



Master of Science in “Entrepreneurship”

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Startups and the role of the startup ecosystem in periods of crises

Νεοφυείς επιχειρήσεις και ο ρόλος του οικοσυστήματος σε περιόδους κρίσης.

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STATEMENT

I declare that I am the author of this dissertation and that every help that I had during its preparation is fully recognized and referred within the dissertation. Moreover, I have referred to all the resources from which I made use of data, ideas or words, either they are stated with exact text or in a paraphrased way. Finally, I declare that this dissertation has been prepared by me personally and especially according to the needs of MSc in Entrepreneurship.

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Abstract

The purpose of this research is to investigate how the entrepreneurial ecosystems provide assistance to startups in order to overcome any kind of crises that they are coping with. It also aims to investigate whether a crisis could become an opportunity for the startups. According to the relevant literature, the economic stability affects by specific characteristics of economic, social and other factors. Therefore, we aim to understand how ecosystems support startups, especially in case of a crisis and how the latter consider an opportunity for startups. In order to shed more light on these, this study will review the startup concept, the startup ecosystems worldwide, as well as it will discuss the crisis management under the theoretical framework of triple helix model. A crisis could be economic, political, natural, or health-related such as pandemics (e.g. COVID-19). In the present research, we are going to conduct interviews with Greek startups and we will gather insights regarding the support and the incentives that the Greek startup ecosystem is providing by the use of the 3ple helix approach. Finally, we will investigate the needs of the Startups of the same ecosystem in order to understand better which are their expectations and perspectives regarding the ecosystem's future support.

Keywords: Startups ecosystem, entrepreneurship, triple helix model, crises, opportunities and challenges

Contents

1. Introduction	6
2. Literature Review	7
2.1. Entrepreneurship	7
2.2. The startup companies	8
2.2.1. Startup Life Cycle Stages	10
2.3. The startup ecosystem	11
2.4 The Greek Startup ecosystem	14
2.5. Crises and crisis management	15
2.5.1. The Triple Helix Model	16
2.5.2. Economic and health crises and their effects on startups	17
3. Research Methodology	18
4. Findings of the research	20
4.1. Case Study 1: A telemedicine Startup	20
4.1.1 Interview with the Startup's representatives	20
4.1.2 Description of the specific ecosystem	23
4.2. Case Study 2: A Startup on IoT food	24
4.2.1 Interview with the Startup's representative	24
4.2.2 Description of the specific ecosystem	27
4.3. Case Study 3: A Biomedical Startup	28
4.3.1 Interview with the Startup's representative	28
4.4. Case Study 4: A startup on Advertisement Technologies	31
4.4.1 Interview with the Startup's representative	31
4.4.2 Description of the local ecosystem	34
5. Conclusions	35
6 Recommendations for the enhancement of the local ecosystem.	38
7. Implications	38
7.1 Theoretical Implications	38
7.2 Practical Implications	40
7.3 Research Limitations and suggestions for further research	41
8. References	41

1. Introduction

During the last decades it is observed that more and more economies are being struck by social, economic, political or natural disasters. Crises deriving from any of the above disasters, often lead to negative consequences for the economy and growth of a country. In addition, these circumstances are showing that a crisis might be often responsible for causing a negative impact on the entrepreneurial ecosystem of a country. The purpose of the current research is to investigate the role of the entrepreneurial ecosystem in times of crisis. In order to answer this research question, we are going to answer the following three research sub-questions:

- a) How does an entrepreneurial ecosystem provide assistance to startups in order to overcome any kind of crises that are coping with?
- b) How could a crisis become an opportunity for the startups of the entrepreneurial ecosystem?
- c) Which are the expectations of startups regarding the support that they would preferably need by the ecosystem?

One of the key challenges for the sustainability of Startup ecosystems is the scaling up of startups that are operating within it. Startups, as nascent innovative entrepreneurial ventures, improve players of a community and their roles. They are turning into companies so that they can serve as a driving force for the economy (Kebbi & Valliere, 2016). They can also act as an effective mechanism for creating jobs in developing countries (Humala, 2015). Over the past decades, many efforts been made towards this direction. This is resulting to an overwhelming number of new startups created each year worldwide. Even though, many of these ventures do not survive during their early-stage operation and they stop to exist sometimes before they have fully exhausted their potential. Fostering the scale-up of startups considers a crucial factor and is highly dependent on the maturity of the ecosystem, the actors surrounding it, the cooperation and networking within it. However, literature shows that building an ecosystem is not simply cloning of best practices from other successful ecosystems (Brown & Mason, 2017). European Commission's reports also show that it is easy to start-up but difficult to scale-up. Barriers to start-up the businesses are very low, while barriers to scale them up are high (De Marco et al., 2019).

2. Literature Review

2.1. Entrepreneurship

Despite a large number of research studies, the definition of entrepreneurship and/or an entrepreneur continues to generate debate (Low, 2001). In general, the individuals that are seeking for new opportunities in order to achieve a potential exploitation of new products or services are considered as entrepreneurs, mainly ambitious, and are trying to add as much value as possible in their entrepreneurial process. In other words, more specifically, an entrepreneur “*would be a person who undertakes a wealth-creating and value-adding process, through incubating ideas, assembling resources and making things happen*” (Kao, 1993). Moreover, Bygrave and Hofer (1991) view the entrepreneur as “*someone who perceives an opportunity and creates an organization to pursue it*”. In his study, Long (1983) mentioned that the entrepreneur “*bears uncertainty, organizes and supervises production, introduces new methods and new products and searches for new markets*”. Entrepreneurs are actively and constantly seeking changes or making the most appropriate strategic choices as a mean of overcoming problems and influences that the ventures face, leading to business success (Hormiga et al., 2018). Entrepreneurs are also interested in innovation and innovative procedures and methodologies. Using the term “innovation”, we refer to the innovation of a product, a process or management style. However, the most prominent definition of innovation is attributed to Schumpeter (1912), who stated that innovation is consisted of any one of the following five factors:

1. introduction of a new good;
2. introduction of a new method of production;
3. opening of a new market;
4. conquest of a new source of supply of raw materials or half-manufactured goods;
5. implementation of a new form of organization

There are also definitions of innovation’s term. For instance, Van de Ven (1986, p. 591) defines an innovation as “[...] a new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the

individuals involved [...].” The process of innovation requires two phases: the initiation phase, followed by the implementation phase (Koput, 1997).

2.2. The startup companies

In the last few years, due to the phenomena such as the global competition, the acceleration of technology change and the expectations placed in technology and innovation, a new actor has emerged, the startup. The characteristics of startups are radically different from those of traditional companies (Tripathi et al., 2019). They are link to high expectations and been considered as more vulnerable than established organizations (e.g., SMEs or a large organization). In addition, they constitute an explicit value chain, with their own support entities (e.g., accelerators), public policies and investors (Tripathi et al., 2019). They are often located in big cities. Startups are companies oriented towards expectations for rapid growth. They achieve the velocity with money provided by forms of financing that have no place in traditional companies (e.g., business angels, seed capital companies, crowdsourcing platforms, etc.) (Giardino et al. 2014). Startups represent a high-risk model with considerable turbulence and volatility. A start-up company is born when an entrepreneur with an idea, product or service gets support by investors. The investors can provide sufficient capital and to allow the new venture to become established (Archibald & Possani, 2019).

The term “startup company” usually used in order to describe a company that comes to bring a solution in a specific problem by the use of innovative approaches and technological innovations. Startups are newly established companies that aspire to grow fast in extreme uncertainty (Wang et al., 2016). Startup refers to a company in the early stages of its operation (Gurel & Sari, 2015). Startup company pursuits to enter an existing market or sometimes to open up a new market with innovative products or services (Stubner, Wulf & Hungenberg, 2007). More precisely, startups been considered as a key player in innovation processes (Colombo & Piva, 2008; Davila et al., 2003). The most widely adopted definition of these firms is that a startup is a company, partnership or temporary organization designed to achieve a repeatable and scalable business model (Clarysse & Bruneel, 2007). In general, startups are critical to the economics of a nation (Basu & Nair, 2015).

