(IFC)	(AVE)
			(Loading 2)				
F1	HGS	0.925	0.855	0.795	0.808	0.907	0.83
	HSE	0.895	0.801				
F2	HACSI	0.742	0.55	0.817	0.819	0.88	0.655
	HFSE	0.838	0.702				
	HPIF	0.776	0.602				
	HTS	0.857	0.773				
F3	EARE	0.745	0.555	0.841	0.87	0.885	0.645
	ETM	0.822	0.675				
	MCPE	0.805	0.648				
	DPE	0.780	0.608				

Source: retrieved from González Flores & Molina Morejón (2022).

In the work of Fornell and Larcker (1981) suggest that the “square root” of AVE of each latent variable should be greater than the correlations among the latent variables, in this case (Table 7) we can observe the criterion of Fornell and Larcker (1981) is met.

Table 7 Discriminant validity test

	F1	F2	F3	
F1	0.91	0.911		
F2	0.809	0.804	0.809	
F3	0.723	0.801	0.779	0.803

Source: retrieved from González Flores & Molina Morejón (2022).

3. SCIENTIFIC FINDINGS

In the findings could established panoramic view of the actual entrepreneurship ecosystem in Mexico even when it is continuously growing and the government making efforts to incentivize entrepreneurial projects, in the Global Entrepreneurship Survey (GoDaddy, 2022) reveals that in Mexico the 47% of entrepreneurs start their business out of necessity or the desire to have an extra income, while in other countries such as the United States, Canada, or Australia they start their companies pursuing a passion and not a need.

ASEM (2022) also mentions that in 2021 the main motivations the Mexicans have to start a business is the search for personal and professional growth, as well the need to fix problems in the society or in the market, in the report as well mention some statistics like the 64% of the entrepreneurs have their business as main income, 22% of the entrepreneurs said that their business is their secondary income, and the 14% entrepreneurs consider their business as just an extra income, the sources for financing entrepreneurial ecosystem of Mexico during the first three years, are mainly from own resources, sales and utilities generated by the business, and/or from the family or friends resources (ASEM, 2022).

The National Institute of Statistics and Geography (INEGI, 2021) points out that the preferred areas for Mexicans to start a business are food, technology, and beauty. In technology, the Mexican entrepreneurs decide to start their business mainly in software, gadgets, videogames, and digital services, highlighting that the sales of beauty and personal care items grew by 8 % in 2021. Meanwhile, gastronomy represents 12.2% of all businesses in the country and generates just over two million jobs (INEGI, 2021).

The local, national, or international economy and society all have an impact on an entrepreneur's ability to succeed. The entrepreneurial "ecosystem" is this conglomeration of mindsets, assets, and infrastructure. A yearly index called the Global Entrepreneurship Index (GEI) rates the effectiveness of entrepreneurial ecosystems in 137 different nations.

The GEI technique gathers information on the local population's entrepreneurial attitudes, skills, and ambitions and compares them to the social and economic "infrastructure." Using this procedure, 14 "pillars" are created, including internet connectivity and transportation connections to external markets, which GEDI utilizes to measure the condition of the local

ecosystem. Figure 5 is made based on the data compiled by the GEDI (2022) about the Mexican Entrepreneurial Ecosystem.

