The entrepreneurial ecosystem of Guadalajara, Jalisco, Mexico: Its technology-based and fast-growing startups and entrepreneurial-employees

María Isabel Rivera Vargas[1]*, Adrián de León Arias[2]

Abstract

The purpose of this article is analyse the Entrepreneurial Ecosystem of Guadalajara Jalisco, México (EEZMG) through its technology-based, fast growing startups and *'entrepreneurial-employees'*, their growth dynamics and interactions as well as to explore the factors that impact their growth, and discover the policies or programs that have the greatest effect on their development. Therefore, using as analytical framework the 'Entrepreneurial Ecosystem Model' proposed by Stam (2015) this research applied a mixed research method through in depth and semi structured interviews to entrepreneurs, key informants, and influencers. The study has confirmed the hypothesis of '*entrepreneurial-employees*' and its ambition about job creation that previous research has predicted. Moreover, the study shows that both the '*institutional framework*' and the '*systemic conditions*' have created a '*productive entrepreneurship*' promoting '*value creation*' and furthermore, the *entrepreneurs* have capacities to develop, globalize and strengthen the ecosystem. After the conclusions, the study provides some implications for policy design and cumulative development of entrepreneurial ecosystems.

Keywords: entrepreneurship, innovation, entrepreneurial-employees, productive entrepreneurship, entrepreneurial ecosystem, deep technology sectors

1. Introduction

According to Frost & Sullivan (2019) early-stage entrepreneurial activity in Mexico increased from 19% in 2014 to 21% in 2017, above the 18.3% average for Latin America. Period of major growth in the emerging Entrepreneurial Ecosystem of Guadalajara Metropolitan Area (EEZMG), which has already achieved global visibility and it is recognized for its dynamism. Thus, in 2019 it was distinguished by the StartupBlink Ecosystem Ranking Report (SBER, 2019) as one of the 100 most important in the world, and in 2020 the same report places it as the tenth in Latin America and the third in Mexico. However, there is not systematic information about the number of startups nor about the quality of the entrepreneurial activity in Jalisco, that is, the information in the databases does not distinguish between technology-based startups and traditional ones. To fill this gap in systematic knowledge and in view of the growing interest of ecosystem stakeholders, and society in general, this systemic study of the EEZMG was conducted.

Based on previous research results that have shown that it is the small group of ambitious and innovative entrepreneurs that is important for economic growth and not all new or small firms (Wong, Ho and Autio, 2005; Stam, Suddle, Hessels and Van Stel, 2009; Stam, Hartog, Van Stel and Thurik, 2011), this study focuses on technology-base and fast-growing startups as well as its founders. The Entrepreneurial Ecosystem approach proposed by Stam (2015) in his model is used as analytical framework for considering it offers a comprehensive, holistic and systemic approach, while analyzes the key elements of the entrepreneurial ecosystem and its interactions. This study examines the startup characteristics, development, networks and interactions and explores the factors that foster and/or hinder their growth, as well as discover the policies or support programs that the entrepreneurs report as having the greatest impact on their growth and development.

The field work of this study was carried out from April 30, 2019 to March 9, 2020 in the Metropolitan Area of Guadalajara (ZMG), in Jalisco State, Mexico. This systemic study discloses the functioning of the ecosystem as a whole. That is, the results of this study are the first to provide a comprehensive view of the EEZMG in terms of technology-based entrepreneurship. It contributes to provide systematic information on both the number of technology-based and rapidly growing startups and the dynamics of their growth, their interactions and networks, as well as the dimensions and scope of the existing entrepreneurship, but also, the great challenges to be faced in the EEZMG providing some implications for policy design and the accumulative development of entrepreneurial ecosystems.

It is also of great relevance and novelty that the study's focus on technology-based entrepreneurship, that is, *"innovative startups"* and *"entrepreneurial-employees"* as indicators of *"productive entrepreneurship"* since, as previous research indicates, they are an important source of innovation, productive growth and employment (Mason and Brown, 2014; World Economic Forum, 2013).

Additionally, this study contributes to the academic literature on emerging entrepreneurship ecosystems, in particular, contrasting and confirming the hypotheses about job creation and ambitious

(1) Social & Legal Sciences Department, University of Guadalajara, Jalisco, México
(2) Centro de Innovación para el Aceleramiento del Desarrollo Económico y Social, University of Guadalajara, Jalisco, México.
*Corresponding author: isariv2011@cucea.udg.mx

entrepreneurial – employees proposed by Mason and Brown, (2014); Stam, (2015), World Economic Forum, (2013 and 2015) and Global Entrepreneurship Monitor (GEM) (2015).

The research results respond to the need for systematic knowledge that allows generating information on EEZMG's growth capacity and dynamics in order to enable better and more in-depth analysis to be carried out, that in turn, allows refining the design of more appropriate public policies that promote better performance in the entrepreneurial ecosystem. Therefore, it satisfies the need for this knowledge and the interest of ecosystem stakeholders, public sector decision makers, global entrepreneurship scholars and society in general.

After this introduction, the following section depicts the analytical and methodological design. The research results are described on the third section. Secondly, the Conditions of the Institutional Framework are presented. Thirdly, the Systemic Conditions in the EEZMG are illustrated. Fourthly, the development stages and value creation are reported. Finally, in the fourth section we present the conclusions pointing out future challenges for the ecosystem studied, and offering some implications for policy design and accumulative development of entrepreneurial ecosystems.

II. Analytical Framework and Methodological Design

2.1. Analytical framework

Since according to Mason and Brown (2013) the entrepreneurial ecosystem is a network of interconnected actors which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment, a systemic study was required. Therefore, this research applied as analytical framework

The *Entrepreneurial Ecosystem Model* proposed by Stam (2015) for considering it comprehensive, holistic and systemic, given that it analyzes the key elements of the entrepreneurial ecosystem such as the *institutional framework conditions*, its *systemic conditions*, its *entrepreneurial activity*, its *outcomes in the aggregate value creation* and the *capitalization of acquired knowledge*, which provide feedback to the entrepreneurial ecosystem. Besides, it considers the entrepreneur as the focal point and leader not only in the creation of the system, but also as the one in charge of keeping it strong and vigorous.

In this view, entrepreneurship is the result of the system, but also emphasizes the context of *productive entrepreneurship*. Stam defines the entrepreneurial ecosystem as a set of interdependent actors and factors, coordinated in such a way as to allow productive entrepreneurship (2015, p. 1765). In short, founded on previous research this approach is based on people, networks and institutions. This analytical approach integrally gathers all the important aspects and key elements of entrepreneurial ecosystems suggested by previous literature. These key elements and components of entrepreneurial ecosystems also coincide with those analyzed in the study of Weinberger (2019), that although with different focus study their impact on startups development in Lima.

The Analytical model

The selected analytical model allows deeper analysis on four ontological levels: 1) institutional framework, infrastructure and market conditions; 2) systemic conditions; 3) entrepreneurial activity: exits, and 4) creation of added value: results. Figure 2.1, below, illustrated the model.

