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# University as Management Link with the Entrepreneurship and Innovation Ecosystems

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## ABSTRACT

**During the COVID-19 pandemic, nearly 2.7 million companies closed, and with-it unemployment worldwide increased 25%, 18.6% for The Organization for Economic Cooperation and Development (OECD-OCDE) and The Economic Commission for Latin America (ECLA-CEPAL) countries, and 26.9% for Mexico. Therefore, the workforce presented difficulties in assessing employment, which forced them as an option to join informal employment, which grew on average by 59% during the pandemic. Given this scenario, [1] [2] entrepreneurship is a a real alternative to create jobs and promote economic development. However, they require an ecosystem as a linking agent to collaborate with its materialization, permanence and success in the market. Therefore, a descriptive study was carried out applying to 384 public and private universities in the 32 states of Mexico, to identify the actors with which universities are linked through incubators.**

**Keywords:** Entrepreneurship and innovation ecosystems, economic development, Stakeholders, linkage, management.

## INTRODUCTION

In recent years, the closure of companies and the increase in the unemployment rate have worsened and worsened in the pandemic, on the one hand, the closure of companies worldwide represented 2.7 million companies that closed in 2020. In the case of Mexico, 30.6% of companies closed, with MSMEs being the most affected sector with 30%, followed by Large Companies with 0.6%. This had a direct impact on unemployment, according to the Organization for Economic Cooperation and Development – OECD prior to the COVID-19 pandemic the global unemployment rate was at 5.5% and during the pandemic it increased to 6.9%, representing a 25% increase. For OECD countries, the number of unemployed went from 43.5 million to 51.6 million during the pandemic, an increase of 18.6%. For Mexico, the unemployment rate increased by 26.9%, from 3.49 before the pandemic to 4.43 during the pandemic. It also had a negative effect on informal employment, which grew in Latin America by an average of 59% in 2020 [3] [1], with Colombia and Mexico being the countries with the highest increase with 62% and 52% in the same year. Given this scenario the labor force has difficulties in accessing employment, with entrepreneurship being a viable option for this sector of the population. In this sense, entrepreneurship according to ECLAC [2], and Mayer, Blanco, Alonso, & Charles, has been for several decades a real alternative to promote economic development, providing opportunities to create companies and reduce the increase in unemployment. The motivation behind this research is to seek alternatives that reduce unemployment, informal employment and collaborate in providing the ideal conditions for

entrepreneurship to succeed. The alternative that was developed in this article was related to the entrepreneurship and innovation ecosystem, taking universities/incubators as a binding actor to give the possibility of success to these ventures, and that according to Klaus [4] to promote the development of an entrepreneurship and innovation ecosystem, two pillars are required: Business Dynamism and Innovation Capacity, within which *Interaction* and *Stakeholder collaboration* they are an important part of the ecosystem. The study presents results related to the role of interaction and collaboration that universities have through an active agent destined to serve as a link in the ecosystem through incubators, innovation parks or technology parks, in relation to Stakeholders such as companies, sectorized clusters, governments, technology parks, universities, investors, Civil Society Organizations on entrepreneurship, Technology Transfer Offices, Specialized Laboratories and International Stakeholders.

## STATE OF THE ART

### Business Closures, Unemployment and Entrepreneurship

### Business Closures Before and During the Pandemic:

Companies worldwide have been affected before and during the pandemic, with the closure of companies and the dismissal of employees. As can be seen in *Illustration 1*, MSMEs were the most affected, on the one hand, 30.6% of companies were forced to close and on the other, it was the sector that made up 31.5% of its workforce. That being that they represent more than 70% of the labor force used. In the large enterprises sector, 0.6% of them were closed and 0.6% of their workforce was laid off.

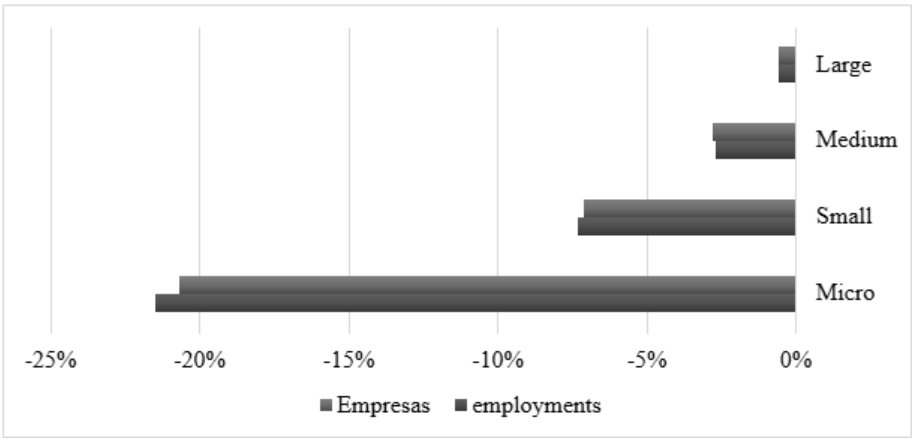


**Illustration 1: Latin America and the Caribbean (27 countries): percentage of companies that closed and jobs lost by company size**
Source: MSMEs and COVID-19 [5]

According to ECLAC, it is estimated that 2.7 million companies declared bankruptcy by the end of 2020, particularly micro, small and medium-sized enterprises (MSMEs) which represent 99% of economic units and generate more than half of the jobs. The most affected are those that depend on self-employment, added to the consequences of isolation, closure and containment measures, since they have less liquidity and reserves. In addition, MSMEs whose services were not classified as essential lost 76.5% of workers in the commercial sector, and 86.1% in the hotel and restaurant sector. In the particular case of Mexico, according to INEGI, more than one million [5], [6], [7], [8]. The number of companies were forced to close. The above is shown in


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detail in the *Illustration 2,* the most affected state was Quintana Roo which represented -4.46% at the national level, followed by Baja California Sur, Sinaloa, Tamaulipas with -3.8% each and Nuevo León with -3.7%, while the least affected states were Oaxaca, Chiapas, Guerrero, Michoacán, Yucatán and Mexico City with -2.03%, -2.32%, -2.33%. -2.45%, -2.73% and -2.76% (respectively).