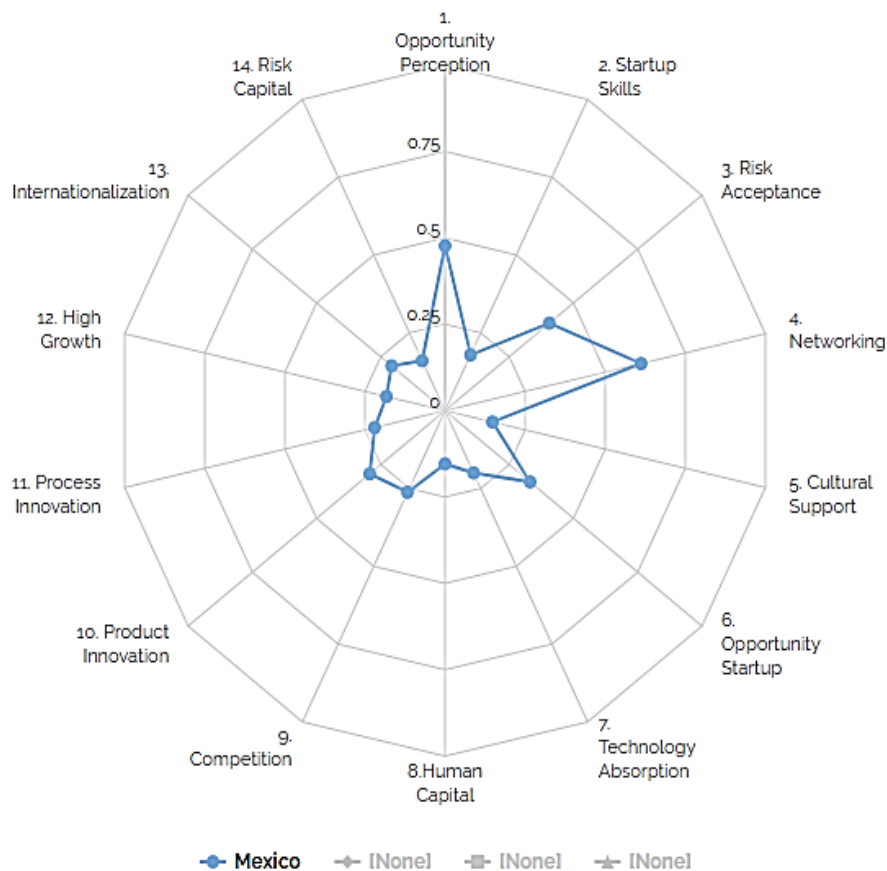


Figure 5 Mexican entrepreneurship ecosystem based on the GEDI pillars 2022.
Source: retrieved from <http://thegedi.org/tool/> GEDI (2022).

After reviewing the actual Entrepreneurial Ecosystem in Mexico, this dissertation gave a turn in the direction, focusing on the HEIs entrepreneurship ecosystem and their relationship with the Entrepreneurial Education.

In this part of the research the incorporation of the Delphi method provided a wider point of view from the stakeholders called panel of experts, which mainly gave their opinion about the definitions of the mission of the entrepreneurial university, and the entrepreneurial human capital, as well their opinion about the factors of the HEIs entrepreneurship factors using their experience to establish the framework to use in the next part of the research based on the literature reviewed and the opinion of the panel of experts

For the following part of the study was used a quantitative research design, and the data was collected from master's graduate students pursuing business and management degrees in HEIs in the Northeast region of Mexico. The results highlighted the existence of an ecosystem in which EE is hosted, and the study identifies several factors that influence the entrepreneurship mindset of the students by evaluating three main hypotheses, explained, and developed further in this dissertation.

The study provides insights into the factors that influence the entrepreneurship mindset of students, and it highlights the importance of fostering an entrepreneurship ecosystem in HEIs to promote entrepreneurship education. The chapter concludes by presenting recommendations for policymakers, HEIs, and other stakeholders, improving the entrepreneurship ecosystem in HEIs in the Northeast region of Mexico.

The proposed relationship model that was contrasted in the methodology chapter, according to the results of González Flores & Molina Morejón (2022), mentions that the coefficient of determination (R^2) and the predictive validity of the model (Q^2) were obtained. The value of the coefficient of determination of the independent or endogenous variables must be equal to or greater than 0.1 (Hair et al., 2011). The predictive validity of the dependent constructs was calculated using the Blindfolding technique.

As stated by González Flores et al. (2022) the coefficient of determination of the endogenous or dependent variables (R^2) according to Hair et al. (2011), the values of 0.25, 0.50, and 0.75 have weak, moderate, and substantial significance, respectively. On the other hand, what determines the prediction quality of the structural model is the value of the coefficient (Q^2) according to Stone (1974) and Geisser (1974). This test is used as a criterion to measure the predictive relevance of the dependent constructs and is calculated by means of the Blindfolding technique. A value of $Q^2 > 0$ indicates that the model has predictive relevance (Chin, 1998).