Figure 2.1 The Entrepreneurial Ecosystem Model
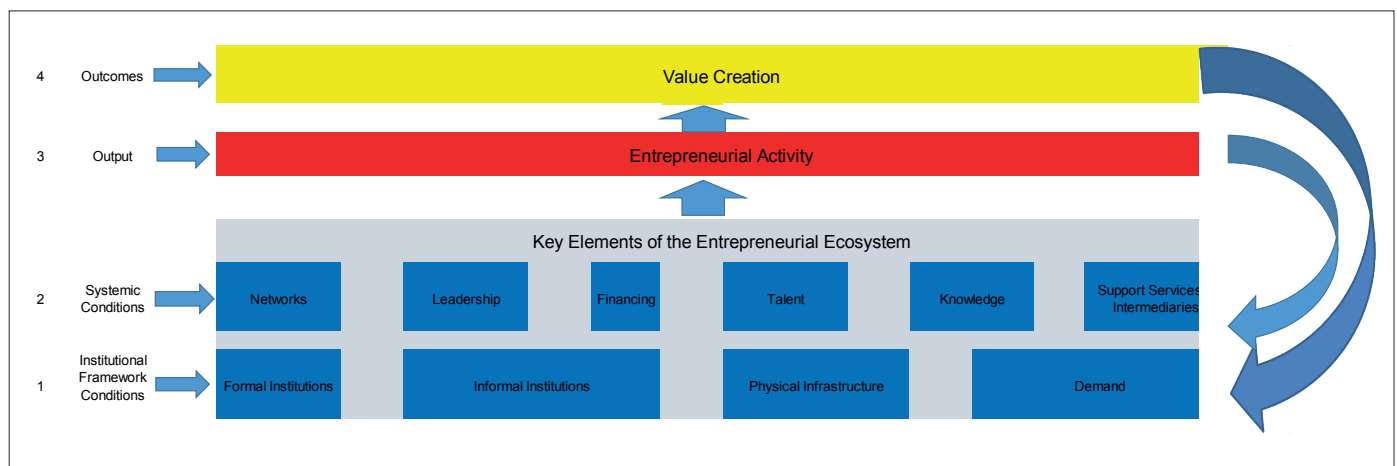
Source: Stam (2015 pp. 1759-1769)

The conditions of *the institutional framework* include the formal institutions or social aspects, as well as the informal institutions, or entrepreneurial culture, one that reflects the degree to which the entrepreneurship activity is valued in a society; physical infrastructure

is understood as the physical conditions that allow or limit human interaction, and finally, demand implies the access to exogenous demand for new goods and services.

The systemic conditions comprise networks of entrepreneurs, leaders, investors, talent, knowledge, support services and intermediaries, which are envisaged as the heart of the ecosystem. The existence of these elements and the interactions between them largely determine the success of it.

In this model **entrepreneur networks** indicate business connectivity for the creation of new value, and provide a flow of information that allows an effective distribution of capital and labour. **Leadership** provides guidance and direction to collective action, as well as models that can be followed by the entrepreneurial ecosystem, and is considered decisive to build an ecosystem and keep it vigorous and solid. This involves a group of outstanding entrepreneurs who provide leadership and are dedicated to the region and its development.

Access to **financing** is considered crucial in this model and it is explicitly recommended that is provided by actors with knowledge about entrepreneurship, especially in the case of projects with a certain level of uncertainty and with a long-term horizon.

The presence of **talent**, or a group of diverse and skilled workers, is considered in this model as the most relevant element for an effective entrepreneurial ecosystem that is closely related with another element such as **public and private organizations' knowledge**, which in line with Audretsch and Lehmann (2005) is identified in this model as a very important source of opportunities for entrepreneurship.

Furthermore, following Sternberg (2007) and Malecki (2011), this model considers that **founders of companies** with high growth, and especially those that the model identifies as **entrepreneurial-employees** – those who were employees of large established companies, have the potential to act as connectors of the ecosystem on a global scale and, therefore, as integrators and knowledge and innovation diffusers. Moreover, according to the Global Entrepreneurship Monitor (GEM 2015), these **entrepreneurial-employees** tend to be more ambitious in the expectations of job creation than the established executives for whom they use to work.

Stam explains further that his model reduces entrepreneurship to "high growth startups" because they are an important source of innovation, productive growth and employment (Mason and Brown, 2014; World Economic Forum, 2013). Therefore, his proposal is to include in the analysis **"innovative startups"** and **"entrepreneurial-employees"** as indicators of **"Productive entrepreneurship"**. Stam defines productive entrepreneurship as "Any entrepreneurial activity that contributes directly or indirectly to the net production of the economy or to the ability to produce additional production". Using Davidsson's (2005) concept of catalyst ventures, Stam makes clear that productive entrepreneurship "*could also include companies' failures that have provided a fertile breeding ground for subsequent endeavors, or that have inspired them, creating a net social value*", and states that

"*the total social value created by the business activity should be more than the sum of private value created by individual entrepreneurs*" (Stam, 2015, p. 1765).

Finally, according to Stam, a *"healthy entrepreneurial ecosystem"* produces **entrepreneurship** as a **product** and adds **value as a result**. This new **value creation** is an emergent property of a complex system of economic agents and their interactions: *the* **entrepreneurial ecosystem**. In this model, entrepreneurship is both the **result** and the **mediator** in the evolution of the entrepreneurial process*: the* **entrepreneurial behavior**, since the system enables a **product**, while the **new value created** and the possible structural change as a result of the system are mediated by **entrepreneurship.** This result is an emergent property of the system and redefines its nature through the feedback effects. Such effects mean that the system and its results should not be interpreted as one-way relationship, since the current state of the system is generally affected by the previous results. Stam describes entrepreneurship as "the process in which opportunities are explored, evaluated and exploited to create new goods and services" (Stam, 2015, p. 1761).

2.2 Methodological Design

As the research design needed has to be capable of to study the entrepreneurial ecosystem as a whole, its actors, networks, interconnections, and performance within the local entrepreneurial environment, a systemic study and a mixed methodological approach to obtain quantitative as well as qualitative information to provide a comprehensive analysis of the entrepreneurial ecosystem was required.

Thus, using as analytical framework the *Entrepreneurial Ecosystem Approach* proposed by Stam (2015) this study investigates the Entrepreneurial Ecosystem of the Metropolitan Area of Guadalajara (EEZMG) through its technology-based and fast-growing startups as well as **entrepreneurial-employees** using a mixed research method: quantitative qualitative with a convergent triangulation strategy. Information was obtained from the EEZMG through 26 entrepreneurs, 17 key informants, 8 influencers, in addition to the data collected from 7 databases and websites of incubators and accelerators with the greatest impact on the ecosystem.