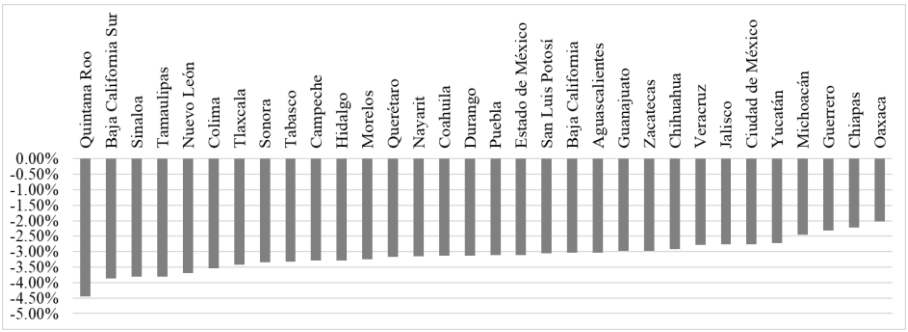


**Illustration 2: Distribution of MSMEs that closed by State in Mexico.**
Source: Own elaboration (2023) taken from the Business Demography Study [9]

## Unemployment Rate and Informal Employment

In relation to the unemployment rate, according to *Illustration 3,* from 2010 to 2020 Mexico is the country with the least impact with an average of 4% in that period, having its peak in 2020 with 4.4%. On the other hand, the country with the highest average unemployment rate is Colombia with 10.8% closing 2020 with 15.1%, followed by Argentina with 10.2% on average and with a rate of 11.5% in 2020, Brazil with 9.3% on average and 2020 with 13.5%, Chile with 8% on average and in 2020 with 10.7%. Finally, Latin America and the Caribbean with 7.5% on average and in 2020 with 10.4%.

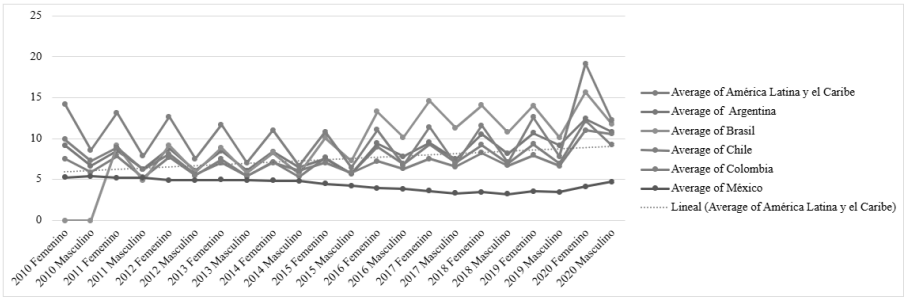


**Illustration 3: Unemployment rate from 2001 to 2022**
Source: Own (2023) taken from ECLAC's Databases and Statistical Publications [5]

In relation to informal employment, during the pandemic, the closure of companies and the loss of employment forced workers in Latin America to join informal employment, which grew by an average of 59% during the pandemic. This will result in the lack of social security, low or no pensions and an increase in poverty in the medium term. According to the [1] *Illustration 4* in the case of Mexico, it represented 52% of the workforce working in the informal industry. In the case of Colombia, it reached 62%, followed by Argentina, Brazil and Chile with 48%, 39% and 30% respectively.

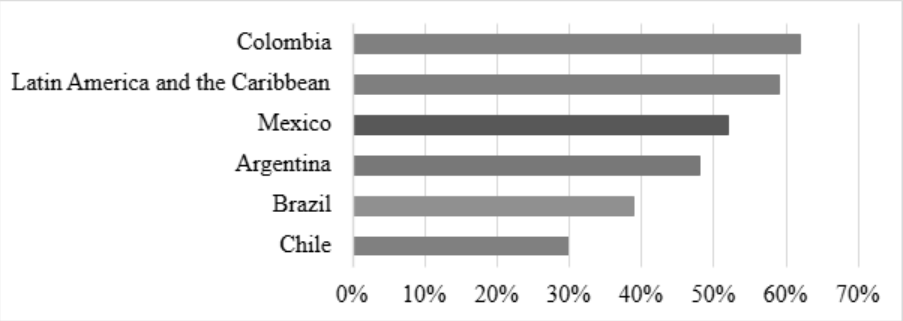


**Illustration 4: Average percentage of informal employment from 2018 to 2023**
Source: OECD Development Centre - household surveys 2018 to 2020 [1]

## Entrepreneurship in Mexico and Latin America

Entrepreneurship in accordance with the ECLAC, OECD and Mayer, Blanco, Alonso, & Charles, has been for several decades a real alternative to promote economic development, providing opportunities to create companies and reduce the increase in unemployment CEPAL [2], [10] [11]. In this sense, Mexico It was listed as the second-best country to start a business. However, the context and conditions socioeconomic resources have not made it possible to take advantage of the talent of entrepreneurs to create companies according to expectations.

On the other hand, prior to the pandemic, according to INEGI, two out of ten enterprises were created by the female gender, and of these, 49% have [9]between 18 and 34 years old and 41% between 35 and 54 years old and about 53% are single women. While in the international context just under 4 out of 10 enterprises were created by the female gender, which their participation was reduced. According to the *Illustration 5*, the male gender increased its participation by 6.8% during the pandemic, while the female gender had been increasing its participation in the creation of companies prior to the pandemic, going from 38.6% to 31.8%, which represents a decrease of -6.8%.

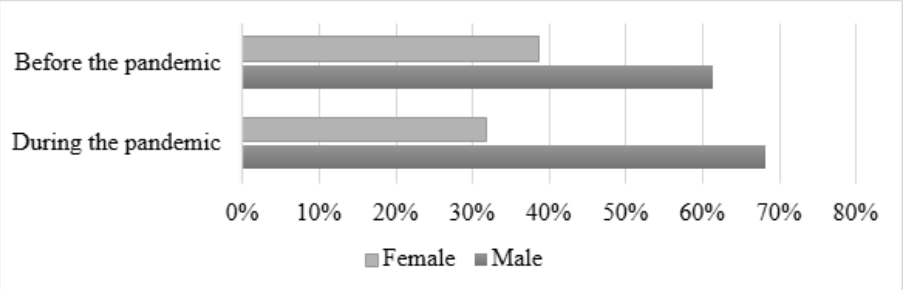


**Illustration 5: Gender of the entrepreneur when creating new companies**
Source: New Business Opportunities [12]

In relation to the entrepreneur's schooling, before the pandemic, primary, secondary and higher education-postgraduate had greater representativeness, accumulating 88%. However, during the pandemic, entrepreneurs with higher and postgraduate studies increased their participation to more than 70% (See *Illustration 6*). The importance of universities with incubators/entities to support entrepreneurship for the coming years lies in the fact that entrepreneurs will look for allies to support them so that their entrepreneurship can succeed transformed into a company and manage to stay in the market.