Startup, as an economic entity is basing on a specific entrepreneurial model. Usually the startup companies are newly established companies but not all newborn companies are considered as startups. Startups characterized by their innovation, their rapid growth and their high-level use of technology. To recognize such companies, it seems also necessary to identify their discrete differences from other companies, and particularly Small Medium Enterprises (SMEs). Startups have a different focus on their goals and priorities, setting their survival as the highest priority for them. Furthermore, startups have to settle their credibility and usefulness both for themselves and other stakeholders, and this is while it is generally expected that they grow increasingly (Duening et al., 2014; Ojaghi et al., 2019). Their special characteristic is their small size, namely a small number of team members, and hence they may cope with a lack of structure and/or a lack of tangible and intangible resources (Presutti et al., 2011). In particular, due to the time pressure and lack of resources, startups often adopt a loose organizational structure without traditional management hierarchies (Giardino et al., 2014). Team members have to be able to absorb and learn from trial and error quickly enough to adapt to new emergent practices and challenges (Giardino et al., 2014). Based on the latter, in terms of risks and uncertainty, startups have often to decide between gradual or radical development, single or multi-product, short or long run focus and the level of entry barriers (Jahanmir, 2016).

According to the 1st ESM (European Startup Monitor) report in 2015, Startups are defined by 3 characteristics:

1. They are younger than 10 years,
2. They develop and adapt in their operation (highly) innovative technologies and/or business models,
3. They present (or strive for) significant employee and/or sales growth.

While analyzing these characteristics, it is of high importance to refer to the innovation aspect. Furthermore, it is often an observed phenomenon that startups are adopting the open innovation (OI) concept, which considers that innovation capabilities are dispersed among many stakeholders except from the company (Chesbrough, 2003). Startups are intrinsically open organizations, engaged in innovation processes and their networks include incubators, universities, large

companies, and public sector entities interacting as an ecosystem to facilitate the success of joint efforts (Rocha et al., 2019).

2.2.1. Startup Life Cycle Stages

Startups are complex diversified in nature; their life cycle is consisting of several stages. In the early stage (i.e., the first stage), the individual has an idea and initiates a set of activities in order to turn this idea into a business. At this stage, there is high level of risk and uncertainty. More precisely, individuals are trying to identify a potential gap, an innovative idea, or a solution for an existed problem, in order to serve or satisfy the costumers' needs (Marmer et al., 2011). The second stage driven by the intention. More specifically, the individual tries to identify the necessary financial resources and search for initial funds and investors. At this stage, the entrepreneurs are in search of investments in their ideas and the first target group that they are approaching is the first-related contact persons such as family members and friends (Salamzadeh, 2015). At this point, individuals also attempt to build a team and they are about to use personal funds and resources for this purpose. The third stage refers to the startup itself. In other words, this means that the Startupper launches the new business (Davidsson & Honig, 2003). This stage characterized as the creation stage, when the startup sells its products or services, enters into the market and hires the first employees (Salamzadeh, 2015). Third stage mostly refers to the seed stage, which characterized by teamwork, prototype development and entrance to the markets, seeking for support mechanisms such as accelerators and incubators, and investments that will grow the startup. A great number of startups fail in this stage (Salamzadeh & Kawamorita Kesim, 2015). At this stage, startups could search for assistance from traditional sources (financial institutions, capital ventures), as well as crowdfunding platforms. The final stage refers to the expansion. According to Blank and Dorf (2012), the startup has to become self-sustainable. At this stage, the entrepreneur has to develop new skills, motivate and coordinate the team and generate links with new customers and suppliers. The entrepreneur is also looking for expansion to international markets and cooperation with new partners in order to achieve sustainability and growth of the startup. Crowne (2002) proposed a start-up's life-cycle model, which identifies the goals and the key challenges of each startup's life cycle phase.

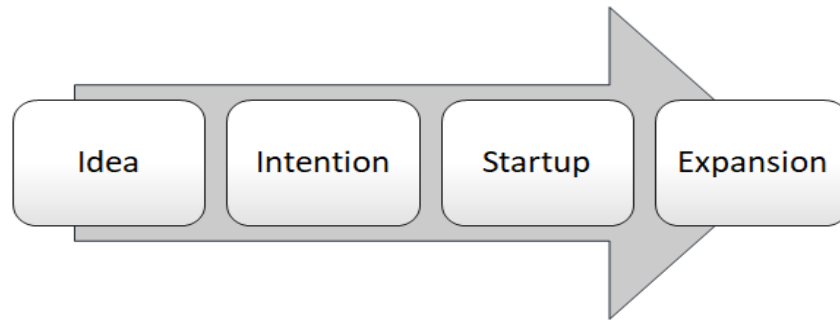


Figure 1

2.3. The startup ecosystem

Trying to describe what an ecosystem is, a simple definition could be the following: An ecosystem comprises a community of living beings whose members interact each another and with nonliving elements in their environment (Ives & Carpenter, 2007). On the business perspective, the entrepreneurial ecosystem can be defined as a set of factors coordinated in such a way that they facilitate “productive entrepreneurship” in a specific domain. In this domain, “productive entrepreneurship” is considered as the result of the success of “ambitious” entrepreneurship (Audretsch, 2009). In addition, Clarysse et al. (2014) referred to the knowledge ecosystems like the clusters and organizations that “facilitate collective learning and increase the speed of innovation diffusion.” This type of ecosystem entails a combination of academia, research institutions, and other support organizations that create, promote, and disclose knowledge.

While analyzing several definitions of ecosystems, it is important to mention that existing research indicates that forming relationships with external partners is a priority for the success of startups (Teece, 2010; Pangarkar & Wu, 2012; Kask & Linton, 2013). More specifically, it is noteworthy that connections and interactions among individuals, between organizations and individuals are necessary (Motoyama & Knowlton, 2016). Mäkinen & Dedehayir (2012) explain that the business ecosystem is a complex ecosystem, which comprises interactions and collaborations between companies and organizations in order to deliver added-value products and services to their customers. A stable and sustainable stakeholder-collaboration framework requires resources, support, assistance, commitment, communication, and adaptability (Audretsch et al., 2017). Ojanghi et al. (2019) mentioned that Startups affect by their environment, they also affect it by

playing a key role within it. For example, their competitions lead to more entrepreneurial and innovative learning among business components (Passaro et al., 2017).

In the majority of cases because of their small size, startups suffer by the lack of tangible and intangible resources (Wymer & Regan, 2005). Going further into the conceptualization of startup ecosystem term, a startup ecosystem characterized by several specific factors and elements. According to World Economic Forum (2013, 2014), entrepreneurial or startup ecosystems are consisted of the following eight factors, which considered as assistance to the startup companies (WEF 2013, WEF 2014):

- 1) Accessibility into markets, either domestic or foreign, which includes small companies or large organizations as well as governments, policy stakeholders and customers.
- 2) Talent and human capital. In particular, ecosystems can provide both managerial and technical support, experience and knowhow, access to services and tools or outsourcing of services.
- 3) Funding. For instance, ecosystems can provide to startups access in a variety of business angels, seed capital and venture capital.
- 4) Support, by the providing and link with coaches, mentors, advisors and other professionals, as well as with incubators, accelerators and networks, this is creating entrepreneurial collaboration and learning.
- 5) Regulatory and legal framework that can facilitate the business startup by providing tax incentives and business-friendly regulations. This factor also includes access to basic infrastructure and telecommunications.
- 6) Education and training of workforce in order to develop specific skills including entrepreneur-specific training.
- 7) Major universities which could operate as catalysts promoting a culture of respect for entrepreneurship and providing human resources(e.g., graduates, postgraduates, professors and researchers) to the new companies. It has been mentioned that the collaboration and interaction between universities and industry could shift the focus of research away from the interest of the society to business (Davey et al., 2016)

- 8) Cultural support, which refers to the development of tolerance on risk and failure, this can be achieved by exploring of success stories and promotion of a positive image of entrepreneurship and innovation.