The sample

In order to identify technology-based and fast-growing startups, a database was built with information obtained from different sources[1], which resulted in an initial list of 152 startups that did not distinguish between those that are technology-based and the traditional ones. In order to identify those technology-based and fast-growing startups, semi-structured interviews were applied to key informants of the entrepreneurial ecosystem based on a generalized conceptualization that coincides with the definition of a startup in Ranking StartUp: "*An organization with high innovation competence and strong*

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[1] Ángel List, Ranking Startup, Contxto, Angel Ventures, Crunchbase, Startupgdl y Latin America Venture Capital (Lavca), besides official web sites of high impact incubators and accelerators as SparkUp from Universidad Panamericana, CIPAE from Universidad Autónoma de Guadalajara, Instituto Tecnológico de Estudios Superiores de Occidente (ITESO), Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM), Balero Ventures, Reto Zapopan and other organisms and support service organizations such as Enlace and Endeavor.

technological base, which has the faculty of an accelerated growth and maintains independence through time. The max lifespan should be of 10 years" (2019). As a complementary strategy to define the sample, a questionnaire was designed in Google Forms with the objective of capturing the majority of startups characterized by **high technology**, **rapid growth**, and with **investment rounds** received, as the three parameters of inclusion in the sample. The Google questionnaire was sent by email to the 152 entrepreneurs in the general database and also the questionnaire link was shared in social networks of key informants, support services organizations, and intermediaries. As a result of this process, 44 questionnaires were answered, received and analyzed so that the selection process only include in the sample the startups that meet the three inclusion parameters established by the study. Thus, 40 startups were identified as technology-based and fast growing and therefore included in the sample. However, for time restrictions we interviewed only the first 26 that agree to be interviewed. That is, the core sample represents 65% of the total relevant[2] startups according to the research focus. The entrepreneurs interviewed identified the influencers in the EEZMG based on the following definition: "*Any actor and their networks that have had a decisive influence on the entrepreneurial ecosystem, fostering and promoting the growth, development or achievement of its objectives with its vision, ideas, leadership, relationships or investment*". 34 influencers were identified, but 11 stood out for the number of times they were mentioned. However, we were able to retrieve information and obtain the perspective of eight from the 11 most outstanding influencers.

The interviewing process

The field work was carried out between April 30, 2019 and March 9, 2020 at the EEZMG. At the beginning of the interview, the interviewer gave the entrepreneur visited a letter containing the confidentiality agreement. The average duration of the interview was an hour and a half and in all cases the entrepreneur agreed to be recorded and also that the research results will be published using fictitious names in order to honor the confidentiality agreement.

Limitations

Besides time and resource limitations, the study has certain information constraints. One of the interviews could not be carried out due to the busy schedule of the entrepreneur. However, given the importance of the startup due to the number of times it had been mentioned, information about the company and its founder was obtained on Crunchbase, LinkedIn and Lavca platforms, which was included in the analysis. In addition, the case of an entrepreneur who did not answer questions about the value of his current sales, and another who did not provide information on the financing received and the investors providing the capital but the information was obtained from Crunchbase, LinkedIn, Lavca, and Contxto websites, as well as in newspaper articles on different years (Alfaro, May 2, 2018; Medina, January 9, 2018, 2017; Martin, April 21, 2016).

III. The Results

3.1. The Entrepreneurs

Among the most relevant results of this study we found that within the EEZMG actively participate, as central actors and leaders, entrepreneurs with capacities to develop, strengthen and invigorate it, since in addition to these capacities they display social and psychological capital, as briefly will be described later. Their demographic characteristics, educational background, and work experience are presented below.

Demographic Characteristics

Entrepreneurs in the EEZMG are predominantly young, averaging 31 years old. The male gender predominates with 86% and only 14% is female. Regarding their place of birth, 96% are Mexican and 4% are foreigners.

Educational Background

The 89% of entrepreneurs has professional education, that is, a bachelor's degree in engineering or equivalent. Studies in STEM areas prevail with 57%; followed by studies in economics and administrative sciences with 29%. 36% of entrepreneurs has graduate education, mainly master's degrees. 53.8% has declared to be autodidact and 99% of them speak English at an advanced level.

Work Experience

The entrepreneurs with previous work experience accounts for 88%, while the rest do no have work experience, this 12% without work experience declared to have dropout their university studies to undertake their entrepreneurial projects. Of the entrepreneurs with work experience prior to their entrepreneurship engagement, 57.69% obtained their experience in transnational corporations and 20% have work experience in startups as employees or as founders in a previous project, see Figure 3.1 in the Appendix for more specific information.

Entrepreneurial-Employees and Job creation

Given that 57.69% of the founders obtained their work experience in transnational corporations, this study identifies them as **entrepreneurial-employees** in accordance with previous research (Mason and Brown, 2014; Stam, 2015, World Economic Forum, 2013, 2015 and Global Entrepreneurship Monitor (GEM), 2015). According to these authors, these **entrepreneurial-employees** have the potential to act as connectors of the ecosystem on a global scale and, therefore, as integrators and diffusers of knowledge and innovation, but in addition, are more ambitious in job creation, characteristic that was confirmed by this research in the sample analysed. Indeed, in the EEZMG there is 54% of **entrepreneurial-employees**, who have created a substantial number of jobs and therefore confirms the hypothesis raised about job creation by the previous studies mentioned. Their startups in the sample grew more than 100% in employment, considering the number of employees at the firm's foundation year and the same

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[2] Relevant, according to the indication made by the 17 key informants, of which seven were also identified as influencers in the entrepreneurial ecosystem of the ZMG, after the interview with entrepreneurs.

indicator declared in 2019. Moreover, the company that created more jobs reports an increase of 5,980%. But in addition, this study registers that the companies with the largest increase in employment were all founded by *entrepreneurial-employees*, as table 3.1 below illustrates. However, as it could be seen in the same table, the study reject the

hypotheses of previous studies about *entrepreneurial-employees* as *global connectors*, since only 15% of them have operations in international markets and none of them participate in global, national or regional research, knowledge production and innovation networks, as it will be confirmed in the innovation section.

Table 3.1 *Entrepreneurial-Employees* as Ambitious Job Creators and Global Connectors

Number	Years of Operation	StartUp Fictitious Name	% Employment Growth	Entrepreneurial-Employee	Internationalization Global Connectors
1	3	AVESTART1	233%	SI	
2	8	BESTART2	3275%	SI	
3	2	CISTART3	100%	SI	
4	3	DORSTART4	100%	SI	USA, CANADA
5	2	EBESTART5	250%	SI	
6	11	ESETECH6	100%		
7	4	FEDTECH7	200%	SI	
8	5	GOTSTART8	500%		COLOMBIA, COSTA RICA
9	4	HEPSTART9	250%	SI	USA, AUSTRALIA
10	4	INSTART10	500%		ECUADOR
11	3	INDOSHOP11	40%	SI	
12	7	INDESTART12	1900%		
13	6	JESTART13	600%	SI	
14	2	KEFSTART14	100%		
15	6	KAISTART15	5980%	SI	USA
16	4	LANSTART16	29%		USA
17	5	MASHOP17	5300%		
18	1	MUBARSHOP18	s/inf	SI	
19	4	PATSTART19	350%		COLOMBIA, CHILE, SPAIN
20	1	PETSHOP20	s/inf	SI	
21	3	QUASTART21	133%	SI	
22	7	RAGSTART22	600%	SI	
23	10	ROKSTART23	-40%		
24	5	UNASTART24	s/inf	SI	CHILE, SPAIN
25	1	VISTART25	s/inf		
26	1	ZABASTART26	350%	SI	

Source: Field research data

Notes: The *entrepreneurial-employees* are shaded in green

Fictitious names are given to startups in the study to honor the confidentiality agreement.

