

## RESEARCH ARTICLE

DOI: <https://doi.org/10.26524/jms.15.29>**University as management link with the entrepreneurship and innovation ecosystems**Patino-Galvan <sup>a\*</sup>**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, (OCDE, 2021)(CEPAL, 2018) entrepreneurship is 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.

**Author Affiliation:** <sup>a</sup> Entrepreneur management division, Tecnológico de Estudios Superiores de Ecatepec, Tecnológico Nacional de México, Ecatepec de Morelos, 55055, México.

**Corresponding Author:** Patino-Galvan. Entrepreneur management division, Tecnológico de Estudios Superiores de Ecatepec, Tecnológico Nacional de México, Ecatepec de Morelos, 55055, México.

**Email:** [ispagalvan@tese.edu.mx](mailto:ispagalvan@tese.edu.mx)

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**1. 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 (2022) (OCDE, 2021), 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 (2018), and Mayer, Blanco, Alonso, & Charles (2020), 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 (2019) 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

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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.

## 2. State of the art

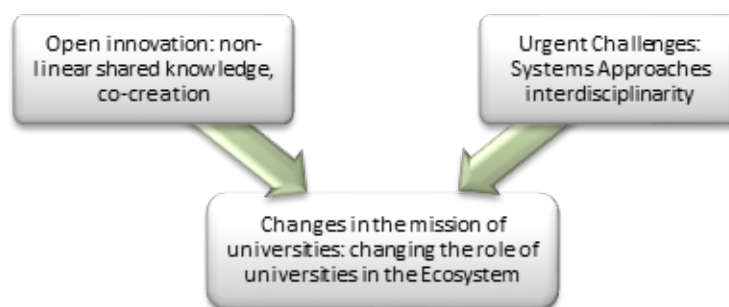
### 2.1. The role of universities in the Entrepreneurship and Innovation Ecosystems

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 (Sybille, 2019):

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.
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



**Illustration 1.** Entrepreneurship and the change of role in universities within ecosystems

**Source:** Own (2023), taken from the role of universities in innovation ecosystems. (Sybille, 2019, pág. 10)

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.

As can be seen in Illustration 1 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: (Goldstein & Drucker, 2006)

1. Culture of the ecosystem.
2. Human capital (intellectual capital).
3. Production of knowledge.
4. Support structures (financing, services and infrastructure).
5. Institutional and regional strategic processes.
6. 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. (Sybille, 2019) (Austria Wirtschaftsservice Gesellschaft mbH (aws), 2021)

- **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.

### 3. Methodology: Sample calculation and type of sampling.

#### 3.1. 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.

#### 3.2. 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 (2009) 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 (Martínez, 2010).

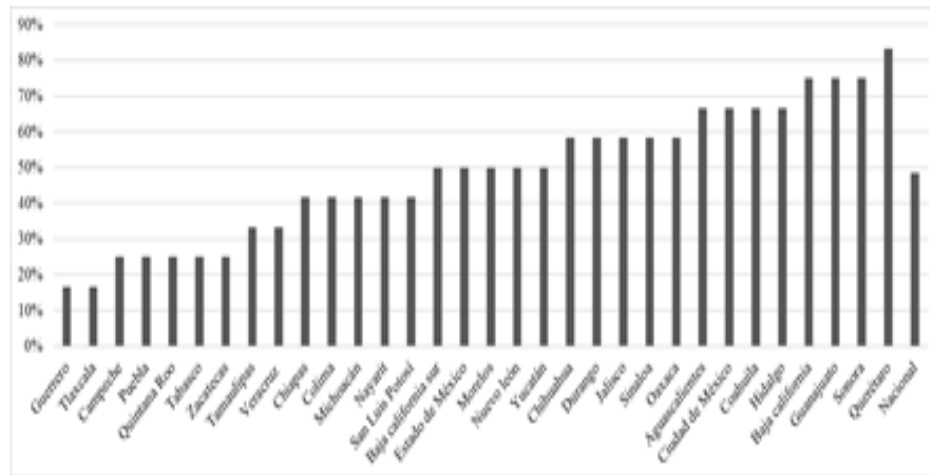
Formula:  $Z = 1.96$ ;  $N = 5,535$ ;  $p = 0.9$ ;  $q = 0.1$ ;  $i = 0.029$