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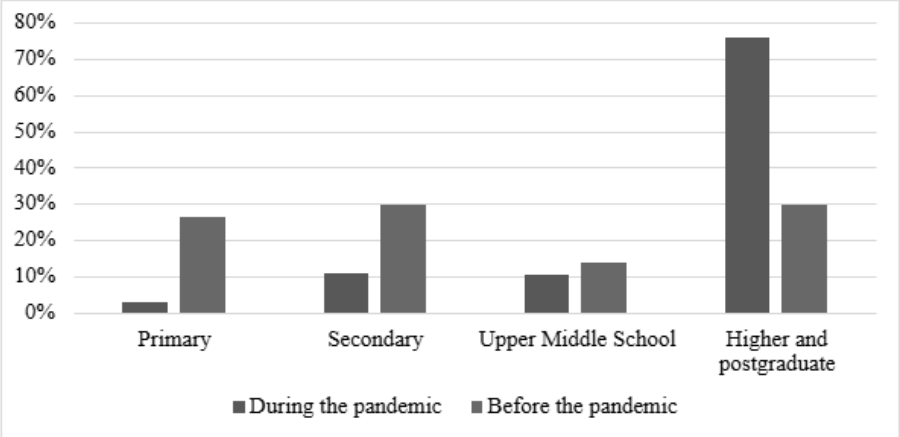


**Illustration 6: Entrepreneur Schooling When Creating New Businesses**
Source: New Business Opportunities [12]

Continuing with entrepreneurs, according to *Figure 7,* the age ranges of people who started a business increased their participation, the age range of 55-64 years had an increase of 1.6% from 18.10% to 19.70%, followed by ages 65-99 with 1.5% going from 4.10% to 5.60% and finally the ages of 25-34 years went from 18.50% to 18.90%. While the ranges that decreased were 18-24 with -3.7% going from 6.00% to 2.30%, and from 35-44 with -0.5% going from 26.70% to 26.20%. This suggests that those over 45 years of age saw opportunities or were forced to undertake in the pandemic, far from projections indicating a decrease in the creation of companies, these grew significantly. This showed that the school age of new entrepreneurs will increase during the pandemic, showing 75.60% of cases with higher education studies and 10.4% with upper secondary education (See *Illustration 7*).

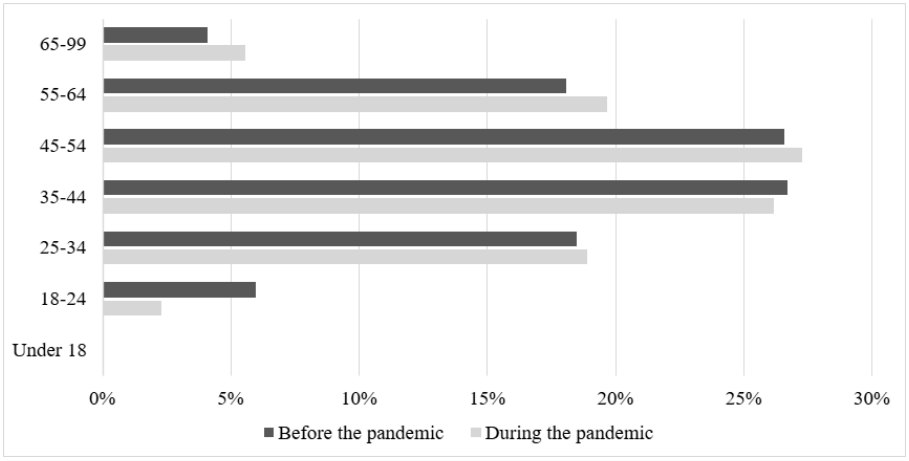


**Illustration 7: Age of the entrepreneur at the time of creating an MSME**
Source: New Business Opportunities [12]

## Context of Entrepreneurship and Innovation Ecosystems (ERA)

### What is an Entrepreneurship and Innovation Ecosystem?

Entrepreneurship and Innovation Ecosystems (EIEs) are spaces promoted by institutions, companies or other organizations to research and develop solutions to new, old problems and/or needs. In them, not only research and technology are developed, but also advances in management, economics, biology, health, among others. This space serves as a stimulus to

adopt the most innovative technologies in companies and in society. According to Smart Social City, an EEI is a [13], [14] Open Knowledge Network, where companies, governments, universities and society support and accompany initiatives in the identification, resolution of their challenges and opportunities for improvement, from innovation and sustainability. This leads to the reflection that an ERA is how the talent, creativity and ideas of individuals can refine and *create logical or physical entities, things, or objects*, consuming the resources available in the ecosystem, thus managing to materialize the ideas turning them into entrepreneurship and innovation. In this sense, an ecosystem has different components, such as:

- The talent of people (ideas, creativity).
- Collaboration/feedback between actors.
- Access to capital/investment.
- An adequate legal framework to regulate its actions.

However, the most important condition for an ecosystem to be successful is the elimination of hierarchies in the knowledge network, that it is in constant contact, that it shares ideas and experiences to offer alternative solutions to existing problems or the improvement of products and/or services. In this sense, universities, through their active agent (incubators, technology parks, among others) function as disseminators and amplifiers of this knowledge network, since they are the ones who provide support, collaborate for the linking of actors, ideas and necessary infrastructure. In addition, they create opportunities for the community to access resources that are normally inaccessible. Reiterating that the most important thing is that the core of the community is always made up of intellectual and creative capital, that is, entrepreneurs. It is important to mention that an ecosystem entity should not assume the core of the ecosystem, since if this happens the community would have good diffusion, but activity and growth would decrease. In the same way, EEI cannot miss companies, which support each other to make the market grow. Finally, the government also interacts in the ecosystem as a disseminator of the knowledge network that collaborates with infrastructure in coordination with the university. [14].

**Components of the Entrepreneurship and Innovation Ecosystems (ERA)**

According to the research carried out by Komorowski [15] The components of innovation ecosystems are the size, number and type of actors, sectors of expertise, stages of development of the ecosystems, scales of operation, central entities that operate the ecosystem, leaders of the ecosystem, their scope, actions and goals, of which the following definitions are identified:

- Size or city: Cities are distinguished by different categories based on the average number of inhabitants classified as large (L), medium (M) and very large (XXL).
- Number of actors in the ecosystem: Its operation is conditioned by the number of actors involved. Therefore, it takes different sizes. Most ecosystems concentrate between 101-500 actors, followed by 50-100 and less than 50.
- Type of actors involved: The actors involved in the IAS are represented by different organizations with their respective roles, which contributes to defining the organization, sector and type of ecosystem. The pillar actors in the construction of Innovation Ecosystems (IES) are universities, followed by Micro, Small and Medium-sized Enterprises (MSMEs).
- Sectors of specialization and industry (Sectorized cluster): In this area, they are identified by the generation of experts and specialized sectors. Therefore, experience in