3. 2 Institutional Framework Conditions

Formal Institutions

The study finds that the institutional framework conditions are adequate and exhibit a reasonable capacity to foster productive entrepreneurship, since there is a range of formal and informal institutions at the State and National level. These institutions and organizations operate programs and funds that have benefited several of the entrepreneurs interviewed in this study. A comparative analysis between the impact level of federal and state organizations and support programs shows that the impact of State Government organizations and programs is greater than those sponsored by the Federal Government. Those at the state level got 84.52% of the mentions, standing out the

program Reto Zapopan, issued by the government of Zapopan municipality while those at the federal level only were pointed out by 53.83% of the interviewees.

Entrepreneurial Culture

It was found that 84% of the entrepreneurs interviewed have a relative who is or was an entrepreneur. 53.84% have parent's entrepreneurs and 38% in addition to parents has grandparents who are or were entrepreneurs. In addition to this business heritage, intense campaigns have been launched by the government and entrepreneurial communities through the media, and also a wide variety of mass entrepreneurship events have been organized to support and promote entrepreneurial culture in Jalisco.

Team and Work Culture

The work teams at the startups interviewed have an average of three years operating as such. Very well structured and consolidated work teams are observed with more than three years and some up to six years functioning. Regarding the work culture, 80% declared that they enjoy working as a team, and 76% are open to criticism and to receive feedback on their projects.

Risk Culture

The 88% of the entrepreneurs expressed to be fond of risk taking and therefore this demonstrate self-confidence, a variable identified by previous studies as one of the main cognitive factors that affect entrepreneurship (Segal, Borgia & Schoenfeld, 2002). On the reaction of entrepreneurs at facing business challenges, 59.24% respond that they analyse the problem, investigate it, get some advice and prepare themselves to face it. Which indicates that a high percentage of them have critical thinking skills. On the other hand, 37% indicates that they face business challenges with determination, motivation and optimism, which are characteristics of the psychological capital that distinguish them, as it is conceptualized by Luthans et al. (2007).

Infrastructure

The EEZMG has a fairly solid and strategic infrastructure in terms of sea ports, air, and road communication infrastructure that move forward entrepreneurial activity. In Jalisco state, converges the investment of 2,600 foreign companies from different business sectors. Some of the manufactures' content are high in electronic and automotive parts, aerospace engineering, aeronautics, pharmaceuticals, biotechnology, multimedia, and software. According to the Mexican Institute for Competitiveness (IMCO), in 2016 Jalisco classified sixth nationally in the ranking of the competitiveness index (2018). In addition, Guadalajara has been selected by the Massachusetts Institute of Technology (MIT) as one of the 12 best cities in Mexico to establish digital creative cities, including industries such as television, film, video and digital animation. In addition, the ZMG has more than twenty coworking spaces. Among the most visible we can mention the following: Ciudad Creativa Digital, WeWork, Mutuo, Master Office Guadalajara, Hackergarage, Nevermind, Startcups, Reto Zapopan, and so on.

Most of the entrepreneurs, key informants and influencers interviewed pointed out that one of the competitive advantages of the region is the connectivity of Jalisco, especially with the Silicon Valley, Austin, New York and the main developed centers. However, some disadvantages such as problematic roads during the rainy season and with the internet service were pointed out by 4% of the interviewees.

Demand and Market

According to the entrepreneurs included in the sample, there is national and international demand for the goods and services they offer. The startups market is characterized by being business to business (B2B) and business to consumer (B2C). Their market is made up by 37% of large and SMEs, 22% sell to final consumers and only 4% have the government as a client, which may represent an area of opportunity for the future. In addition, some of them are already operating

in the international market. 31% of the entrepreneurs in the sample operates in North America, and also in some countries of Central America, South America, Europe and Oceania. Moreover, 27% have medium term plans to initiate operations in the international market.

3.3. Systemic Conditions

Networks and Leadership

The interviewees in this study reported that there are favorable systemic conditions to continue evolving in the EEZMG. It exhibits indicators of integration, communication and density in networks that promote business connectivity for new value creation. 84.62% of entrepreneurs are organized in networks of entrepreneurial communities, associations or national and international chambers, see Figure 3.2, below.

There is also notable leadership. The study identified 34 leaders and influencers, who provide guidance and direction in the ecosystem. But 11 of them outstand for the number of times they were mentioned. They belong to the different groups of key actors within the entrepreneurial ecosystem, such as entrepreneurs, investors, government officials and support services organizations representatives.

Financing

It is important to note that at the beginning of their entrepreneurial activity 43% of founders used personal financial resources, and only 30% obtained their resources from financial institutions. 19% declared having obtained resources from relatives, friends and associates, and only 9% obtained resources from public organizations. Later on, investment from equity funds and angel investors has been received from 57.69% of the startups included in the sample in pre-seed and seed stages, with the exception of two startups that have already received six and five investment rounds in series B and A, respectively, as you can see in Table 3.2, in the Appendix, where also you can observe further information about the startups.

However, the scarcity of private equity funds in Guadalajara, has been mentioned by several sources and by most of the key actors of the EEZMG, but specifically the problem has been highlighted by 35% of entrepreneurs in the sample. These entrepreneurs consider that financing is still meager, that there is a shortage of investment funds, especially in the early stages, and point it out as one of the main restraining factors for growth. A situation that one of the internationally renowned influencers interviewed clarifies explaining that:

> "*the problem is that seed capital investors have not adopted the appropriate strategy to invest, the problem is that many ideas are receiving 25,000- 50,000 US$ of capital, which is going to be lost because it's not the right way to invest, that's not the adequate way*" (interview with influencer Bismarck Lepe via Zoom platform, March 9, 2020).

Nevertheless, this limitation in financing has evolved, and according to the same influencer "*there are more and more investment funds in the EEZMG compared to 2010*" (Bismarck Lepe via Zoom platform, March 9, 2020) and a greater number of companies have managed

Figure 3.2 Entrepreneurs Networks: chambers, associations, entrepreneurial communities, support organizations and intermediaries in the EEZMG

Source: Field research data

to get capital, as this study details, and De la Cruz in his article confirms by reporting an investment in Jalisco for US $ 70,000,000 at the end of 2019, it also reports accumulated risk capital investments of 14%, which is higher than that received in Mexico City and Monterrey (2019).

Among the most notable characteristics of the two startups that by 2019 have received five and six investment rounds series A and B, respectively, the following are identified: a) both have major number of years operating and therefore their work teams are more consolidated; b) both have increased their sales and the number of employees; c) their annual growth in these indicators is considerably higher than that of the others startups in the sample; d) both are registered not only in Mexico, but also in the United States; e) their CEOs have previous work experience in transnational corporations *(entrepreneurial-employees)* as well as in startups.

Talent and Knowledge
Jalisco has experienced an important expansion in its educational infrastructure and in the training and qualification of its human resources. But to the educational infrastructure we must also add the research infrastructure. That is, research centers ascribed to the main higher education institutions, and other independent or public research centers within the region.

Specifically, the entrepreneurs' talent and professional formation, as well as their employees is high. 89% of entrepreneurs and 73% of their employees have higher education studies, most notably in engineering fields. Also, 36% of entrepreneurs and 55% of their employees have graduate education. Moreover, 99% of the entrepreneurs and 69% of the employees, respectively speak English as a second language at an advanced level.