Table 8 displays how the entrepreneurship education factor's R^2 value is 0.645, meaning that the F3 factor accounts for 64.5% of the variance in the F1 and F2 factors. According to this empirical standard, all of the constructs have respectable predictive power, and the Q^2 values are all positive.

Table 8 Explained variance and predictive validity of the model.

Construct	SSO	SSE	R²	Q² (=1-SSE/SSO)
(F1) HEIs External Entrepreneurship Ecosystem	242	242		
(F2) HEIs Internal Entrepreneurship Ecosystem	484	296.652	0.758	0.387
(F3) Entrepreneurship education	605	387.666	0.645	0.359

Source: retrieved from González Flores & Molina Morejón (2022).

As compiled in the work of González Flores & Molina Morejón (2022), utilized the concepts of the goodness of fit and hypothesis testing by Vinzi et al. (2010) their work suggest a global goodness-of-fit criterion for PLS structural models, they propose that the global goodness-of-fit index be given by means of the square root of the multiplication of the arithmetic mean of the extracted variance analysis (AVE) and the arithmetic mean of the coefficient of determination (R²) of the endogenous or dependent variables.

Analysis of causal relationships and contrasting hypotheses:

The PLS methodology does not assume that the information is normally distributed, which means that, in order to assess the quality of the complete model, it is necessary to apply a non-parametric resampling technique called bootstrapping, which involves random resampling with replacement of the original sample, creating new pseudo-samples from the original sample in order to obtain sampling errors for hypothesis testing (Cabana et al., 2019).

Once the reliability and validity of the measurement model have been verified and the trajectory coefficient is adequate, the bootstrapping or resampling process was performed.

“Re-sampling” positively validates the four hypotheses in table 9.

Table 9 Hypothesis verification.

Hypothesis	Trajectory	Original sample	Mean	Std. Deviation	"t" value	Trajectory coefficient P value *p<0,05; **p<0,01; ***p<0,001
H1	F1 External HEIs entrepreneurship ecosystem → F2 Internal HEIs entrepreneurship ecosystem	0.871	0.844	0.073	11.959	0.000***
H2	F1 External HEIs entrepreneurship ecosystem → F3 Entrepreneurship education	0.723	0.734	0.0337	19.701	0.000***
H3	F2 Internal HEIs entrepreneurship ecosystem → F3 Entrepreneurship education	0.712	0.735	0.129	5.515	0.000***

Source: retrieved from González Flores & Molina Morejón (2022).

Table 9 provides the "t" values of the bootstrapping or resampling process for the external model, demonstrating that all loadings are significant, supporting the assertion that the measurement model is reliable, and that convergent validity holds.

The findings suggest that the conceptual model's proper management of the external HEIs entrepreneurship ecosystem has a beneficial impact on the internal HEIs entrepreneurship ecosystem because (H1: $\beta = 0.871$, $p = 0.00$, and $t = 11.959$), which accepts the **hypothesis H1 is supported by the data**. Additionally, the external HEIs entrepreneurship ecosystem factors have beneficial impact on entrepreneurship education the **hypothesis H2 is confirmed** by the fact that (H2: $\beta = 0.723$; $p < 0.000$ and $t = 19.701$). Finally, **hypothesis H3 is also accepted** because the internal HEIs entrepreneurship ecosystem has a favorable impact on entrepreneurship education (H3: $\beta = 0.712$, $p < 0.000$ and $t = 5.515$).

3.1 Hypotheses Testing Results

First Hypothesis: There is a strong positive correlation between the level of the External entrepreneurship ecosystem factors in HEIs and the level of the Internal entrepreneurship ecosystem factors in HEIs.

- Even if the hypothesis Factor F1 (external HEIs entrepreneurship ecosystem), the **hypothesis H1** was accepted, Isenberg (2011) advises that the entrepreneurship ecosystem consists of a group of individual factors that combine in a complex manner; individually, each of these factors drives entrepreneurship, but they are not sufficient to maintain it. The EPAH and HATE variables (Entrepreneurship Promotional Activities by HEIs and HEIs attitude towards entrepreneurship, respectively) were eliminated from the analysis. The development of risky businesses such the creation of SMEs or startups is accelerated, however, when all of them are integrated into a comprehensive system working with all the stakeholders with a clear objective, the entrepreneurship ecosystem of the HEIs will thrive.