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certain industries becomes an important criterion for the design of an innovative ecosystem. The sector where the most experience is generated is the energy sector, followed by Information and Communication Technologies, and health care. [16]

- Stages of development: The development of the stages of an IAS shows how the actors of the ecosystem interact and collaborate with each other to achieve evolution, in addition to allowing a certain pattern of behavior which gives rise to the stages through which the ecosystem passes. In general, the following stages are integrated: emerging, growing, permanence and transformation, [17] [18].
- Scale of operation: The scale of operation envisions the linkage and coordination to delineate the functioning, complexity and types of IAS in the local, regional, national and international context. The [19]Regional operation scale has greater interaction, management and market. In relation to the scale of international operation, it continues to grow and probably when ecosystems mature, this type of scale will exceed the regional scale.
- Central entity (centralized or decentralized): In all the IEAs there are central entities that promote or stimulate interaction and the generation of entrepreneurship and innovation, which allows the analysis of information. Such entities are clusters, incubators, universities, among other actors. Therefore, the ecosystem can be centralized or decentralized, if and only if, collaboration structures are created between different actors and levels of intervention in the processes [20].
- Leadership of main actors: In the emerging context of IAS, it is important to focus on leading actors. The more roles of the different actors within the ecosystem, the more important leadership will be. The knowledge acquired by the core stakeholder will be essential, and even more so in the birth of the ecosystem. The main players take on roles of governance, partnership building, platform management and the value of management. Government leadership continues to be more represented, followed by the leadership of universities and later by individual or private initiatives. This is an advantage if the government actor has a well-defined long-term objective and ensures the continuity of the ecosystem, relying on universities, experts and companies as part of the Stakeholders.
- Actions and goals: The main objective must be entrepreneurship and innovation. However, supportive environments can be created through actions and goals. Where these are not always defined, it is suggested to build them progressively according to the general and specific objectives set. To this end, the objectives must be accompanied by specific objectives that are common and shared among the actors. These actions define the types of ERA and collaborate in their classification direct actions and broad objectives. [21].

## Characteristics of Entrepreneurship and Innovation Ecosystems

The characteristics are linked to the type of EEI as their objectives and stakeholders vary. However, according to Llewellyn & Erkko there are generic characteristics such as: [22]

- Heterogeneity of the actors: It generally arises as the actors involved in ERAs come from a variety of industries and sectors. This heterogeneity is accentuated by the role-based governance that characterizes ecosystems.

- Outbound products or services: Ecosystems facilitate the generation of products or services. In this sense, the outputs of the IAS are products or services that are compatible with each other, adhering to the production chain in a modular way.
- Interdependence of the participants: This is perhaps the most outstanding feature, since information flows in the LES. In this regard, the first interdependence is technology, since the ecosystem requires technological infrastructure to operate. The second interdependence is the economic aspect, due to the ability to invest in infrastructure, and due to all the products or services that are generated in the ecosystems, and the third interdependence is cognitive, that is, the participants of the ecosystem have historical patterns of practices, experiences, philosophies, values, beliefs that provide the formal and informal rules of action. interaction and interpretation that guide decision-makers.

On the other hand, according to Klimas & Czakon, around 49 types of LES are considered worldwide, grouped into 5 categories and 14 typologies. Where the local and hierarchical entrepreneurship and innovation ecosystems stand out, led by universities that in the medium and long term tend to be more successful, because the seed intellectual capital is formed and polished in these, in addition to having support infrastructure, such as facilities, teachers, researchers, minimum infrastructure to design, operate and collaborate with the ventures of students or entrepreneurs, and linkages on which stakeholders join efforts and capacities to materialize ventures and innovations. This does not mean that any other actor cannot assume this role, however, by their nature universities have greater projection and reduce the risk of failure. In fact, the leadership of universities may change according to the interests and strategic plan in the medium and long term according to the level of maturity and process of the ERA [23].

**Entrepreneurship and Innovation Ecosystems in the World**

The IAS from 2000 onwards accelerated in certain regions of the world, focusing on ensuring their development and growth, in addition to adapting existing resources and infrastructure to ensure their evolution, starting with entrepreneurial ecosystems, redefining their local and regional potential. However, each ecosystem is characterized by certain aspects that guarantee to a greater or lesser extent its degree of success, considering local characteristics, skills and national and international experience to successfully enable ecosystems.

On the other hand, worldwide, according to Klaus in the World Economic Forum's global competitiveness report, there are various advances in the construction and strengthening of entrepreneurship and innovation ecosystems in each country. In addition, to generating strategic links between regions to accelerate them. In this sense, to measure the degree of progress in these ecosystems, Block 4 – Innovation Ecosystems (EI) and its pillars 11 – Business dynamism and 12 – innovation capacity of the report was considered. In these pillars, progress in different areas is measured by country.

They are shown in the [4] in *Table 1* detailed indicators and the best performing country(ies).

**Table 1: Countries with the best performance in the development of the ERA in 2019**

| Pillar | Mejor performance | General indicator | Mejor performance | Detailed indicator | Mejor performance |
|---|---|---|---|---|---|
| **Business dynamism** | United States | Administrative requirements | United States | Cost to Start a Business | Multiple (1) |
| | | | | Time to start a business | New Zealand |
| | | | | Recovery rate | Japan |
| | | | | Regulatory framework | Multiple (2) |
| | | Company culture | Israel | Better attitudes to deal with business risk | Israel |
| | | | | Skills to delegate authority | Denmark |
| | | | | Growth of innovative companies | Israel |
| | | | | Companies with the best adoptions of disruptive ideas | Israel |
| **Innovation Capacity** | Germany | Interaction and diversity | Singapore | Workforce Diversity | Singapore |
| | | | | Cluster status and development | Italy |
| | | | | International co-inventions | Multiple (3) |
| | | | | Multi-stakeholder collaboration | Israel |
| | | Research and development | Japan | Scientific publications | Multiple (4) |
| | | | | Number of patents | Multiple (5) |
| | | | | Research and Development expenditure | Multiple (6) |
| | | | | Better education institutions involved in the innovation cycle | Multiple (7) |
| | | marketing | Luxembourg | Sophistication in the Shopper Experience | Republic of Korea |
| | | | | Trademark Creation | Multiple (8) |

Source: Own elaboration (2023), prepared from the World Economic Forum's global competitiveness report.
Multiple (1): United States, New Zealand and Japan; Multiple (2): United States and Japan; Multiple (3):

Singapore and Israel; Multiple (4): Germany and Japan; Multiple (5): Germany, Japan, United States, Canada; Multiple (6): China, Germany and the United States; Multiple (7): Switzerland, Sweden, Germany, Israel, and the United States; Multiple (8): Luxembourg, Germany, Israel, Sweden, and the United States. [4].