Nevertheless, the demand for human resources in the EEZMG is such that 76% of entrepreneurs face difficulties in obtaining the specific personnel required by their company, especially programmers. More precisely, 37% of them have experienced difficulties in finding human resources in marketing and sale of high-tech products or services. Meanwhile, 16% report the difficulties to get data analysts and other professionals in finance and administration. In addition to this mismatch in offer and demand of human resources, the entrepreneurs report problems in obtaining the specific profiles that fit into the organizational culture of their companies, regardless of disciplinary training. This discrepancy adds to the lack of entrepreneurial mentality and the disparity between the graduates' current skills and those that are increasingly being demanded in the labour market, specifically the so-called soft skills, mainly teamwork, problem solving, communication, collaboration, negotiation, creativity and self-management.

Support Services or Intermediaries
There are several support services organizations or intermediaries that are fundamental in the EEZMG. Some of them, in addition to being investment funds and business connectors, are also incubators, accelerators, pre-accelerators or post-accelerators. Other organizations that also carry out these latter functions are entrepreneurial

communities that support startups in their development. Among these, the most mentioned by the entrepreneurs included in the sample are Hackers & Founders, Balero, Endeavor, Angel Ventures, Enlace, StartUp Gdl, Reto Zapopan, Zapopan Academy, Capital Emprende, Amexcap, Mexican Association of Private Equity & Venture Capital Fund (SIPI), Pragmatec, iTuesday, Plug & Play and Social Valley.

Incubation and Acceleration Process
High impact University incubators and accelerators also play an important role in these processes, such as SparkUP from Universidad Panamericana (UP), the Incubator of Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM) and CEGINT, the Incubator of Instituto Tecnológico de Estudios Superiores de Occidente (ITESO). However, the study shows that 33% of the startups interviewed were incubated in Reto Zapopan, which is not a university incubator, but it is part of the entrepreneurial support program of the State Government, more specifically from Municipality of Zapopan. SparkUp from Universidad Panamericana incubated 27% of the startups in the sample, while Balero, COPARMEX and Hackers & Founders each of them contributed with the graduation of 13% of these companies.

3.4 Entrepreneurship Activities and Value Creation

In this section the dynamics of the startups inside the entrepreneurial ecosystem are identified within a scheme of development stages, its production orientation and its results in terms of value creation.

Stages of Development
The 80.76% of the entrepreneurs interviewed reported that their company is in the scaling stage, and only 19% declared to be in the early stage. However, using LAVCA's classification, which relates the development stage with capital investment, it could be affirmed that 86% of startups are in the incubation / seed capital stage, 14% in early stage / series A and B and still none of the startups in the sample has received investment in series C or D.

The above is explained by the youthfulness of the entrepreneurial ecosystem in Jalisco, which as such is no more than a decade old. It was practically until 2013 that the growth of the ecosystem accelerates with the emergence of support programs released by the National Institute for Entrepreneurship Development (INADEM). This coincides with Weinberger' conclusions in Lima entrepreneurial ecosystem study and other emergent ecosystems report, as noted by her (2019). The EEZMG growth increase speed around 2016 when a greater concentration of support service organizations and intermediaries began operations in Guadalajara. In Figure 3.4, in the Appendix, you can observe that 59% of the startups included in the study began operations from 2016.

The EEZMG could be placed in the *activation* stage of the Ecosystem Life Cycle Model proposed by the Global Startup Ecosystem Ranking Report (GSER, 2020), see the Model in Figure 3.5, in the Appendix. Activation is the initial stage and is characterized by 1) a restricted experience of startups and a limited knowledge of the founders, advisors and mentors, even if there are community behaviors that support the success of startups; 2) low exit of startups (thousand or less); 3)

experiences challenges such as lack of resources and experience, as well as leakage to ecosystems in later stages of development. With the exception of the first characteristic, which seems to be surpassed, the activation stage is the one that best describes the level of development of EEZMG, since it is very far from the next phase considers by the Model, which is *globalization*, and among other indicators is distinguished by having from 800 to 1,200 startups IPOs.

Production Orientation

The startups in the study offer technology-based products and services or traditional products and services with a technology-based business model in whose core process is the use of high technology such as: artificial intelligence, algorithms, machine learning, big data, robotics, virtual reality, augmented reality, 3D printing of medical devices, sophisticated biotechnology technologies, etc. The startups in the sample represent 15 economy sectors, some of the strongest are FINTECH and Internet of Things (IoT), each of these sectors have 15% of the startups in the sample, followed in importance by HEAL-TECH sector with 11%, EDTECH with 8%, E-COMMERCE with 8% and LEGAL TECH with 7%, which, jointly with 9 other sectors, with a lower proportion of companies, coexist and comprise it. In addition, this study detects among these sectors, five of them that are classified within what has been identified as '*deep tech*' or deep technology. These five[3] sectors are BIG DATA / SOCIAL NETWORK, FINTECH, AGTECH, BIOTECH and HEALTECH and represent 38% of the startups in this study. According to the GSER (2020) these sectors are the fastest growing and will be key to the totally different innovations on which the next Silicon Valley will grow. These five[3] deep tech sectors are grouped all together in color blue in the Figure 3.6, in the Appendix. The study shows, that the EEZMG has the highest concentration of these sectors compared it with Mexico and Latin America, since it counts with 38%, while Mexico, the country has 44% and Latin America sums 32%, according to data from LAVCA (2019).

Results in Terms of Value Creation

The institutional framework conditions and the systemic conditions have achieved a synergy in the EEZMG in such a way that has resulted in a substantial *value created* in terms of jobs, sales and innovation.

Job Creation and Sales

This study reveals notable increase in both job creation and sales. The growth in the number of jobs, in most of the startups in the sample, has been expressed at a significant 948% on average per year. Similarly, there is an increase in sales of 1,677% on average, measured by comparing the current[4] total value of its sales with the same indicator in the first year of operations in each startup within the sample.

Innovation

This research also informs that the innovation carries out by the interviewed entrepreneurs focuses on the needs of the client or user and his feedback. Also, the vast majority use organizational learning strategies and a flexible organizational structure in order to stimulate

innovation in their company. Besides their declarations, this is supported by the fact that 58% report innovation in the product or service, 52% in the business model and 48% in the process. Therefore, it can be said that the EEZMG registers certain innovation and tangible intellectual property. However, it is necessary to point out as *a very important pending issue* on the agenda, that there is no participation of entrepreneurs, or ecosystem actors in global, national or regional research, knowledge production and innovation networks.

Entrepreneurial Success, Failure and Knowledge Capitalization

This study finds that the experience of entrepreneurs has fed back the ecosystem to achieve productive entrepreneurship. When reflecting on the reasons and causes of both their success and failure, 73.07% of those interviewed declared having been successful as entrepreneur, which they attributed to perseverance, persistence and tenacity, see Figure 3.10, in the Appendix for further reasons mentioned. On the other hand, 80% of the entrepreneurs in the sample recognize their failures and identify various causes, among the most mentioned are: 1) the lack of preparation to undertake an entrepreneurial project; 2) deficiencies in the strategy; 3) lack of financing, and 4) lack of market knowledge. In figure 3.11, in the Appendix you could see other reasons stated.