In general, the startup community often uses the term “ecosystem” to refer to the network of people, institutions, and resources. At a first glance, it could be stated that a startup ecosystem focuses on a particular region in which entrepreneurs and supporting organizations collaborate in order to create new startups and expand the existing ones (Tripathi et al., 2019). This ecosystem, the startup ecosystem “includes entrepreneurs from different backgrounds, skills, and levels of experience, as well as private investors, public and private funding institutions, large companies that create infrastructure, and universities” (Cervantes & Nardi, 2012). Another research determines the startup ecosystem as “a limited region within 30 miles (or one-hour travel) range, formed by individuals, their startups, and various types of supporting organizations, interacting as a complex system to create new startup companies and evolve the existing ones” (Cukier, Kon, & Lyons, 2016). This ecosystem is also consisted by universities, large corporations, support organizations (e.g., incubators, accelerators), funding organizations, service providers (e.g. legal services) and research organizations (Lipińska, 2018). Finally yet importantly, startup ecosystems could be global, national or regional. For instance, a regional startup ecosystem is an effective method to endorse regional innovations and the development of the business environment along with securing the growth of the domestic product and employment in the given country (Krajcik & Formanek, 2015).

Previous research on entrepreneurship has devoted little attention to the dynamics of the evolution of ecosystems as most studies have adopted a static perspective (Alvedalen and Boschma, 2017). A startup ecosystem considered as a system that is complex due to its heterogeneous nature, and dynamic or adaptive since it changes over time (Cavallo et al., 2019). Indeed, the main perspective of the ecosystem of startups is to seek and to understand how interconnections and dependencies between actors, institutions and organizations facilitate entrepreneurship in a particular region and thus applies a relational perspective to entrepreneurial ecosystems (Alvedalen and Boschma, 2017). Startups need access to information to overcome their obstacles and be innovative. They also need resources, talented employees, access to critical knowledge about financial resources, access to research, technologies and market, which can be facilitated widely within the ecosystem

they belong. Taking into consideration the stats regarding the cases of startup companies that fail, this fact posits the significance to analyze which factors within their ecosystem could enhance their potential for sustainability. Factors that could support them in order to overcome innovation obstacles, generate competitive advantages, and ensure their long-term survival. According to this, the baseline theoretical position is that the ecosystem plays a key role for the development, support and sustainability of the startups that are operating within it. The support by the ecosystem comes by reducing possible obstacles, developing innovations, providing information and encouraging cooperation opportunities. However, no prior research has investigated the dynamics of a startup ecosystem, particularly the context referring to Greek startup ecosystem.

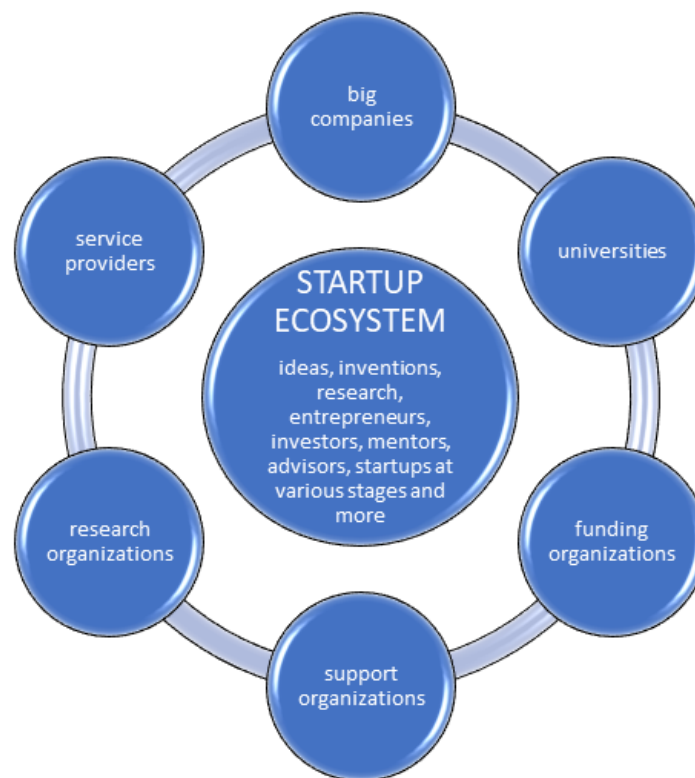


Figure 2.

Source (self-edited): Grow Advisors [2017], *The Startup Ecosystem White Paper* [online], <http://www.startupcommons.org/>

2.4 The Greek Startup ecosystem

The entrepreneurial environment in Greece is consisted by the following characteristics: low chances, high bureaucracy and lack of public support that does not allow the Greek startup ecosystem to grow. However, the Greek startup ecosystem has brought into the spotlight during the financial crisis, then the startup scene saw a stage of consolidation with new successes and a lot of balancing out and since then it is growing. During the last decade, Greece is aspiring

entrepreneurs who are working on promising new ideas and innovative business models. Although, the size of Greek startups is not easily measurable so far and estimated is consisting by 2.000 startups. A new initiative undertaken by the Greek government has created the national Startup point named Elevate Greece with aim to map the existing Startups in the country. Serving as a gateway, Elevate Greece is the official platform and the leading resource for in-depth information on the Greek Startup Ecosystem. The main characteristics of this initiative are:

- To map the Innovation Ecosystem by monitoring the number of startups per Region.
- To provide information on jobs created at startups and to measure the impact this has on Greek economy.
- To process statistical data regarding the industry sectors startups operate in and the technology they use.
- To analyze the performance of Greek startups by using KPIs, like the funding received by the enterprises and their annual turnover.

The platform has so far received 622 interests from potential Startups that will be included in this gateway. A report contacted by the Enterprise Greece in 2018 has concluded that several developments demonstrate the progress occurring in Greece on the innovation front and set a promising path towards a technologically fueled economic growth.

2.5. Crises and crisis management

A crisis is as a phenomenon that does not occur often, has a high level of uncertainty, and affects the society. It is widely accepted that a crisis generates a sense of urgency in how to respond to the situation (Ratten, 2020). Crises been constituted by several characteristics and they can differ each another. For instance, crises are different in length, type, and magnitude depending on its impact on society. In order to respond to crises, there is a high need of cooperation among stakeholders (Ratten, 2020). Furthermore, in terms of the crisis' types, there are types occurring by natural disasters such as earthquakes and hurricanes, or society's crises such as bankruptcies, technological disasters, government-level crises such as political deadlocks or often changes in leadership and health crises which are also infrequent and unpredictable (Ratten, 2020).

Crises, especially the ones we are facing now, both economic and pandemic crisis, have a significant financial and human cost, by blocking assets and human capital, causing a significant social and economic dislocation (Barbulescu et al., 2021). In fact, it has been mentioned that the

nature of crises could be either internal or external (e.g., crises that have occurred out of the company's environment) (Wang, Ellinger, & Jim Wu, 2013). For example, it is been observed that economic crises are powerful push factors (e.g., viewing as an opportunity) (Amit & Muller, 1995). Push factors relate to external conditions that force people into entrepreneurship because of the lack of viable alternatives. Furthermore, economic crises as well as high rates of unemployment might be consider as push factors that lead individuals toward self-employment because of the absence of other opportunities (Dawson & Henley, 2012).

To date, few studies on crisis management in entrepreneurship research evaluate and discuss the actions that entrepreneurs or startups take to mitigate the potential negative effects of a crisis (Doern et al., 2019). Along the same line, startup ecosystems could play a significant role to cope with the negative impact of a crisis on the startups. Ecosystems have a dynamic nature as they change based on the conditions of the environment. The effective collaboration and interactions within an ecosystem are crucial and they can reduce the negative impact of a crisis. Entrepreneurial ecosystems base on the self-organization of members around entrepreneurial pursuits and in times of crisis are important ways to cope with change (Ratten, 2020).