According to *Table 1*, the countries of the United States, Japan, Israel, Singapore and Luxembourg stand out. However, other countries and regions have become increasingly involved in the creation, development and growth of IAS given the sustainable multidimensional economic and social benefits, in addition to leveraging the intellectual capital they possess in their populations. From the above, it is important that countries recognize and work on the construction of these ecosystems in a comprehensive manner, creating at the same time an ideal framework in which institutions, infrastructure, ICT adoption, macroeconomic stability, human capital (health and skills), enabling the competitive market (labor market, product market, financial system), adjustments to the regulatory framework that allow freedom of creation and innovation, open government that encourages the adoption and creation of distributive innovation, as well as promoting interaction between actors.

**The Role of Universities in the Entrepreneurship and Innovation Ecosystems**

Since this work focuses on the university (through the incubator, innovation park, among others) as a binding actor of the Entrepreneurship and Innovation Ecosystems, they assume a multifunctional role for the ecosystem and facilitate its development, growth and evolution. According to the study carried out in nine universities in Europe by Sybille: Aalto University, Finland; Masaryk University, Czech Republic; Sorbonne University, France; TU/e – Eindhoven University of Technology, The Netherlands; TUM – Technical University of Munich, Germany; University of Manchester, UK; University of Minho, Portugal; University of Warsaw, Poland; UPC – Polytechnic University of Catalonia, Spain; The study showed that the roles and expectations of actors in the ecosystem have been transformed in recent years, which can be summarized in seven changes, including paradigm shifts in the conception and organization of entrepreneurship and innovation, these changes are [24]:

1. From linear to repetitive: Universities and companies already visualize entrepreneurship and innovation as a process that goes from basic to applied research and is commercialized. They also recognize and engage as an iterative process in which basic, applied research and prototype development can stimulate and improve each other and on multiple occasions in a collaborative process.
2. From closed to open: entrepreneurship and open innovation improves the role of universities. Given the increasing complexity of technological development and acceleration cycles, companies have adopted new open models that include internal and external stakeholders.
3. From technology to systemic challenge-driven: Entrepreneurship and innovation approaches are growing to include technological, social and economic entrepreneurship and innovation in a common agenda, where universities have a central role in the breadth and depth of research and education.
4. From the individual to the collaborative and interdisciplinary: with increasing specialization, digitalization, hybrid technologies, collaborative interdisciplinary research and development become a necessity. Where Stakeholders find the most important thing in the role of the university in entrepreneurship and innovation and its ability to "incubate interdisciplinary research", to educate interdisciplinary thinking and its competencies.


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5. From the spontaneous to the systematic: all the actors of the triple helix (University, Government and companies) develop innovation in a systematic and strategic way. Government agencies are engaging universities, companies and stakeholders in structured dialogues to identify, analyze, exploit regional strengths and potentials, facilitating strategic specialization.
6. From exchange to co-creation in spaces of creativity, entrepreneurship and innovation: It is possible to evolve from the exchange between Stakeholders. Innovation becomes an interdependent co-creation between actors from different sectors and institutions. Researchers, innovators, and leaders from universities, companies, or public agencies are building strengths, increasing their skills, and identifying regional challenges.
7. From entrepreneurship and innovation projects to common cultures of entrepreneurship and innovation: In favor of co-creation through universities, intermediary agencies such as clusters or science parks and commercial partners, guide relevant events to turn spaces into cultural poles of entrepreneurship and innovation that become a cultural practice.

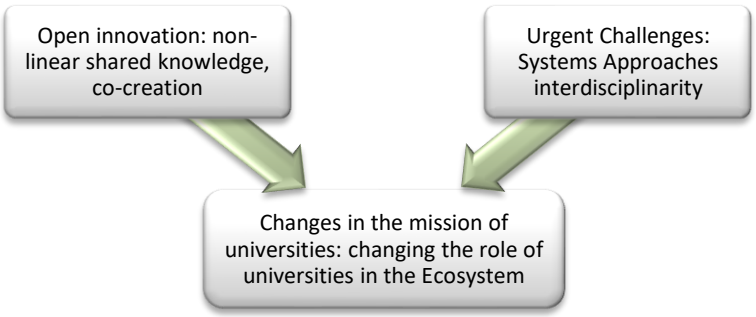


**Illustration 8: Entrepreneurship and the change of role in universities within ecosystems**
Source: Own (2023), taken from the role of universities in innovation ecosystems. [24, p. 10]

As can be seen in the *Illustration 8* Open Innovation and urgent challenges guide the changes in the role of universities within the ERA. In this way, the university assumes and recognizes two roles: as an actor in the production of knowledge for competitiveness, and as an entity that encourages the culture of entrepreneurship and innovation to facilitate interaction between the actors involved. To satisfactorily achieve these roles there are challenges, processes and elements that contribute to universities, these elements are: [25]

- Culture of the ecosystem.
- Human capital (intellectual capital).
- Production of knowledge.
- Support structures (financing, services and infrastructure).
- Institutional and regional strategic processes.
- Network communication channels and formats.

Finally, it is important to note that according to the study by Sybille, and the Austrian Wirtschaftsservice Gesellschaft mbH point out the importance of the different actors and specific roles within the ERA, and for the particular case in the birth of the ERA, the actors considered core are entrepreneurs, universities (through an entity such as incubators), and investors. [24] [26]

- Entrepreneurs: Intellectual capital where ideas are born that are transformed into entrepreneurship to be materialized in companies
- Universities through incubators: They are the binding entity that supports the entrepreneur to connect with acts and provide the facilities/link of that infrastructure necessary to give guidance, form and materialization of the enterprise.
- Investors: They provide the capital with which the projects are financed, and that this work is progressively diversified among the various Stakeholders.

## METHODOLOGY: SAMPLE CALCULATION AND TYPE OF SAMPLING.

### Methodology

The methodology used in this is integrated into two sections, the first is documentary since it allows an inductive-deductive analysis between the closure of companies, unemployment and entrepreneurship, to finally contextualize the concept and importance of an ecosystem of entrepreneurship and innovation to identify its collaboration to counteract the effects of the closure of companies and unemployment. that were intensifying the labor market during the COVID 19 pandemic. The second section of the research is quantitative, in which a representative sample of public and private universities that have an incubator or entity that supports and supports entrepreneurship is calculated, the design and application of a survey is also included. The type of research carried out is descriptive for the university as a binding agent of the ecosystem through an incubator and Stakeholders, based on a correlational analysis to identify the importance of these links.