All declared to have capitalized on the lessons learned from the failures and this learning unfolds potential to feed back the ecosystem. However, the EEZMG can be considered young when compared with other ecosystems of global visibility, so it presents challenges that need to be faced to achieve sustainable growth and development.

IV. Conclusions

This study conclude that the institutional framework conditions and the systemic conditions have achieved a synergy in the EEZMG in such a way that both favour the progress of the ecosystem and support as well as stimulate *productive entrepreneurship* by creating an effective connection and coordination with the participation of all the actors of the ecosystem and by putting into play a great deal of efforts that has resulted in a substantial *value created* in terms of the number of jobs created as well as the substantial growth in sales and the innovation achieved. But in addition, this study has confirmed the hypotheses about entrepreneurial-employees and major role in job creation, as well as has registered the feedback that the ecosystem has received mainly from the failures and the lessons learned by the entrepreneurs. However, despite there are certain grounds to conclude that EEZMG could be characterized as a *healthy entrepreneurial ecosystem*, according to Stam (2015), it must be considered the limitations detected within the systemic conditions and which stand out as major challenges to face in the EEZMG: 1) insufficient financing and capital funds, as well as unsuccessful or inappropriate investment strategies, especially in the early stages; 2) the imbalance between supply and demand of talent and its lack of correspondence with the requirements of the entrepreneurial ecosystem, and 3) To achieve a

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[3] The IoT sector was not included because there is certain disagreement about whether or not this belongs to the 'deep tech' group

[4] The current total value of its sales, mean the current total value of sales in 2019.

critical mass of start-ups in quantity and quality. Nonetheless, there are elements to affirm that the EEZMG has great potential to develop, not only because of the strengths shown in most of the key elements that make up the entrepreneurial ecosystem, but also for contextual factors that favor the EEZMG potential to develop such as the significant local, regional and national market. The considerable percentage of its startups operating in North American, Central and South American markets, as well as in some countries of Europe and Oceania. Moreover, it must be contemplated the proximity and great connectivity of Guadalajara with several of the entrepreneurial ecosystems classified by the GSER (2020) in the group of the top 25, as well as with those registered in the set of the leading 100, both North American and South American countries with which Mexico not only has the possibility of fostering commercial deals, but also the opportunity to establish cooperative learning relationships. In particular, it would be advisable to seek cooperation strategies with the countries of the LAC5 group[5], of which Mexico is part of, that is, ties should be strengthen with Brazil, Chile, Argentina and Colombia. But, regardless of this and the geographical and cultural proximity, in most of the cases, it is necessary to bear in mind that Guadalajara is still far from the development achieved by the main entrepreneurial ecosystems of the American, European and Asian continents. Consequently, it can be affirmed that great creativity and immense joint efforts are required to achieve a critical mass of startups in quantity and quality that could allow the EEZMG to become in a Latin American innovation hub.

V. Implications for Policy Design and cumulative development on Entrepreneurial Ecosystems

Recognizing the relevance of entrepreneurial and innovation capacities for startups success and therefore for entrepreneurial ecosystems to move forward to the next stage of development it is recommended to design policies, programs and mechanisms aiming at the following:

- Promoting and energizing actors with an entrepreneurial mindset to maintain the stimulation and increase of connectivity with close levels of cooperation within the entrepreneurial community.

- Significantly focus on spotlights of success that have the potential to lead to IPOs.

- The acceleration of construction of strategic sectors on the basis of local or regional strengths aiming to achieve IPOs

- To strengthen research and development in order to lay solid foundations that contribute to the construction of an entrepreneurial innovation ecosystem.

- To promote the participation of entrepreneurs and other ecosystem actors in global, national and regional research, knowledge production and innovation networks, with the aim of pursuing global connectivity and increasing the flow of knowledge in the ecosystem to achieve an integration of startups in the global web of knowledge, and thereby build and foster their capacity and ability to produce cutting-edge business models to achieve an increasingly intense participation in the global market.

- Finding new forms of integration and articulation of policies designed to promote entrepreneurship, innovation, productive transformation and export competitiveness that could allow the entrepreneurial ecosystem to move forward to the next stage of development.

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[5] The Global Bank grouped these 5 countries as LAC5, is the same group of countries that is named as The Latin American & Caribean Region by The StartupBlink Ecosystem Ranking Report (SBER, 2020).

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APPENDIX SECTION

Figure 3.1 Founders Labour Experience
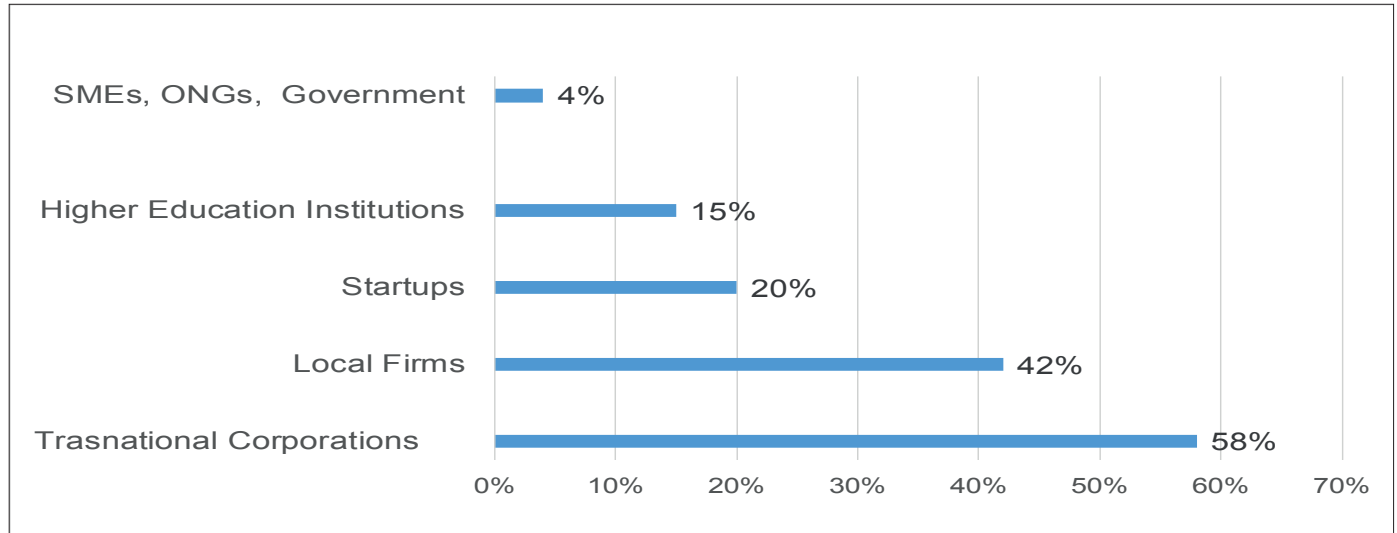
Source: Field research data

Table 3.2 Startups with Venture Capital Investment (2019)