2.5.1. The Triple Helix Model

In order to understand the interactions and the interconnections within the Greek startup ecosystem and the way the Greek startups are getting support by their ecosystem, this study bases on the Triple Helix Model, which highlights the significance of the collaboration among the interested parties (i.e., stakeholders) of an ecosystem as well as the positive outcomes and benefits. In addition, the collaboration networks promote technological innovation in accordance to digitization era and thus the innovation ecosystem needs to be considered as an important – though not the only – enabler for digital transformation (Rocha et al., 2019). More specifically, the Triple Helix Model (THM) is an analytic structure, often characterized by a spiral pattern that is focusing on innovation and is representing the relationship and interaction between three institutional spheres, the universities, industries, and governments. It widely adopted in entrepreneurship research to realize the dynamic of innovation and entrepreneurial activities in a knowledge-based economy (Etzkowitz, 2008; Leydesdorff & Meyer, 2003; Kim et al., 2012). More precisely, the

THM (Leydesdorff & Etzkowitz 1996) argues that the boundaries between public and private sector, science and technology, university and industry are increasingly fading, giving rise to a system of overlapping interactions. For instance, industry functions as the center of production, while on the other hand government and policy makers act as the source of contractual relations, providing stable interaction and cooperation. Finally, universities and generally the research sector are the source of new knowledge and technology. The theoretical approach of THM could apply on the interactions between startups and their ecosystem, in order to promote collaborations, encourage the exchange of human resources and knowledge and facilitate synergies and flexibility. The aforementioned proposition seems to be even more necessary and suitable in case of crises. In particular, it has been observed that interventions are often necessary when the market or system fails; according to Ojaghi et al., (2019), main and strong interactions among actors create the ecosystem's structure, interactions build the required infrastructures, such as the workplace, and finally, the effects of interactions create a developed network around startups.

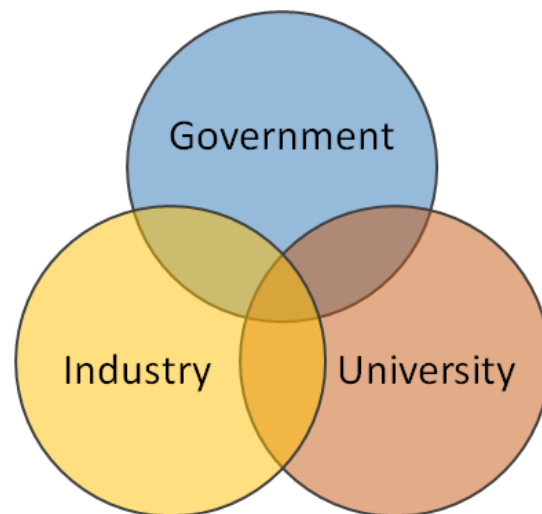


Figure 3.

2.5.2. *Economic and health crises and their effects on startups*

Building upon the Triple Helix Model and the crisis management, the study pursues to fill the research gap regarding the assistance and support that the entrepreneurial ecosystems provide to startups in order to overcome any kind of crisis that they are coping with. In this framework, the study is also trying to investigate whether a crisis could become an opportunity for the startups.

One study that addresses multiple resources to highlight how entrepreneurs could turn challenges into opportunities is mainly focusing on the Australian context during a crisis (Maritz et al., 2020). Previous research on crisis management has tended to focus on natural disasters or financial events (Grewal & Tansuhaj, 2001). Kuckertz et al. (2020) investigated the financial impacts of the crisis on startups and overlooked other essential challenges. This has limited the current literature to crises that occur due to other related factors, such as health crises. The discovery of the coronavirus (SARS-CoV-2) and the spread of COVID-19 have led many governments to take urgent and tough measures. The few studies on crisis management in entrepreneurship research predominantly assess the actions that entrepreneurs or organizations take to mitigate the potential negative consequences of a crisis (Doern et al., 2019), among which are changes in sales, marketing, and employment practices. Furthermore, a recent review of the literature organized research on crisis management based on the perspectives of time and stakeholders (Bundy, Pfarrer, Short, & Coombs, 2017). There are also several studies that have shown that regions and even businesses that exhibit a high level of entrepreneurship before a crisis, are well positioned in order to deal with exogenous shocks (Williams & Vorley, 2015; Bishop, 2019). Small businesses in particular tend to excel at adaptability and flexibility (Smallbone et al., 2012) and we should expect them to demonstrate that in response to the COVID-19 crisis. In fact, it seems more appropriate for innovative startups to embrace iterative and flexible approaches such as effectual logic (Sarasvathy, 2001). To sum up, crisis management tends to minimize the impacts of a crisis (Spillan & Hough, 2003) and, if it is successful, it can quickly restore functionality to organizations suffering from the effects of disrupted or weakened systems (Williams et al., 2017).

3. Research Methodology

In terms of methodology, the researcher designed the main structure of the questionnaires and after getting an initial feedback by relevant stakeholders (entrepreneurs, startups, academics and researchers), he finalized the structure of the questionnaires for the interviews). Afterwards, the researcher proceeded to the implementation of the qualitative research, which has focused in the case studies of 4 Greek Startups from the regional ecosystem. Case study is an empirical inquiry that investigates a modern phenomenon within its real-life context, especially when the boundaries

between phenomenon and context are not clear. Indeed, a case study is a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context. In this sense, the case study is not either a data collection tactic or merely a design feature alone (Stoecker, 1991) but a comprehensive research strategy.

Interviews are considered as a widely used methodology in research. They are flexible, allowing in-depth analysis from a relatively small sample size and place the focus of research on the views of participants. The interview process starts with the identification of the research questions that are generated after the study of the relevant literature review. It should be mentioned that there are different styles of interviews such as structured, semi-structured and unstructured. The present study is based on structured interviews, which are based on a fixed set of pre-determined questions that aim to collect all the necessary information for the analysis of the investigated topic. Interviews provide the ability to record personal experiences of interviewees and to give a better understanding to the researcher regarding the specific research questions that are trying to cover.

The sample of this study included four innovative startups from Greece and more specifically from the region of Thessaly. Startups were approached by telephone communication, and the researcher scheduled separate meetings with a representative or the owner of each Startup in order to conduct the interviews. From the selected startups, the oldest one is officially operating for the last 6 years. On the other hand, the largest Startup, in terms of team capacity, is employing 15 full-time employees. The main characteristic of these Startups was that young people established them and all of them are located in the same region, thus we have also considered that as a local small ecosystem. The interviews' process took place through the Zoom and Skype platforms and each of them lasted from 30 to 40 minutes. At the preparatory phase, the researcher explained the purpose of the interview, addressed the terms of confidentiality, explained the format of the interview and indicated the duration of the interview.

The researcher has categorized the questions into three pillars:

Pillar 1

-What are the potential benefits that startups enjoy within the ecosystem during a crisis against the difficulties and risks that startups outside of the ecosystem have to cope with?

- How does an entrepreneurial ecosystem provide assistance to startups in order to overcome any kind of crisis that are coping with?

Pillar 2

- How could a crisis become an opportunity for the startups of the entrepreneurial ecosystem?

- Is the current crisis (of COVID19) generates new opportunities for your startup?

Pillar 3

-Which are the expectations of startups regarding the support that they would preferably need by the ecosystem?

- Are there any good practices from entrepreneurial ecosystems of abroad that could apply in the Greek startup ecosystem?

By the use of the questions of the first pillar, the researcher aimed to gain a deeper understanding regarding the support provided by entrepreneurial ecosystems to startups in periods of crises. The questions of second pillar focused in investigating whether crises could be view as opportunities or not. Finally, the questions of the third pillar pursued to investigate how the stakeholders imagine the role of the ecosystem and what expectations they have from it in the future.