### Sample Calculation and Sampling Type

Before presenting the results of the research, the population that was used in the calculation of the sample and the sampling technique used are described. The total population considered in this study is made up of 5,535 public and private universities, which according to the Ministry of Public Education 41% are public and 59% are private. Considering the above, the technique with the known population will be used for the calculation of the sample, which according to Murray & Larry allows us to establish the number of individuals with certain previously known characteristics and which expresses the relationship between the variables, number of participants and statistical certainty [27].

Formula: Z =1.96; N= 5,535; p= 0.9; q= 0.1; i=0.029

$$n = \frac{Z^2.N.p.q}{i^2(N-1)+Z^2.p.q}$$

Substituting in the formula, = $n = \frac{1.96^2\ x\ 5535\ x\ 0.9\ x\ 0.1}{0.029^2(5535-1)+1.96^2\ x\ 0.9\ x\ 0.1}$= 383

After the above, the exhibition indicates 383 individuals, however, for the purposes of embracing one more study group, were taken 384, increasing in a sample to be able to consider 12 universities for each state, distributed in 6 public universities and 6 private universities. In relation to the sampling technique, it was *Simple Random* to guarantee representativeness, distribution and variety in the information collected. The selection of the sample was made covering all the States of Mexico. The instrument used was a survey applied through Google


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Forms, while the reliability of the instrument was calculated using Cronbach's alpha [27] [28] [29] and McDonalds Omega obtaining 0.872 and 0.871 (respectively) resulting in a very good level of reliability. Once the survey was obtained, it was downloaded into a spreadsheet for further processing and generation of statistical estimators with the Statistical Package for the Social Sciences (SPSS) software. [30].

## RESULTS AND DISCUSSIONS

### Results

According to the results obtained and presented in *Illustration 9*, 59% of the states have half of their universities (public and private) with an incubator/entity that serves as a linking agent for the ventures and/or serves as support for the ventures, 38% have 7.5 out of 10 universities with an incubator/agent and 3% have 8.3 of each university with an incubator. The national average indicates that 4.8 out of 10 universities have an incubator/entity.

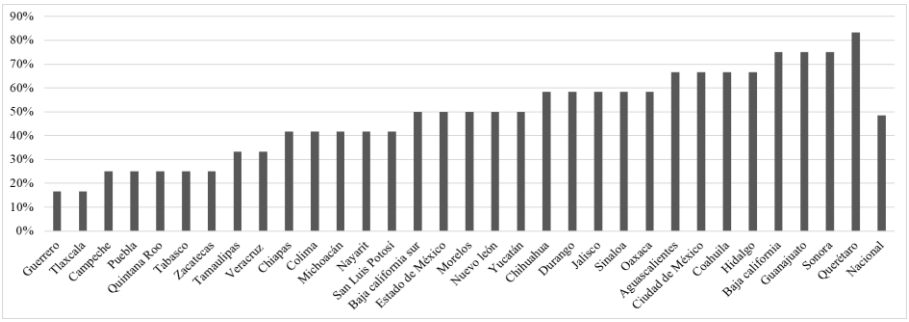


**Illustration 9: Percentage of universities with an incubator/entrepreneurship support entity**
Source: Own elaboration (2022), taken from the results of field research

Continuing with the participation of public and private universities with incubators/entity as binding agent of the ERA, the states of Querétaro, Baja California, and Hidalgo have more public universities with incubators while Sonora, Jalisco, and Nuevo León have more private schools with incubators. It is noteworthy that the state of Nuevo León has a difference of more than 83% of universities with incubators with private ones, and the remaining 17% are public. (*See Illustration 10*).

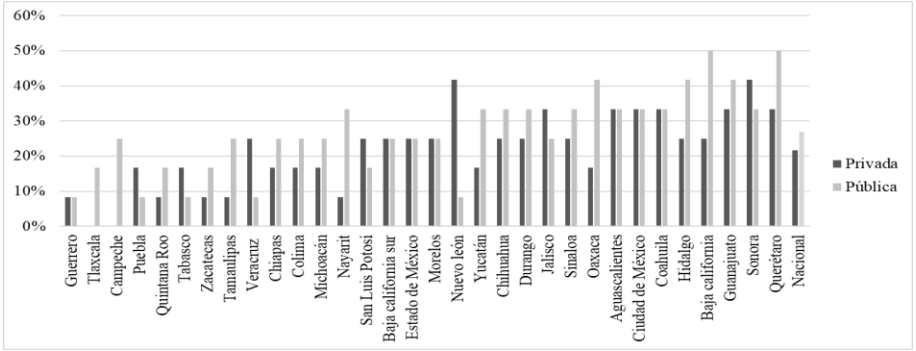


**Illustration 10: Percentage of representation between public and private universities with incubators by State**
Source: Own elaboration (2022), taken from the results of field research

According to the results presented in *Illustration 10*, although it is true that our country does not yet have a culture of entrepreneurship and integrated innovation, and as such lacks a solid infrastructure to support the ERA, taking universities as a binding agent. This process of gradual development, where public universities that have an incubator/entity are above private universities, with a percentage of representation of 55% compared to 45% of private universities. That is, 5.5 of each university with an incubator is public and the remaining 4.5 is a private university. On the other hand, in relation to the role of binding agent of the universities through the incubator/entity within the ERA, and according to Komorowski, the main actors that intervene initially and progressively are: Companies, Sectorized Cluster, Government Sector (municipal/state/federal), Technology Parks, Universities, Investors, Banks, CSOs (Civil Society Organizations, OTT (Technology Transfer Offices) and International Stakeholders. Other stakeholders can be included progressively. In this sense, they are presented in the [15]. *Illustrations 11* to the *13,* The results obtained to identify the degree of interaction of the university as a binding agent in the ERA through the incubator/entity. On the other hand, to measure the degree of linkage by state, each linkage was assigned one point and the existence of an incubator/binding agent an additional point, so that the ceiling per university/Stakeholder reaches a maximum of 11 points (See *Table 2*)

**Table 2: Weightings by linkage and existence of incubator at the University**

| **Stakeholder** | **Points** |
|---|---|
| University with Incubator/Entrepreneurship Support Agent | 1 |
| Enterprises | 1 |
| Sectorized cluster | 1 |
| Government sector (municipal/state/federal) | 1 |
| Technology parks | 1 |
| Universities | 1 |
| Investors | 1 |
| Banks | 1 |
| CSOs | 1 |
| OTT | 1 |
| International Stakeholders | 1 |
| Total | 11 |

* Total points achieved are multiplied by the number of samples per state

Source: Own elaboration (2022)

*Illustration 11* shows that the state with the best conditions to support/collaborate with entrepreneurship through universities linked to the EEI (with incubators/agents) is Aguascalientes with 82%, followed by Mexico City with 79% and in third place the state of Jalisco with 70%. It should be noted that the three states with the fewest conditions in universities to assume the role of binding agent through an incubator are Tabasco with 30%, Guerrero with 30% and Tlaxcala with only 20%.