Foundation Year	StartUps Fictitious Name	Investment Rounds	Annual Sales Value in MXN $
2013	KAISTART15	6	200 Mill >
2012	BESTART2	5	459 Mill
2016	FEDTECH7	3	1- 5 Mill
2017	GOTSTART8	3	1- 5 Mill
2014	INSTART10	3	1- 5 Mill
2016	PATSTART19	3	1- 5 Mill
2015	UNASTART24	3	S/Inf
2017	QUASTART21	2	1 Mill<
2016	LANSGTART16	2	S/Inf
2013	RAGSTTART22	2	50 Mill>
2019	ZABASTART26	1	5 - 10 Mill
2017	INDOSHOP11	1	1 - 5 Mill
2016	HEPSTART9	1	1 - 5 Mill
2019	MUBARSHOP18	1	1 - 5 Mill

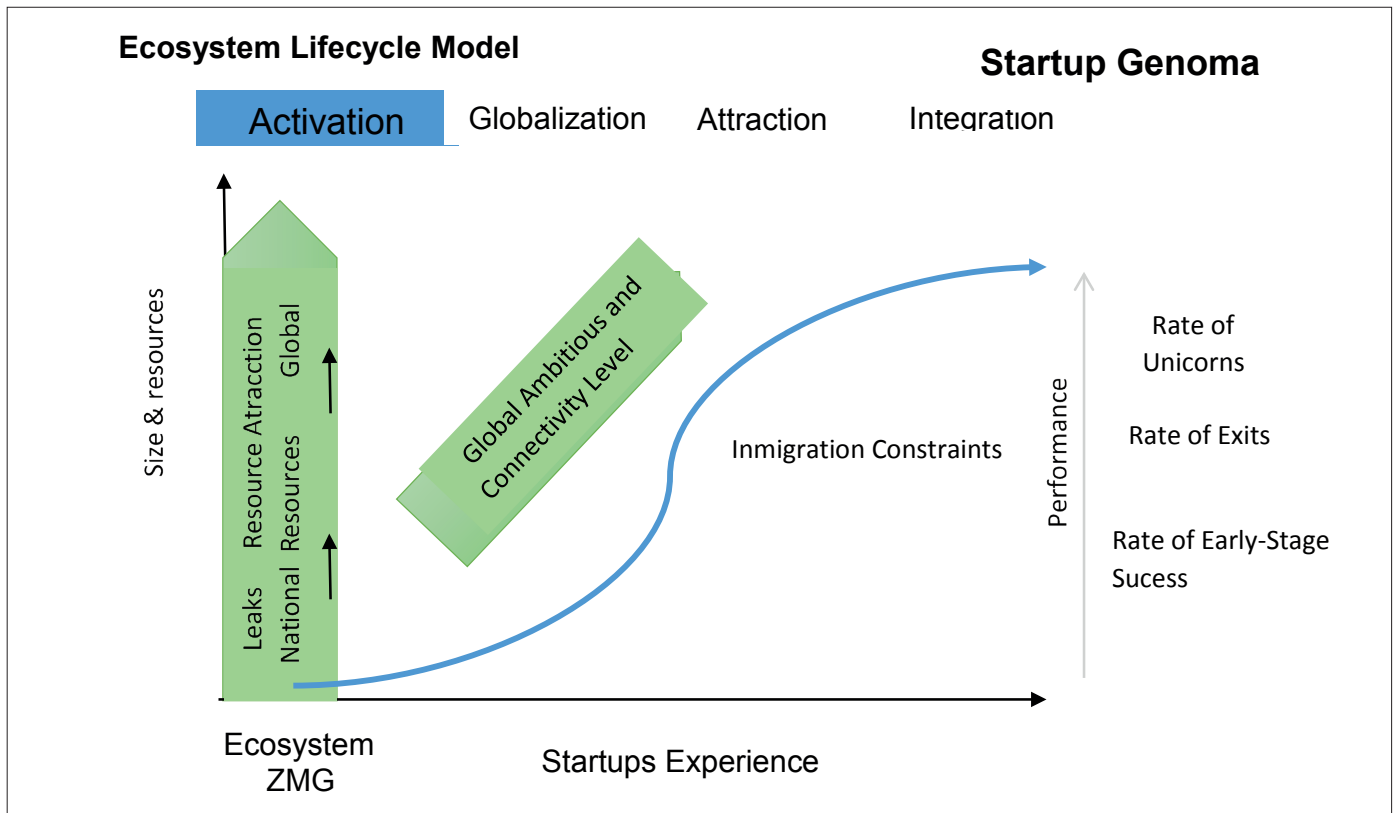**Source:** Field research data

Figure 3.4 Foundation Year of Startups in the Sample