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

Substituting in the formula,  $n =$

$$= \frac{1.96^2 \times 5535 \times 0.9 \times 0.1}{0.029^2(5535-1) + 1.96^2 \times 0.9 \times 0.1} = 383$$

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 Forms, while the reliability of the instrument was calculated using Cronbach's alpha (Martínez, 2010) (Ackoff, 1953) (Otzen & Manterola, 2017) 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. (George & Mallery, 2003).



**Illustration 2.** Percentage of universities with an incubator/entrepreneurship support entity

## 4. Results and discussions

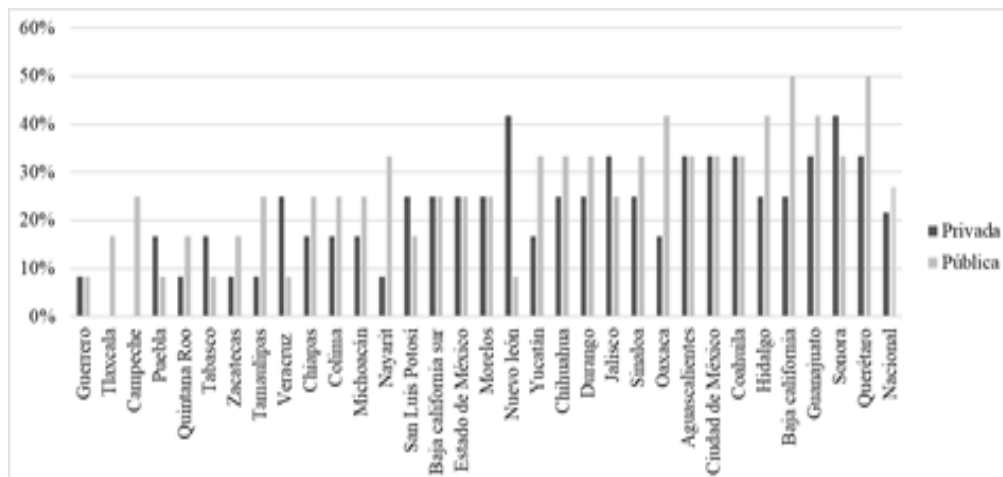
### 4.1. Results

According to the results obtained and presented in Illustration 2, 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.

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 3).

According to the results presented in Illustration 3, 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 2019), 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 (Komorowski, 2019). Illustrations 4 to 6. The results were obtained to identify the degree



**Illustration 3.** Percentage of representation between public and private universities with incubators by State

**Source:** Own elaboration (2022), taken from the results of field research



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

| Stakeholder |                                                          | Points |
|-------------|----------------------------------------------------------|--------|
| 1.          | University with Incubator/Entrepreneurship Support Agent | 1      |
| 2.          | Enterprises                                              | 1      |
| 3.          | Sectorized cluster                                       | 1      |
| 4.          | Government sector (municipal/state/federal)              | 1      |
| 5.          | Technology parks                                         | 1      |
| 6.          | Universities                                             | 1      |
| 7.          | Investors                                                | 1      |
| 8.          | Banks                                                    | 1      |
| 9.          | CSOs                                                     | 1      |
| 10.         | OTT                                                      | 1      |
| 11.         | International Stakeholders                               | 1      |
| Total       |                                                          | 11     |