Second Hypothesis: A strong External entrepreneurship ecosystem in HEIs is correlated with a higher level of Entrepreneurship Education.

- In a similar context, the Factor F2 (internal HEIs entrepreneurship ecosystem) the **hypothesis H2** was accepted authors like Roundy et al. (2017) and Bischoff et al. (2018) studies, revealed that if a link/connection in the ecosystem is broken, it is very difficult to repair it. Therefore, any intervention program in this area must strengthen the ecosystem and maintain the balance between its agents, which include institutions, large businesses, public administrations, and the entrepreneurs themselves; studies like Gielnik et al. (2015) and Guerrero et al. (2016) highlighted the importance of promoting entrepreneurship in higher education institutions and the potential benefits of doing it.

Third Hypothesis: A strong Internal entrepreneurship ecosystem in HEIs is correlated with a higher level of Entrepreneurship Education.

- In the factor F3 (Internal HEIs entrepreneurship ecosystem), the **hypothesis H3** was accepted, although as a result of eliminating the variables DEEC and SOE (Degree of entrepreneurial education in curriculum and orientation on entrepreneurial, respectively) was not possible to analyze it as a result they were not specific academic programs during their master programs, even though exist cases of study like authors analyzed in Italy, at the University of the Marche with a project called "Economics Entrepreneurship and management of innovation and University of Naples II" and "In the case of Bologna, it was a two-year postgraduate course in management with a curriculum called "Firm and innovation". In the city of Urbino there was a specific curriculum within a three-year academic program called "Entrepreneurship and small firms" (Iacobucci and Micozzi, 2012); in their research study the entrepreneurship courses were part of curricula mentioned just in general management programs not as a main subject according to the participants of the survey.

Even though in the literature consulted, many of the authors warn that if the results of the research are conclusive in the sense of identifying factors that are associated with entrepreneurial intention in young people, the studies do not control the fixed effects and should be applied to a specific city or region, which should be defining institutional arrangements that adapt the incentives to undertake for improve the entrepreneurial mindset (González Flores & Molina Morejón, 2022).

4. CONCLUSION, RESEARCH LIMITATIONS, RECOMMENDATIONS AND FUTURE RESEARCH

4.1 Conclusion

The current global scenario of the industry and the digital revolution is expected to bring about significant changes in economic and social ecosystems, particularly in the labor sector. According to the World Economic Forum (WEF, 2023) in the future for job report, 2023, mentions that 69 million jobs will be created by 2027, but also will be eliminated 83 million jobs worldwide (this is the 2% of the actual occupation). The report also emphasizes the necessity for investment in training, reskilling, and social support networks to protect

individuals' future of work. Also stated that startups can portray a key role, by educating and training with upskilling programs to workers who may be at threat of losing their employments due to shifting trends and technologies such artificial intelligence (AI) (WEF, 2023).

In this context, it is crucial that Higher Education Institutions (HEIs) integrate entrepreneurial skill development and mindset support into their academic programs. This will enable students to acquire not only business management skills but also the awareness and commitment required to navigate their ecosystem and contribute positively to the entrepreneurship ecosystem.

The academy faces three major challenges in this regard:

- 1) It must educate and coach better entrepreneurs, intrapreneurs, and future business leaders who are not only knowledgeable about business management but also committed to their ecosystem as was supported by the results of the hypothesis 3 and the approach of mentoring and coaching variable (MCPE)
- 2) Organizations and companies must be economically viable and take responsibility for addressing the significant social and environmental problems associated with the entrepreneurship ecosystem, as was discovered in the results of the panoramic view of the Mexican entrepreneurship ecosystem.
- 3) HEIs entrepreneurship ecosystem must contribute to strengthening and growing small and medium-sized enterprises (SMEs) and civil organizations through training and consulting services based on the knowledge and expertise of academics and researchers, as was proved by the results of the validation of the variables such as HSE (HEIs support for entrepreneurship) and well prepared HTS (HEIs teaching and staff).