4. Findings of the research

4.1. Case Study 1: A telemedicine Startup

4.1.1 Interview with the Startup's representatives

The first case study was about a Startup, which is located in the city of Larissa, the capital, and the largest city of Thessaly region in Greece. It is operating 3 years in the field of telemedicine and it employs 15 employees. The Startup leverages technology advances and implements innovative technology solutions by delivering digital health services (eHealth), to optimize healthcare in terms

of quality, cost-effectiveness, and accessibility to all. The interview started with the 1st pillar of questions regarding benefits that a startup could enjoy within the ecosystem during a crisis, and the Operations' Manager raised the significance of the cooperation and interaction with the other startups and generally with industry stakeholders of the ecosystem. In particular, the interviewee specified the following:

“In the case of our startup, this can be clearly defined from the fact that the startups of the local ecosystem decided to use common human resources. The teams had the ability to interact with each other and many times happened that some individuals were working at the same time for different startups, having the status of shared human resources. Another example of cooperation during the pandemic crisis from the research’s community perspective is that the University General Hospital of Larissa started a cooperation with our e-health startup in order to exchange knowledge regarding surveys. Furthermore, from public sector’s view, there was also a kind of cooperation since the local regional authority gave the opportunity to our startup to discuss with them ways of cooperation, raising the opportunity to have direct dissemination to the society since when a Startup establishes cooperation with regional local authorities; this automatically creates trust with the society”. This as an outcome was the first interaction with the regional authorities and they had the chance to know better our services and to create the chances for a potential future collaboration.

Afterwards, the researcher focused on the 2nd pillar of questions that addresses the issue of whether a crisis could become an opportunity for the startups of the entrepreneurial ecosystem. The interviewee highlighted that every crisis includes many opportunities, and this occurs because the characteristic of a crisis is that reality is changing and the entrepreneurial world is trying to adapt in a new era, even if forecasts a small period or even it is a new reality that came to stay for long. Moreover, he mentioned the following:

“The startups are able to change fast, to transform their products and services and to follow the society’s needs and this is because startups are characterized by

innovation, fresh mindsets and a culture that promotes change adaptation as a tool that leads to sustainability”.

“When Greece entered pandemic crisis, the actor of government (which is within the 3ple helix methodology) has decided to change various practices and become more digital. This transaction towards digitalization of the public services boosts innovation and generates benefits for the startups of the ecosystem. For example, since the government applied the e-prescription of medicines, the reality of a sector changed since this practice gave solutions in an existed problem. This case of transformation provided a lot of benefits and advantages to the startups that operating in the telemedicine sector, such as our startup”.

Afterwards, the researcher specified whether the current crisis, the COVID-19 pandemic, have generated new opportunities for the under-investigation telemedicine startup, and the interviewee responded positively, noted that the current crisis can indeed generate many opportunities for the Startups. More specifically, he referred to the following:

“When we talk about our Startup which operates within the sector of telemedicine, the opportunities are many since the current situation is leading people to use our startup’s core service, the platform that matches patients with doctors. We realized that the people were keener to use our platform since people needed the doctors’ advice while the healthcare system was crashing and the less physical contacts you could have, the better in order to avoid potential illness due to COVID-19. Moreover, the crisis generated one more opportunity that we did not expect. Many qualified profiles that were working abroad, decided to get back to their roots and it seems that many of them have decided to explore the potential job opportunities in their country. That generated a pool of people with many skills and experiences that were able to work in the local startup ecosystem and this fact can be considered as an added value for our startups and our industry at general”.

At the final stage of the interview, the main issue of the discussion referred to expectations of Startups, particularly on those regarding the support that they would preferably need from the ecosystem. The interviewee answered:

“As a Startup, we would expect more cooperation within the ecosystem, more open-minded practices, and links between competitor companies. We believe that if we will work more closely with Startups that we have similar needs then we will achieve better results. One more thing that could be stated as expectation is that we would need more initiatives from the State, namely the government, and more support in the difficult journey for our sustainability”.

Finally yet importantly, the interviewer asked whether are any good practices from entrepreneurial ecosystems of abroad that could have application in the Greek startup ecosystem. The Operations’ Manager referred to Silicon Valley as well as to the French Startup ecosystem and he mentioned the following:

“We observe that at these startup ecosystems, stakeholders have the opportunity to come all together in the same table and discuss about their problems and their needs. Afterwards, they can decide on a common plan and generate ideas on how to overcome barriers and create a big team. Moreover, it is a fact that when a group of people is growing, this fact make the group better able to put more pressure on government in order to get the needed support. It is important to act all together when we need to find solutions that are important for our existence. However, in Greece the entrepreneurial ecosystem is not yet that mature in order to reach this level of cooperation, there are of course important attempts, but we still have way to go in order to make a big step towards this direction. Startups that are competitors are struggling to find way of cooperation between them and there is also a lack of initiative in that area”.

4.1.2 Description of the specific ecosystem

As has been stated by the interview, their Startup is cooperating with other Startups of the local ecosystem in the perspective of shard human resources. Moreover, the

aforementioned Startup has cooperation with the University General Hospital of Larissa and the regional authorities. The precise ecosystem that is consisted around this Startup can be shown in the following table:

Ecosystem's member	Helix	Kind of cooperation
Local Startups	Industry	Sharing of human resources
University General Hospital	Public	Knowledge exchange
Regional Authority	Public	Communication and visibility

Table 1

4.2. Case Study 2: A Startup on IoT food

4.2.1 Interview with the Startup's representative

The second case study was about a startup company, which is operating 2 years in the field of Internet of Things (IoT) on food. The startup is located in the city of Volos and it is consisted of 5 employees, particularly 4 engineers and 1 advisor. The main product of the Startup has already its first sales; however, it is in a beta version, not yet fully commercialized. The representative of the company explained to the researcher that the team preferred to locate the startup in a small city in order to decrease the expenses of operation. Afterwards, regarding the first group of questions, which refer to the potential benefits that a startup could enjoy within the ecosystem during a crisis, the Startup's representative mentioned the following:

“Indeed, the bigger is a city or when it is the country's capital, or it is close to the capital, the more benefits and advantages are provided to startups. It is common for startups to begin their operations in a smaller city and then they have to move

to a larger urban center in order to increase the potential opportunities of expansion. A strong startup ecosystem provides access to accelerators, incubators, as well as venture capitals. Furthermore, recently, the Greek Government launched Elevate Greece initiative. Elevate Greece is the official platform and leading resource for in-depth information on the Greek Startup Ecosystem, aspiring to help it grow and expand. It is a very important initiative as it gives many benefits and incentives to Greek Startups. Elevate Greece offers a number of actions and programs, contributes to the facilitation of startups in the sense of support for research and development, product development, and provision of financing tools, as it facilitates access to angel investors”.

Afterwards, the researcher asked whether the entrepreneurial ecosystem provides assistance to startups in order to overcome any kind of crisis that are coping with and the interviewee mentioned that it really does. More precisely, he mentioned the following:

“The truth is that our Startup received useful and significant assistance during the current crisis especially from other Startups which have reached a higher level of maturity, and they operate in a similar area on a larger scale. We got help in a sense of feedback provision on our problems, on business development, and on how to overcome possible obstacles and barriers as well as guidance based on their experience. It is important to mention that most of our bigger clients are coming from links generated within the ecosystem. Cooperation is very important for startups, especially during a crisis”.

Thereafter, the researcher proceeded to the second group of questions that addresses the issue of whether the crises can be seen as opportunities and whether the current crisis, the COVID-19 pandemic, have generated new opportunities for the under-investigation startup. Indeed, at this case, interviewee also responded positively. More specifically, he mentioned the following:

“We observed and hence we realized that COVID-19 pandemic made it easier for us to approach opportunities. For instance, working remotely and establishing communication via virtual applications and teleconference platforms have become the new normal for us. The emails’ exchange and virtual meetings

obtained reliability and trustworthiness as the whole world (especially those that have not so far) learnt to work in such way. As a result, it was easier for us to contact with stakeholders both within country and abroad. Furthermore, the crisis created more opportunities and business initiatives. For example, industries and manufacturers close to our field of operation realized the crisis generated new knowledge and gave incentives for radical changes. Many managers and teams exploited the inaction of markets and found the available time to investigate opportunities, make research on new technologies and discuss with new ventures. Above all, Startups seem to get benefited the most as by our nature we are more eager to change and more flexible to adapt to a new reality. In our case we had the opportunity to discuss with our partners regarding our product development and we received guidance which was very important in order to improve the quality of our product and examine more options about the markets that we will target”.