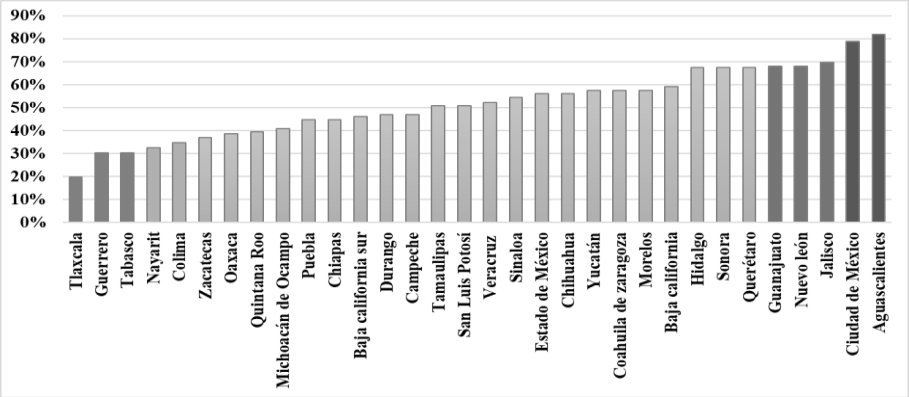


**Illustration 11: States with better conditions for universities as binding agents of the ERA.**
Source: Own elaboration (2023), taken from the results of field research

Continuing with the analysis of results, the link between public and private universities with stakeholders is presented, according to *Illustration 12*, private universities have greater links with investors, banks and CSOs with 69%, 82% and 80% respectively, while public universities have 31% for these same actors.

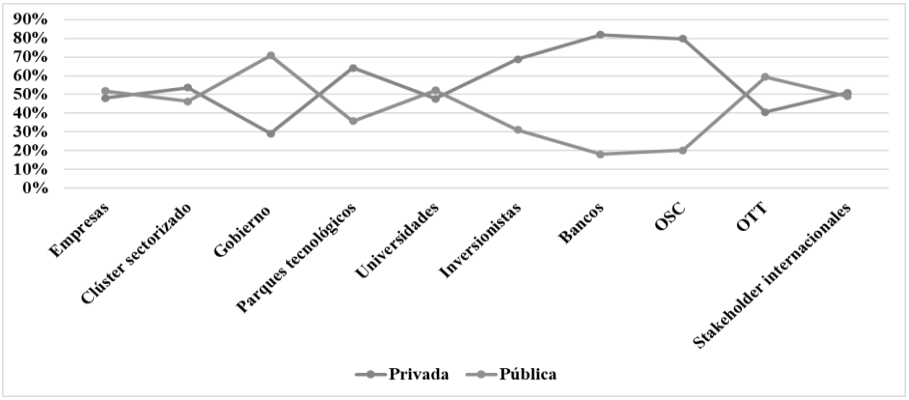


**Illustration 12: Linkages by type of educational program (Public or Private)**
Source: Own elaboration (2023), taken from the results of field research

18% and 20% of linkage. On the contrary, public universities have greater links with the government with 71% and private universities only 29%, and technology transfer offices (OTT) with a slight majority for public universities reaching 59% and private universities 41%.

According to Sybille, and the Austrian Wirtschaftsservice Gesellschaft mbH, the core actors in the birth of an EEI are investors and universities. In this sense, as can be seen in the [24] [26] *Illustration 13* The Central region has the most universities with incubators with 43%, followed by the North and South regions with 39% and 18% respectively. In relation to the links with investors, the central region is the one that has the most interaction with 55%, followed by the northern region with 33% and finally the southern region with 12%. As for the link with other universities, the central region concentrates 41%, the northern region 35% and the south with 24%. This in the long term will allow the evolution of the ERA from the local to the regional, national and international.

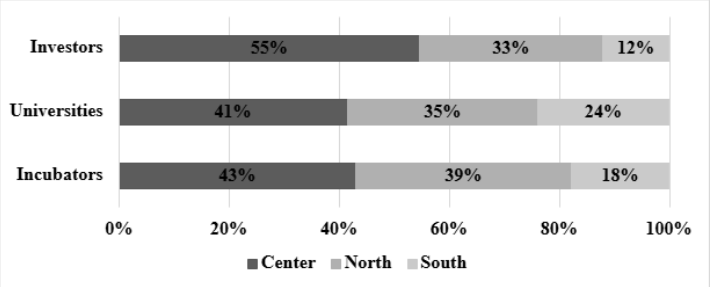


**Illustration 13: Percentages of linkages with investors and universities by region**
Source: Own elaboration (2023), taken from the results of field research

## DISCUSSION

In accordance with the objective focused on the role of universities as a binding agent of an ecosystem of entrepreneurship and innovation between incubators/entrepreneurship support agents and Stakeholders, the results of the correlation between the variables associated with Stakeholders, and particularly the dispersion between incubators and universities/investors, are presented. given the role they have according to what is pointed out by de Sybille , and the Austria Wirtschaftsservice Gesellschaft mbH [24] [26]. In Figure 14, there is a low positive correlation since there is no increase in dispersion in incubator (x-axis) and universities (y-axis), this is corroborated in Table 3 with Person's correlation obtaining 0.169.

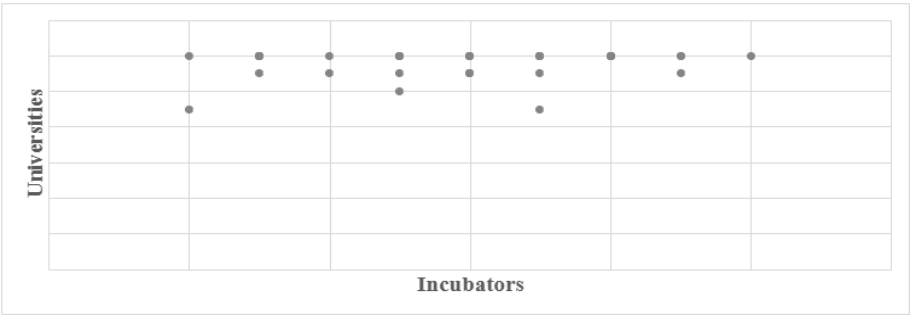


**Illustration 14: Dispersion between the incubator and universities**
Source: Own elaboration (2023), prepared in SPSS with the results of the application of the instrument

In relation to the dispersion between the incubator and investors, according to *Illustration 15*, frequent increases are observed with trends of a moderate positive correlation where the increase in the incubator axis is accompanied by an increase in the investor axis. This is verified in *Table 3* where the Pearson correlation between these variables is 0.429.