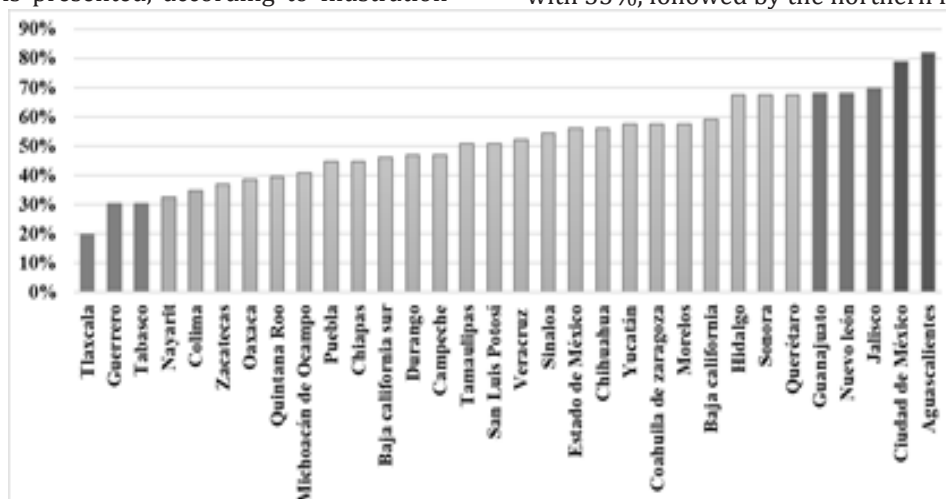
of interaction of the university as a binding agent in the ERA through the incubator/entity. On the other hand, to measure the degree of linkage by state, each linkage was assigned one point and the existence of an incubator/binding agent an additional point, so that the ceiling per university/Stakeholder reaches a maximum of 11 points (See Table 2)

Illustration 4 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%.

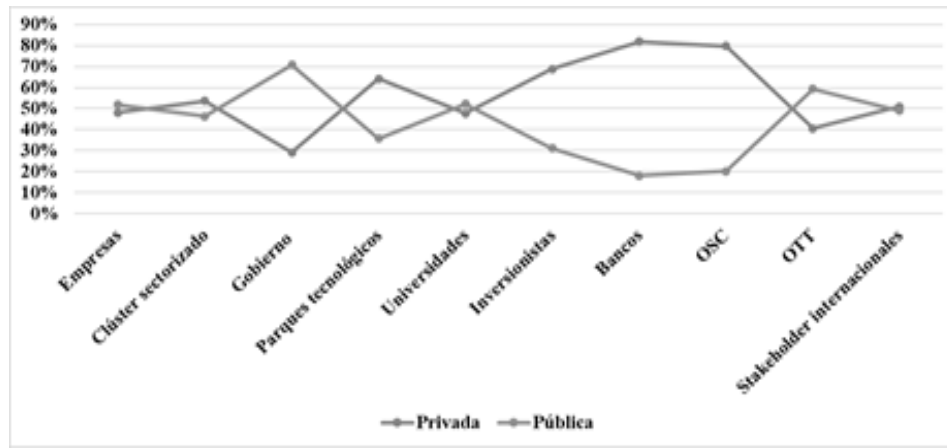
Continuing with the analysis of results, the link between public and private universities with stakeholders is presented, according to Illustration

5, 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. 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 (Sybille, 2019) (Austria Wirtschaftsservice Gesellschaft mbH (aws), 2021) Illustration 6 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%

**Illustration 4.** States with better conditions for universities as binding agents of the ERA.

**Source:** Own elaboration (2023), taken from the results of field research



**Illustration 5.** Linkages by type of educational program (Public or Private)

Source: Own elaboration (2023), taken from the results of field research

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.

#### 4.2. 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 (Sybille, 2019) (Austria Wirtschaftsservice Gesellschaft mbH (aws), 2021)

In Illustration 7, 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.