At the final stage of the interview, regarding the expectations of their Startup and the support that they would preferably need from the ecosystem the representative of the Startup answered the following:

“The paradox is that in Greece the tax and insurance liabilities and the fixed expenses for a Startup are similar to those of SMEs. The state should provide more incentives to startups. For a Startup, it takes a lot of research and time until will achieve its first sales. As a result, there are not incomes that could cover the high expenditures that are required for the operation of the company. I hope that the policy makers will review this soon. There are several good practices from abroad. If we will review how the Startups of foreign ecosystems are treated and protected then we will probably decide to perform changes about the tax and insurance liabilities. There is undoubtedly a big need towards this direction.

Moreover, the representative of the under-investigation startup continued with the last question by saying:

“We started within the university, and we received important support and guidance from several professors individually. They have provided to us great contribution so far. I could say that the University as an entity did not contribute to our initiative, although there was tremendous cooperation and reliability with specific professors and researchers. In my opinion, Greek universities have a key role in the development of startups, the generation of new ideas as well in the empowerment and support of young people. Therefore, it is very important to enhance their cooperation with students and graduates. At this direction, Greek universities could adopt good practices from foreign universities and colleges”.

4.2.2 Description of the specific ecosystem

According to the Startup’s representative, the ecosystem that is existing around this Startup is playing a key role for the sustainability of the Startup. More precisely, the players of this specific ecosystem are the local producers and industries that are operating in the sector of agriculture, the local University and local Startups. These entities have provided to the Startup support, mentoring, cooperation and valuable insights. The following table presents elements of this specific ecosystem:

Ecosystem’s member	Helix	Kind of cooperation
<i>Local producers and industries operating on the field of agriculture</i>	<i>Industry</i>	<i>Field research and analysis</i>
<i>University of Thessaly</i>	<i>Research</i>	<i>Continuous support from the beginning until now by the providing of mentoring</i>
<i>Local Startups</i>	<i>Industry</i>	<i>Communication and knowledge sharing</i>

Table 2

4.3. Case Study 3: A Biomedical Startup

4.3.1 Interview with the Startup's representative

The third case study was about a Biomedical Startup, which is operating the last 6 years in the city of Larissa. The startup operate by one full-time employ, however there are several external experts that periodically are employed in the company when according to its expansion plan is needed. These experts are mainly doctors or other people coming from the healthcare sector. At the first step of the interview, the researcher explained the procedure and the questions. Regarding the first group of questions, which refer to the potential benefits that a startup could enjoy within the ecosystem during a crisis, the Startup's owner mentioned the following:

“Of course, startup ecosystem encompasses a dynamic that gives to startups the opportunity to engage in collaborations, partnerships, exchange their ideas and perspectives, contribute to and develop their networking. Moreover, it is even common in bigger cities in which there are organized events, groups, and more stakeholders. More precisely, in terms of the benefits that a startup could enjoy during a crisis, it is outstanding, the fact that startups can communicate and contact easier than before, as virtual meetings, teleconferences and virtual networking events have been the new normal. This gave the chance to startups to interact each other and exchange good practices, wherever they are. During the crisis, I realized that the Startup within an ecosystem started to get closer; this is something that I have not seen before. I believe that this happened because the Startups felt that if they will support each other they would have more chances to exit the crisis and survive. In this perspective, the ecosystem played an important role this period and I would like to underline the quality of the cooperation been achieved. On our side, we had the chance several times to meet with academia representatives and local authorities' representatives in order to discuss our ideas and get feedback. Someone “outside” of the startup ecosystem probably couldn't have that kind of interaction”.

Afterwards, the interviewer asked to know how the entrepreneurial ecosystem aid to startups in order to overcome any kind of crisis. The interviewee referred to the providence of a variety of options that the ecosystem is able to support startups that are within it, either in a direct or in an indirect way. More specifically, he mentioned the following:

“The truth is that the ecosystem can facilitate the interactions among startups that belong within it, it can also organize startup events relevant to innovation and entrepreneurship. Finally, it can act as a pool of knowledge, tools and resources. In terms of the relationships with universities, research centers and institutions, I believe that this could encourage the collaborations and provide a great number of benefits, resources, and tools. In my opinion, one of the most important benefits from the ecosystems’ support to Startups, is the connections with investors and venture capitals. It is generally very crucial for a Startup to have access to funding and even more in periods of crises. I can see that the local ecosystem is operating well from this perspective. More specifically I can recognize that there is always good level and timing regarding information about funding and investors.”

In terms of the statement whether a crisis could become an opportunity for the startups of the entrepreneurial ecosystem, the interviewee highlighted that every crisis includes and provides many opportunities. More precisely, the owner mentioned the following:

“Crisis revealed that when the need arises, then innovative ideas are generating, and they are putting into practice. We saw that several new ideas, particularly in health and medicine sectors have been generated and been applied. We are realizing that within a crisis the innovators get a lot of free space to generate new services, which give new solutions, or to improve products and services that they already have. The adaptability and continues research is a tool that startups can use as an advantage in order to acquire new knowledge and provide the society with solutions earlier that bigger companies can do”.

The researcher specified whether the current crisis, the COVID-19 pandemic, have generated new opportunities for the under-investigation biomedical startup, and the interviewee responded positively. More specifically, he referred to the following:

“This period we were unable to travel abroad and communicate the product of our startup to potential investors and other stakeholders. Although, I found important free time to make modifications to my pitch presentation, by adopting a virtual and digital format to perform better online presentations, adapting to the new reality. On the other hand, I tried to have as most presence as possible on online meetings and virtual events. The most important that this crisis learnt to me is that I could adapt my promotion and marketing plan according to the needs of the current situation. More in details, we tried to imagine how our product gives solutions to problems generated by the pandemic crisis. What we did was to adapt our promotion plan in a way that is more relevant to nowadays’ needs. I can say that this is a knowledge, very significant and useful for us in order to respond better in future crises”.

At the final stage of the interview, the main issue of the discussion was about the expectations of their Startup, particularly on those regarding the support that they would preferably need from the startup ecosystem. The interviewee answered as followed:

“It is important to create more initiatives such as the Elevate Greece. It would be definitely useful and helpful to build more innovation centers, accelerators and incubators for individuals who have an idea and they have no access in equipment, resources, hardware, tools and more, or they cannot afford it. Besides, it is necessary to give more incentives to startups in order to enhance prototyping. Mentoring and coaching are playing a key role within the early stages of a Startup. Therefore, it would be significant to focus more on mentoring and guidance programmes and initiatives. I have seen that in foreign Startup ecosystems many public programmes for mentoring are taking place in order to support the journey of the Startupper. Finally, it would be great if there were an increased involvement of public or private sector within the ecosystem. Banks, insurance companies, self-employees and self-enterprises could be more involved in order to support startups with advices, knowledge, tools or probably private investments”.