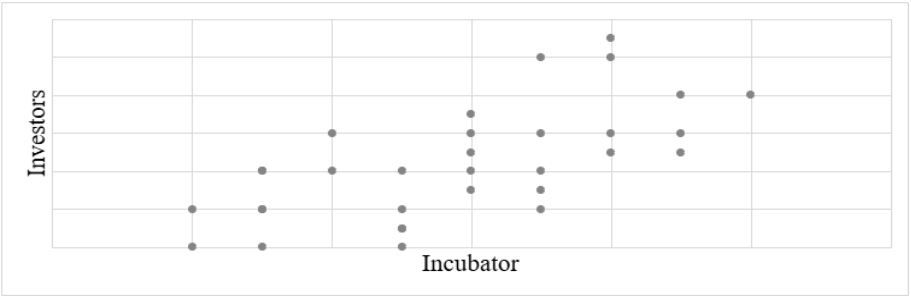


**Illustration 15: Dispersion between the incubator and investors**
Source: Own elaboration (2021), prepared in SPSS with the results of the application of the instrument


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**Table 3: Pearson correlation between incubator/agent, investors, and universities**

| Stakeholders | Incubator | | |
|---|---|---|---|
| | **Pearson correlation** | **Sig. (bilateral)** | **N** |
| Incubator | 1 | | 384 |
| Investors | 0.429** | 0.000 | 384 |
| Universities | 0.169** | 0.001 | 384 |
| **. The correlation is significant at the 0.01 level (bilateral). | | | |

Source: Own elaboration (2023), prepared in SPSS with the results of the application of the instrument

The levels of correlation found between the internal Incubator/Innovation/Technology Park as an "entrepreneurship" entity with the Stakeholders is as follows (see *Table 3*):

- Incubator – Investor: 0.429 (moderate positive). The third strongest correlation of the study means that the link between the incubator and investors is decisive for obtaining funding from ventures where the work of linking the incubator with investors is core.
- Incubator – Universities 0.169 (low positive). According to the results in the international context, this link is one of the most important since universities are providers of infrastructure, experts, researchers, among other inputs for entrepreneurship; however, in the present study this correlation is low positive according to *Table 3*, and in the dispersion of *Illustration 14* the correlation is almost imperceptible. In other words, there is no link between these variables.

**Table 4: Pearson correlation between the incubator/agent and the rest of the Stakeholders**

| **Stakeholders** | **Incubator** | | |
|---|---|---|---|
| | **Pearson correlation** | **Sig. (bilateral)** | **N** |
| Incubator | 1 | | 384 |
| Enterprises | .630** | 0.00 | 384 |
| Cluster | .495** | 0.00 | 384 |
| Government | .393** | 0.00 | 384 |
| Technology Park | .472** | 0.00 | 384 |
| Banks | .316** | 0.00 | 384 |
| OSC | .238** | 0.00 | 384 |
| OCT | .545** | 0.00 | 384 |
| Stakeholder Internacional | .480** | 0.00 | 384 |
| **. The correlation is significant at the 0.01 level (bilateral). | | | |

Source: Own elaboration (2023), prepared in SPSS with the results of the application of the instrument

*Table 4* shows the levels of correlation between the following variables (Stakeholders)

- Incubator – Companies: 0.630 (strong positive). The correlation that exists between incubators and companies is positive, this being the strongest link of all the Stakeholders, since there is a greater collaboration with the ventures, this to support knowledge/infrastructure and joint interaction, and in this way collaborate with new projects.
- Incubator – Cluster: 0.495 (Moderate positive). In the case of clusters, they present a moderate correlation, maintaining a medium level of participation with the incubator.
- Incubator – Government: 0.393 (Moderate positive). This link is considered strategic, since at the beginning of the ventures the incubator-government becomes a facilitator

for the creation and permanence of companies in the market, the correlation remains at a medium level, with moderate parameters, which means that support and collaboration are visualized.

- Incubator - Technology Park: 0.472 (Moderate positive). Technology parks, according to the study, maintain a little more participation compared to the government and other stakeholders, that is, although both remain at moderate levels, there is a positive variation in collaboration.
- Incubator – Banks: 0.316 (Low positive). As for banking institutions, it can be interpreted that, although there is linkage, it is of a low level, so they are not so associated with participation with incubators and the development of ventures either in funding or loans that allow their creation and permanence.
- Incubator – Civil Society Organizations (CSOs) oriented to entrepreneurship: 0.238 (Very low positive). According to the study, the link between the incubator and CSOs is low, so it can be said that there is not adequate participation and association between these agents.
- Incubator – Technology Transfer Offices (OTT): 0.545 (Moderate positive). In the case of OTTs, a moderate positive correlation is observed, this being the second strongest link of all stakeholders, after companies; it is also stated that there is collaboration and commitment with incubators for the support and development of enterprises.
- Incubator - International Stakeholders: 0.480 (Moderate positive). Finally, the correlation that exists between incubators and international Stakeholders according to the study carried out, remains moderate, highlighting that there is support for ventures not only nationally, but also internationally, where it is intended to have a greater reach through a linkage and integration of agents and resources, seeking an optimal development of new projects.

## CONCLUSIONS

As the results were presented and the fulfillment of the main objective of this study, several economic phenomena were identified, among them according to the state of the art and the context, those associated with the closure of companies, increase in the unemployment rate and the growth of informal work, which gave the guideline for the search for solutions that would reduce these phenomena. among them the existence of entrepreneurship and innovation ecosystems, and whose central axis is the University through incubators as active agents of linkage with the different Stakeholders, to serve as support and support for entrepreneurship.

One of the main findings presented in this case is that 70% of universities in Mexico do not have an incubator/support agent for entrepreneurship, so it is difficult to collaborate with the materialization of ventures converted into new companies. It was possible to confirm through the correlation that the linkage between incubators and Stakeholders is positive, which means that the linkages have not managed to develop or are on the way to acquiring it, the same case with the linkage between the incubator and investors, incubator and universities, on the other hand, understanding that it is a process and that entrepreneurship and innovation ecosystems can be developed gradually. It is essential to give greater importance to the beginning of the links with investors and universities and gradually to give the link with the text of the actors.


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