In relation to the dispersion between the

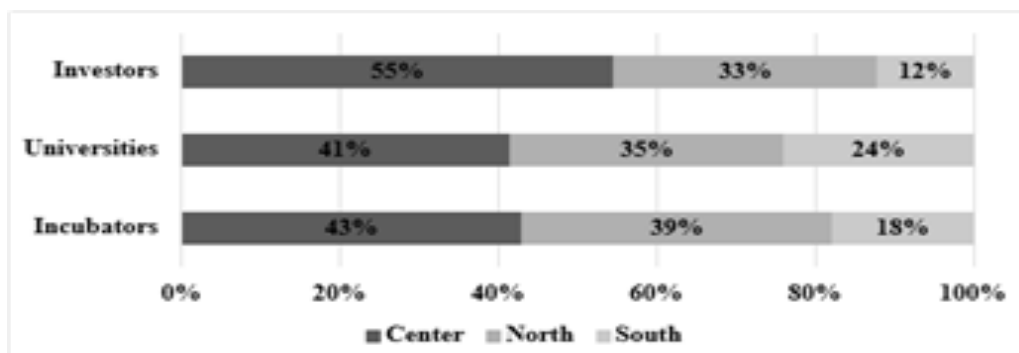
incubator and investors, according to Illustration 8, frequent increases are observed with trends of a moderate positive correlation where the increase in the incubator axis is accompanied by an increase in the investor axis. This is verified in Table 3 where the Pearson correlation between these variables is 0.429.

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.

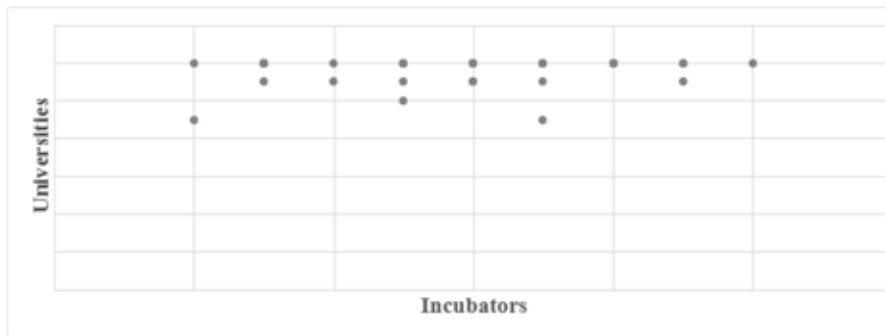
- Incubator – Universities 0.169 (low positive). According to the results in the international context, this link is one of the most important since universities are providers of infrastructure, experts, researchers, among other inputs for entrepreneurship; however, in the present study this correlation is low positive according to Table 3, and in the dispersion of Illustration 8 the correlation is almost imperceptible. In other words, there is no link between these variables.

Table 4 shows the levels of correlation between



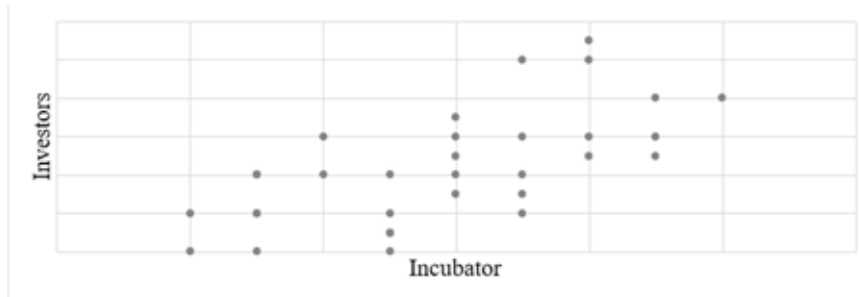
**Illustration 6.** Percentages of linkages with investors and universities by region

Source: Own elaboration (2023), taken from the results of field research



**Illustration 7.** Dispersion between the incubator and universities

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



**Illustration 8.** Dispersion between the incubator and investors

**Source:** Own elaboration (2021), prepared in SPSS with the results of the application of the instrument

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

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

| Incubator                                                         |                     |                  |     |
|-------------------------------------------------------------------|---------------------|------------------|-----|
| Stakeholders                                                      | 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

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.

## 5. 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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