4.3.2 Description of the specific ecosystem

The specific ecosystem that exists around this Startup is mainly consisting by other Startups and industry players. More specifically, the Startup had to collaborate with local industries in terms of materials that are using for the development of the final product. This cooperation has been valuable for the creation of the final product and has bring a benefit to the dissemination purposes of the Startup itself. Moreover, the Startup has linkages with the research sector, which has provided valuable support and feedback during the development of the main product as more as has provided networking activities and initiatives for funding opportunities. The following table is presenting the structure of this specific ecosystem:

Ecosystem's member	Helix	Kind of cooperation
<i>Local industries and Startups</i>	<i>Industry</i>	<i>Active cooperation, continuous support and high quality materials</i>
<i>Research institutes</i>	<i>Research</i>	<i>Feedback, networking activities, support for the finding of funding or investors</i>

Table 3

4.4. Case Study 4: A startup on Advertisement Technologies

4.4.1 Interview with the Startup's representative

The fourth case study was a startup company based in Volos. The company operates the last 4 years in the field of advertisement technologies and it is consisted of 12 employees. More precisely, the startup is a marketplace for professionals, which gives them the benefit to present their profile within the platform and links them with potential clients. Moreover, the Startup provides tools to the professionals in order to advertise them on internet and social media. The

vision of the company is to create an academy in which e-learning courses for digital marketing will be hosted. The first group of questions was realized under the framework of the support provided to startups from the entrepreneurial ecosystem in periods of crises. Consequently, the first question was relevant to the potential benefits that a startup could enjoy within the ecosystem during a crisis, and the representative mentioned that when a startup is operating within an ecosystem, then can enjoy several benefits. In particular, the interviewee specified the following:

“Collaboration with other industries, public support and networking are just few of the benefits that a startup can enjoy within an entrepreneurial ecosystem. Our startup has gained a very important collaboration within the ecosystem and that happen during this period of the pandemic crisis. More specifically, we had the chance to establish a very important collaboration with a big local industry, which is a best-selling company in the field of electrical equipment, lighting, building technology items and energy management solutions. In regards the public support, we have been benefitted from initiatives that aimed to enhance startups in order to support them for their sustainability. The state has helped the startups in regards of tax benefits within the crisis. In terms of the research sector, we have very important support from the University of Thessaly that has been very keen to support our presence in exhibitions and events with aim to support our publicity efforts”.

Afterwards, regarding the question of how the entrepreneurial ecosystem supports the startups in order to overcome any kind of crisis the representative mentioned the following:

“I do believe that operating in an ecosystem makes a Startup more likely to survive within a crisis and this is a result of the overall support that you have when you are part of a community. This community consists mainly by three main actors the industry, the government and the research sector. In our case as a Startup, we have successfully established linkages and collaborations within the Greek ecosystem. Regarding the research sector, it is supporting the startups by providing networking, collaboration, tools, and publicity. In terms of the public sector, the support comes by other ways like reducing of taxes, distribution of

funds and generation of public initiatives. Moreover, there is support in creating strategic links with potential investors. Finally, the industry is supporting by sharing knowledge and experience something that is much valuable for a small team.”

Regarding the statement whether a crisis could become an opportunity for the startups of the entrepreneurial ecosystem, the interviewee mentioned that the crises make the actors of an ecosystem to come closer and to collaborate in order to overcome the barriers. In particular, the Startup’s representative mentioned the following:

“When an ecosystem tries to survive within an economic crisis, its members feel more powerful when they know that they have support from each other. This support could be sharing of human resources between teams, something that could be useful for the sustainability of the whole community. That makes the community more collaborative and there is sharing of knowledge and tools; additionally there is networking and collaboration between the actors of the community in order to become sustainable”.

Regarding the question whether the current pandemic crisis is likely to generate opportunities for their startup or not, the representative mentioned the following:

“COVID-19 pandemic has been surely a big opportunity for numerous startups. Within the startups that were received several benefits and advantages, our startup is also included. Firstly, our core business solution rely on the digitalization of a procedure. When pandemic crisis started, the first advice of the healthcare experts was the social distancing. This fact increased the need and usefulness of our product and expanded our network of clients since it related with a need generated during the pandemic crisis. Secondly, I could say that we have achieved to make successful use of support provided by the state’s funds for the startups of the Greek ecosystem. We have also applied to be registered in Elevate Greece and we are also using employment’s subsidies in order to hire new people with the support of the government and with lower insurance and taxes costs.”

At the final stage of the interview, the main issue of the discussion referred to expectations of Startups. Consequently, the researcher tried to identify the expectations of startup regarding the support that they would preferably need by the ecosystem. Following the representative's answer.

“The startups that are operating within the Greek ecosystem would for sure need better support from the public sector. This could be translated into more initiatives for funding, better connections with potential investors and new initiatives for networking with startups and ecosystems from abroad. This would drive the whole community to achieve knowledge transfer, information and resource sharing as well as more collaborations and partnerships within it”.

In regard to the last question, that refers to the existence of any good practices from entrepreneurial ecosystems of abroad that could apply in the Greek startup ecosystem, the interviewee answered the following:

“The Greek ecosystem is making small steps during the last few years and this is very important. Of course, we have not achieved yet a high level of maturity but there are important signs that show that we are on the right path. In my opinion, if all the main actors and stakeholders of the Greek Startup ecosystem continue to work hard and think big and there is willingness and enthusiasm within the ecosystem, this could bring great results in the next few years. I believe that Greek ecosystem should make more steps forward in order improve more on collaboration aspect and to increase the benefits from the public support. Initiatives that are aiming to bring all the startups together and support them are important and, in my opinion, they should be supported by everyone”.

4.4.2 Description of the local ecosystem

According to the Startup's representative feedback, this Startup has created very strong linkages with the local ecosystem, in a level that some of the ecosystem's actor are in parallel some of the most important clients or supporters. More specifically, the Startup has established collaboration with a best-selling local industry in the field of electrical equipment, lighting, building technology items and energy management solutions. This company has been its best client so far. On the other

hand, the Startup has received support by the regional authorities in an effort to attract funds and create strategic links with potential investors. Moreover, according the representative of the Startup, they got advantage by the Research sector while the University has provided support in terms of networking, feedback, tools and publicity. The following table presents the specific ecosystem that exists around this Startup.

Ecosystem's member	Helix	Kind of cooperation
<i>Best-selling local industry in the field of electrical equipment</i>	<i>Industry</i>	<i>Active client-based collaboration</i>
<i>University of Thessaly</i>	<i>Research</i>	<i>support in terms of networking, feedback, tools and publicity</i>
<i>Regional Authorities</i>	<i>Public</i>	<i>Support in terms of funding and generation of strategic links with potential investors</i>

Table 4

5. Conclusions

In contemporary socioeconomic systems, firms are the main players and innovativeness plays a key role. More specifically, startups, as nascent innovative entrepreneurial ventures, improve players and their roles. Nowadays, it is been observed that more and more economies can be struck by social, economic, political, or other kinds of crises. Crises deriving from several situations, which often lead to negative consequences for the economy and the growth potential of a country. Taking into consideration the current health crisis of COVID-19 pandemic, the actors and stakeholders of the Greek ecosystem need to focus deeper on practices and methodologies that will

create our national plan for resilience and recovery of Startups within and after a period of crisis. Moreover, the Startups should prepare mechanisms and increase their adaptability to new circumstances when is needed to do so. Additionally, the public sector and policy makers should create mechanisms and initiatives that will drive the Greek ecosystem to a higher level of competition, which will reflect the level of other startup ecosystems worldwide. A crisis is likely to be responsible for causing a negative impact on the entrepreneurial ecosystem of a country, and hence it could have negative impact on the startups that are included in it. The purpose of the current research was to investigate the role of the entrepreneurial ecosystem in times of crisis. We have mainly focused on the COVID-19 pandemic crisis , which is considered a surprising, unpredictable phenomenon of great significance for the society and businesses.