Entrepreneurship has a substantial economic contribution, and its role in job creation is undeniable. However, it is vital that academia, the government, and the private sector collaborate to support entrepreneurship activity, enabling them to become more productive, innovative, and competitive, ensuring their survival and growth over time. In doing so, they can offer quality jobs and transform their ecosystem positively. Countries that prioritize

science, innovation, and entrepreneurship are likely to boost their economic and social development (Litsareva, 2017).

The integration of entrepreneurial skills development and mindset support in academic programs is crucial, given the changes that the digital revolution and automation are expected to bring about.

By addressing the challenges, Higher Education Institutions can contribute to the growth and strengthening of businesses and civil organizations, foster innovation processes in all disciplines, and enable positive transformations of the entrepreneurship ecosystem, thereby boosting economic and social development.

4.2 Research limitations and recommendations

The presented research showed mostly informative and exploratory panoramic view of the actual entrepreneurship ecosystem as it was important for me to understand and have a general view of the national entrepreneurship ecosystem. Consequently, the study mostly focused on the internal and external HEIs entrepreneurship ecosystem factors affecting entrepreneurial education. It provides valuable insights to solve the main stated problem in the beginning of the research, while the findings of the study are significant and answered the research questions planned, there are still some limitations that must be addressed to gain a more complete understanding of the HEI entrepreneurial ecosystem.

One of the limitations of the research is that it was conducted in Northeastern of Mexico in 2022 and the findings may not be applicable to other regions or countries. To validate the generality of the results, further research needs to be carried out in different contexts and places.

Even though, while this study considered the perceptions of graduate students, and the opinions of stakeholders such as professors, advisors, and entrepreneurs, is recommended that future studies involve more diverse sample of stakeholders not only coming from the PRODEM program, to gain a more comprehensive and broader understanding of the entrepreneurial ecosystem.

Moreover, the proposed methodology used in the study only focused on analyzing the impact of internal and external factors on the entrepreneurial ecosystem on HEIs and

entrepreneurship education and did not consider other variables that may influence entrepreneurship development. Future research could incorporate more variables to gain a further universal understanding of a bigger study case.

Furthermore, the study only used the PLS technique to validate the hypotheses, and other statistical techniques may provide different results. Therefore, future studies should consider using multiple techniques to validate the findings.

While the presented research provides valuable insights into the factors that affect entrepreneurial training in higher education institutions, there are still limitations that need to be addressed. Further research can build upon these findings to advance our understanding of the entrepreneurial ecosystem and its impact on economic development. By addressing these limitations, we can better train the next generation of entrepreneurs to drive innovation, create jobs, and spur economic growth.

4.3 Future Research

The results of this study suggest that promoting entrepreneurship in higher education institutions can significantly contribute to the development of a robust entrepreneurship ecosystem. It is important to note that while the HEIs ecosystem factors both internal and external, are necessary to drive entrepreneurship, they are not sufficient on their own. Instead, all these factors need to be integrated into a holistic system with the adequate way of teaching and implementing entrepreneurship education to accelerate the creation and development of innovative companies.

Furthermore, any intervention program in this area must strengthen the entrepreneurship ecosystem and not break the balance between its agents, such as institutions, public administrations, large companies, and entrepreneurs themselves (González Flores & Molina Morejón, 2022).

The author of this study recommends that higher education institutions, together with their master's students, should promote more external activities through various means and forms to improve the results.

It is important to recognize that the study did not control the specific circumstances of each HEIs entrepreneurship ecosystem, which may affect young people's willingness to pursue entrepreneurship. Thus, further research should consider these unique factors to gain a more

nuanced understanding of the factors that influence entrepreneurial intentions. In general, promoting entrepreneurship in higher education institutions can have a substantial impact on cultivating a vibrant ecosystem, which, in turn, can accelerate the creation and growth of innovative companies in the region.

5. MAIN AND NOVEL FINDINGS OF THE DISSERTATION

Based on the results of the study, it was determined that higher education institutions can improve both the internal and external factors of the entrepreneurial ecosystem by introducing subjects related to the entrepreneurial economy and innovation in their curriculums.