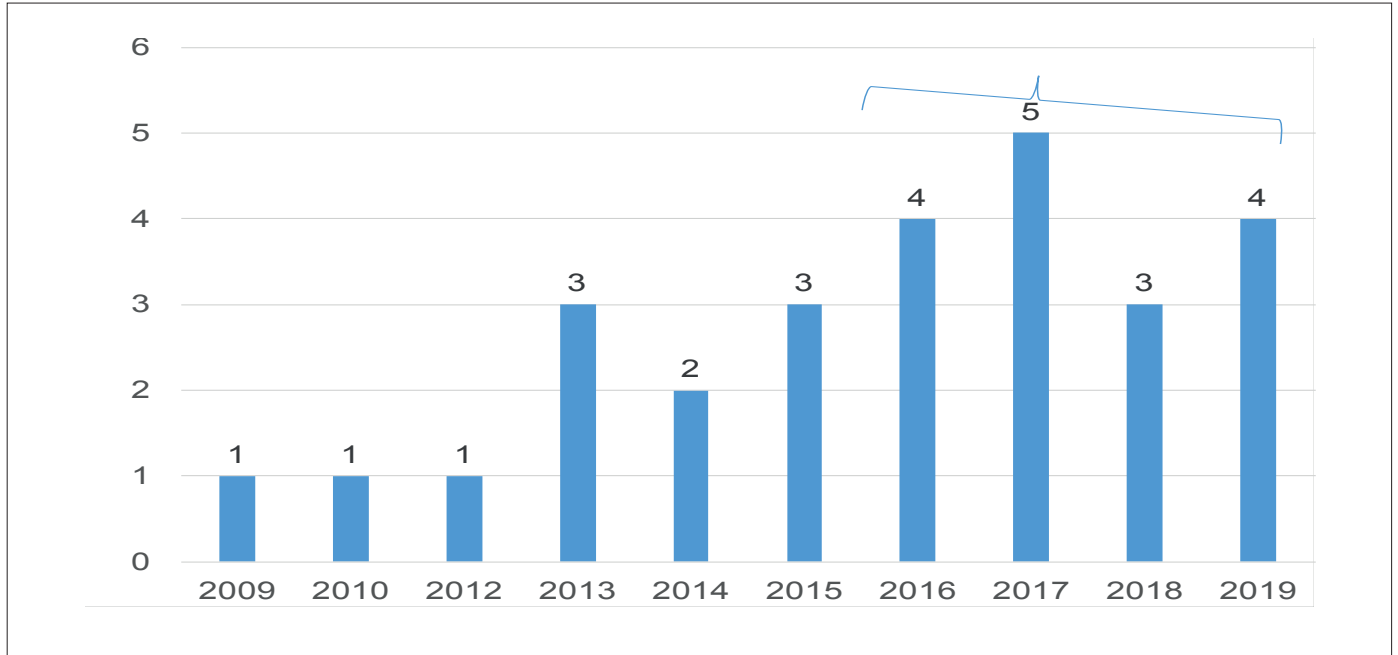
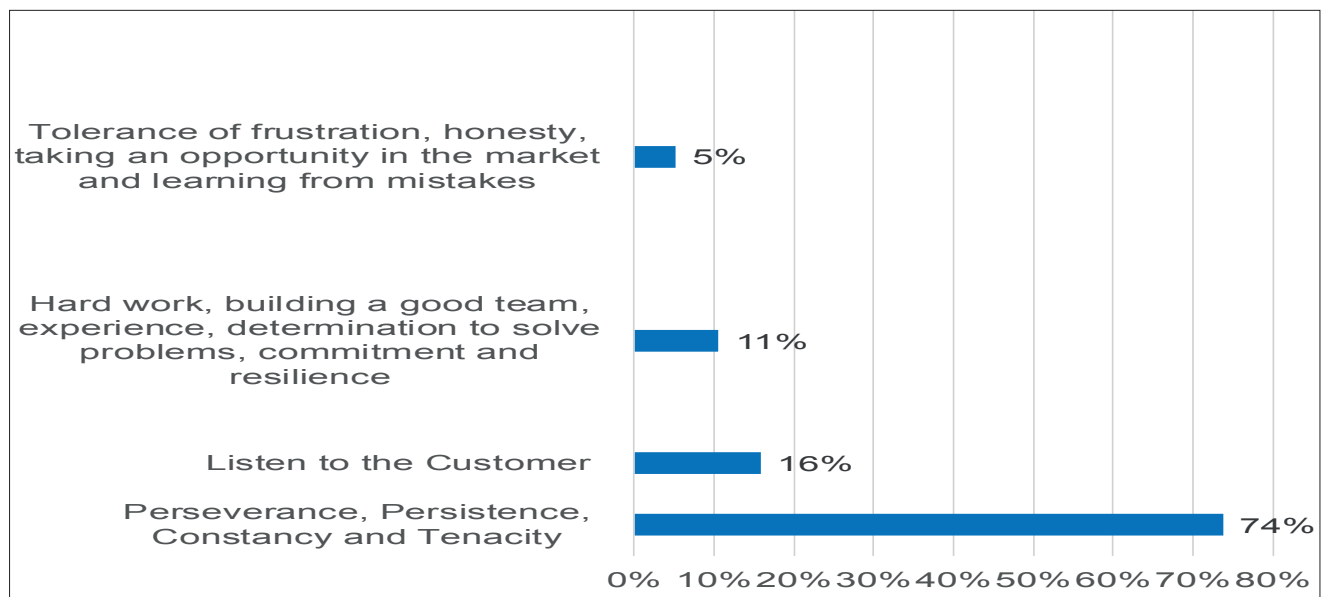**Figure 3.5** Situating the EEZMG in the GSER Life Cycle Model

Figure 3.6 'Deep Tech' Sectors in the EEZMG
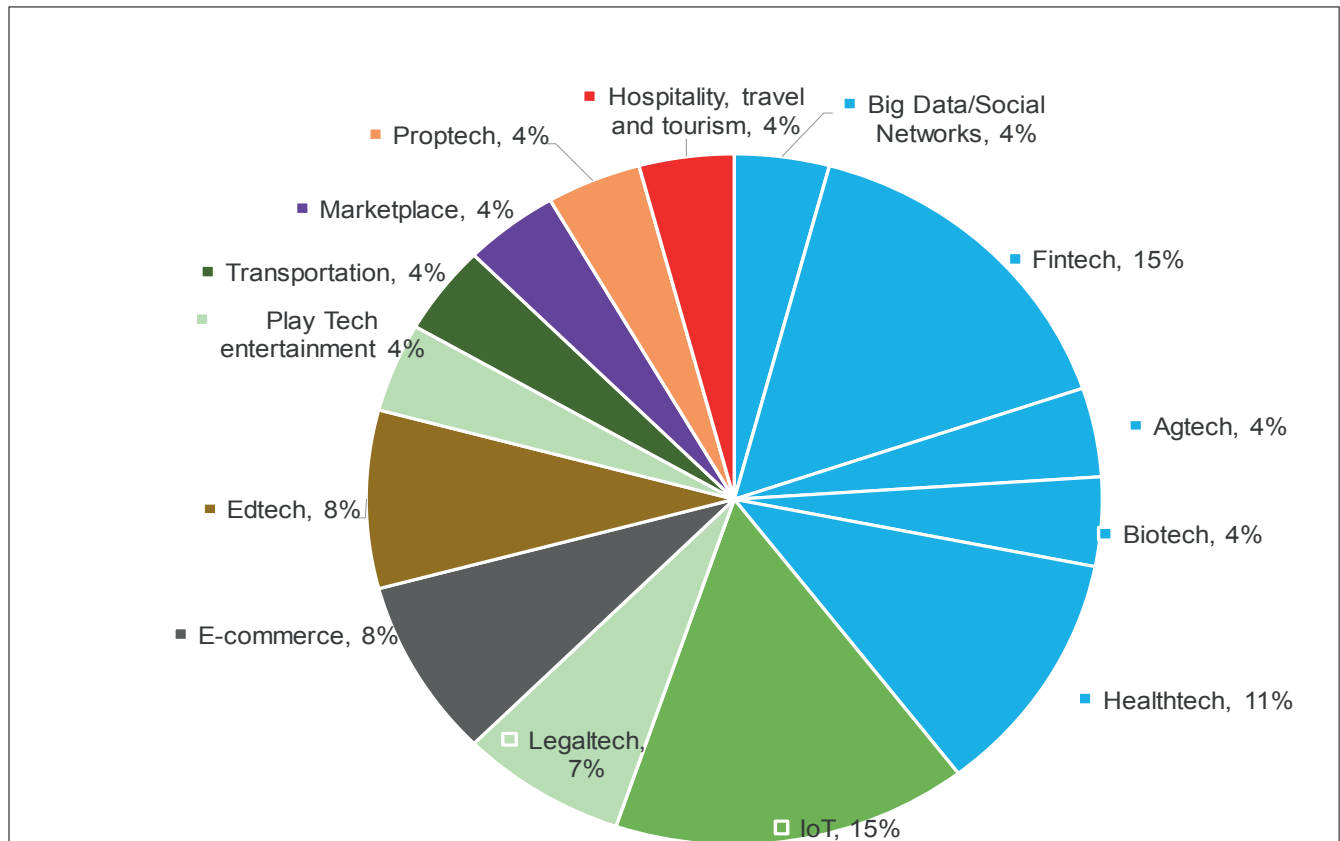
Source: Field Research Data; GSER (2020); y Crusafon, C. (2018) Reported in https://www.elperiodico.com/es/opinion/20180627/laapuesta-por-las-deep-tech-por-carmina-crusafon-6911732

Figure 3.10 Perceptions for Entrepreneurial Success Explanation

Source: Field Research Data

Figure 3.11 Perceptions and Explanation for Entrepreneurial Failures

Source: Field Research Data