5.1 Main findings:

- Firstly, this research gives an actual view of the entrepreneurship ecosystem in Mexico, which is growing. With the efforts from the national programs creation of new companies has increased gradually compared to previous years. It presents that the favorite areas to start a business are in three principal areas: food, technology, and beauty. The majority of entrepreneurs are between 26 and 35 years old.
- The 47% of the entrepreneurs in Mexico start the business out of necessity not out of passion. This is reflected in the results, showing not many innovative projects are created. As conclusion, analyzing the Mexican entrepreneurship ecosystem is important to have a brief view of the challenges and opportunity areas that the entrepreneurs and other stakeholders can improve. This was important for my dissertation to continue and get a better point of view in the HEIs Entrepreneurship Ecosystem and the entrepreneurial education, as was specified in the problem statement the lack of education and training is 36% part of the failure of the businesses in Mexico.
- Secondly this work helps the understanding of the internal and external factors affecting the entrepreneurial training within higher education institutions' entrepreneurship ecosystem by analyzing the perceptions of graduate students in the economic-administrative areas of Northeastern Mexico in 2022. This research provides a comprehensive view of the ecosystem of higher education institutions and

their impact on entrepreneurial training, which has significant implications for enhancing the culture of entrepreneurship in the region.

- Thirdly, the methodology used in this study has a key characteristic of significant reduction in analysis and application time, making it easier to replicate this research in other Mexican contexts or even in other regions. This is essential as it can help spread the culture of entrepreneurship in different areas.
- Fourthly, the proposed technique is user-friendly as it only requires the use of the research instrument, which can be adapted to any context, and the obtained answers, entered into PLS to validate hypotheses. This method simplifies the research process and can be used to test other hypotheses related to entrepreneurial training in other areas.
- Fifthly, the results of the applied method and the PLS technique used to test the hypotheses are comparable within statistically acceptable intervals. This suggests that the methodology is reliable and can be used to draw valid conclusions.
- Sixthly, the methodology used, and the sample analyzed can be extended to other universities and stakeholders within the ecosystem to improve entrepreneurial training. This means that the findings of this research can be applied to other higher education institutions, and stakeholders such as professors, advisers, and policymakers can use them to enhance the entrepreneurial ecosystem in their respective areas.

5.2 Novel findings of the dissertation

This dissertation helped to have an overall view of the Mexican entrepreneurship ecosystem showing statistics that are helpful to focus the entrepreneurship intentions to more innovative projects incentivizing the entrepreneurship for passion not only for need.

Furthermore, the findings of the study reveal that both internal and external factors in the HEIs Entrepreneurship Ecosystem, such as promotional activities, attitudes, support, governance structure, abilities to connect startups, professors and staff, infrastructure and facilities and financial support; significantly affect the graduate students to pursue a degree in business/management fields. From its part, the entrepreneurship education factors, such as curriculum design, orientation, entrepreneurial teaching methodologies, mentoring and

coaching programs for entrepreneurs, and extracurricular activities, have a positive and significant impact on the students' entrepreneurial mindset.

The study also developed a new framework measuring the interconnectedness of Higher Education Institutions Entrepreneurship Ecosystem factors with Entrepreneurial Education constructs. It was modified specifically for the NE of Mexico. This structural framework that was presented in this research helps in the enhancement of successful programs and activities to expand entrepreneurial education in the region (Figure 3).

Overall, the study's outcomes contribute to a better comprehension of the factors that influence graduate students' decisions to pursue business economic degrees, as a result the proposed framework is a beneficial tool for policymakers, educators, and stakeholders working to improve the HEIs entrepreneurial ecosystem of Mexico's Northeast.

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List of publications related to the dissertation

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7. Gonzalez, F. O., **Gonzalez Flores, K. M.**, Canibe, C. F.: Critical success factors on internationalized SMEs. Exploration in Coahuila, Mexico.
In: Ferenc Farkas International Scientific Conference = Farkas Ferenc Nemzetközi Tudományos Konferencia 2018. Szerk.: Dobrai Katalin, László Gyula, Sipos Norbert, Pécsi Tudományegyetem Közgazdaságtudományi Kar Vezetés- és Szervezésstudományi Intézet, Pécs, 175-186, 2018. ISBN: 9789634292388

The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.

31 August, 2023