Taking into consideration the interviews' results, there is a general common belief that the startup ecosystem counts numerous benefits, and it can enhance and support its startups. For example, the ecosystem can give access to accelerators, incubators, as well as venture capitals; it can also particularly offer access for funding opportunities. More precisely, the ecosystem encompasses a dynamic that gives to startups the opportunity to engage in collaborations, exchange their ideas and perspectives, develop and expand their networking. The startup ecosystem can facilitate the generation of innovation, the establishment of collaborations, the exchange of knowledge as well as the share of a variety of tools, material, and resources. All the interviewees focused on the collaboration and interaction as the major advantages of being part of a startup ecosystem, especially during the pandemic crisis. They all emphasized the fact of cooperation with other industries, the interaction with local authorities and the support from the research sector and the universities. In terms of whether a crisis could be consider as opportunity, all the case studies examined within this study have shown that there is optimism that a crisis can be an opportunity; we could say that this philosophy is in the DNA of Startups. This is because startups are able to change fast. They are flexible in changing procedures and adapting in new rules and norms easier and faster than other kind of entities and this is happening due to their business nature. Along the same line, startups are been forced to absorb and learn from trial and error methods in short timeframes and this is a tool that they can use in order to overcome barriers and challenges that can occur within a potential crisis. Besides that, they often have to decide between gradual or radical development, single or multi-product, short or long run focus. They can actually take risks

and support an out of the box implementation of activities that many times are likely to transform products and services according to the society's needs. According to literature, this is because startups are characterized by innovation, fresh mindsets and a culture that promotes change adaptation as a tool that leads to sustainability. Moreover, startups are consisted of qualified people, experts on advanced technologies, applications, and practices, with skills and experiences that can transform the small teams into game changers. A qualified team can bring up up-to-date knowledge, incentives for radical changes; knowledge sharing and professional behaviors. Based on these, startups are more prepared to deal with and manage crises, to convert them into opportunities, to act fast with problem solving and decision-making and finally to transform products and services according to the society's needs and preferences.

Conclusions regarding the helix of Industry

By analyzing the case studies and the interviews of these startups, we can easily understand that Startups enjoy working with industry players. This is because, the industry actors can provide to startupper valuable feedback for their product or service, they can create linkages with other players and they can be the first partner or costumer for the startup. According to our research, we observe that in the regional startup ecosystem of Thessaly the cooperation between startups and industry players exists. However, the interviewees underlined the necessity to expand and strengthen this cooperation.

Conclusions regarding the helix of Public sector

The findings show that nowadays the Greek Startups enjoy much more support and attention by the public sector than they were used to enjoy few years ago. For example, the initiative of Elevate Greece seems to attract the attention of all Startups, the tools that the state provides in order to give incentives and the public funding are just few of the benefits provided by the public sector. It is a fact that the Greek public sector makes many steps during the last few years in order to establish a strong Startup ecosystem and attract investors. Although the public sector is making many steps forward, there is still lot of work to be done towards this direction. The Greek Startup ecosystem rely a lot on the public support in order to compete the foreign ecosystems that are already in a higher level of maturity.

Conclusions regarding the helix of University/Research

The helix of University, which represents the entire research sector, tends to be the most important actor of the ecosystem according the Startupper, this is explained since most of these Startups get born within the University and make their first steps with the support provided by this sector. It seems of high importance the fact that most of Startupper referred to the support they had from

the professors as individuals. Using this impression, the policy makers should empower the role of the Universities as entities and should foresee an extended role of professors as mentors and coaches, since it seems to be a crucial and valuable part of the ecosystem.

6 Recommendations for the enhancement of the local ecosystem.

Apart the initiatives that the state is undertaking in the framework of the ecosystem's enhancement, the local authorities should develop separate initiatives, which will be targeting in the empowerment of the regional ecosystems. Under this perspective, the regional ecosystem of Thessaly should be enhanced by initiatives generated by local authorities; these activities would be targeted to the local Startup ecosystem and would be better positioned in order to respond to the needs of the local ecosystem. Every ecosystem has specific needs and characteristics and the public initiatives should be as more precise as possible in order to achieve the needed results.

For the local Startup ecosystem of Thessaly it is observed that there is a need for a organized mechanism outside of the sphere of the national tools like the Elevate Greece. A specialized programme, which will have similar elements of Elevate Greece, could be structure under the control of the regional authorities. This new programme could be more specific on the support that could provide according to the needs of the players of the regional ecosystem. The initiative would create a feeling of active support to the startupper and it could enhance the collaboration between the academia, the industry and the public sector. The potential 'Elevate Thessaly' mechanism could be also a network which could provide mentoring, coaching, access to tools and funding and networking activities to its members.

7. Implications

7.1 Theoretical Implications

The current study has contributed to the literature in several ways. One of the theoretical achievements is that provides a summary of past research work and the scattered knowledge produced in the field of startups and startup ecosystems, particularly during a crisis. The study also provides concrete knowledge relevant to the potential benefits that startups enjoy within an ecosystem during a crisis and the support is given to startups in order to overcome any kind of crisis that are coping with. Moreover, this study investigates the potential opportunities that a crisis could generate for startups, with a special focus on the current crisis of COVID19 pandemic.

Finally, it gives insights regarding the expectations of startups about the support that they would preferably need from the ecosystem. This study has also contributed to literature and shed light to the triple helix model, extending the knowledge upon this framework combining it with the current pandemic crisis. More specifically, this study has contributed as follows:

The Government's helix:

The helix of government that represents the public sector as a part of the ecosystem has the chance to realize the problems and chances that are occurring by the findings of this study. The public sector will also realize the need for the generation of new initiatives that will support further and more targeted the Greek Startups in order to survive and expand.

The Industry's helix:

The Industry sector got a valuable feedback regarding the importance of collaboration as a tool that will boost the ecosystem's growth. The community that represents the Industry plays an important role as a crucial part of the ecosystem since is the actor that can provide valuable feedback to startups because of its experience. Moreover, most of Startups establish crucial collaborations with Industry's players in order to secure their sustainability. Thus, it is important to enhance the collaboration between the actors by emphasizing the role of the local ecosystems within this procedure.

The University's helix:

The helix of University represents all the spectrum of research sector. On this side the findings of this study could be of high added value since the performance and interaction of research sector and startups is already existing in a high level and with improves in key points could be more empowered and efficient. The positive perception that is resulting by the findings relies on the fact that the Startupper have enjoyed much support by the research sector from the individual's perspective (professors, researchers, coaches, etc) when on the other side it was said that from the University as an entity to the Startupper don't feel that they were supported enough. That leads to a conclusion that Startups expect more structured initiatives organized by the Universities, which should be more in line to the Startups' needs.

Finally, this study is the first to introduce crisis as an opportunity in the Greek context of Startup ecosystems.

7.2 Practical Implications

In this study, the results generated and analyzed through the investigation of case studies by the use of interviews, practices that are considered as appropriate for policymaking. Within this study achieved the generation of a description of good examples and practices of the Greek startup ecosystem. Additionally, this study map the attitude, hopes and expectations of Startups that have dealt with crisis and have achieved to survive and become sustainable within it. Each case study has revealed the necessity of an efficient innovative ecosystem driven by the participation of all actors of 3ple Helix pillars. More precisely, the study's findings have indicated that when a Startup is part of an ecosystem this can be advantage for the company and can have tangible and intangible benefits.

The findings do also emphasize as the importance of collaboration within the ecosystem even among the startups or even between the startups with other industries and stakeholders. Moreover, there is a valuable exchange of information, resources, and solid knowledge, which leads to the generation of new services and/ or products that are in some cases considered as emerging for the society. According to the findings, networking was another dimension been remarked as essential for the expansion of the startups and Startup ecosystem as a whole. Apart that, the current study highlighted the significance of triple helix model and its application in the case of a Startup ecosystem.. Furthermore, this study showed that a crisis could become an opportunity for the startups within the entrepreneurial ecosystem, highlighting that a strong ecosystem is able to enhance and support startups' resilience through challenging times faced by COVID-19. Finally, this study enabled a better understanding about how pandemic affects startups and entrepreneurial ecosystems and examined their ability to remain sustainable even between periods with multiple pressures.

7.3 Research Limitations and suggestions for further research

As every kind of study has limitations, the current study has also several limitations, which occur both from the perspective of the selected methodology but also from researcher's perspective. More specifically, in regards to methodology, the sample of 4 startups was small and that gives the opportunity to future studies to expand the use of case studies in a bigger sample of Startups. It has also limitations because the data collected only through interviews, accordingly in a future study, a combination of qualitative and quantitative research could be used. This will lead future studies to collect a wider set of data based on data collection through questionnaires. Another limitation is generating by the fact that the interviews focused only to representatives of top management positions and this is not giving the opportunity to identify the thoughts and perspectives of other team members of a team. On the other hand, from the researcher's perspective, there was limitations due to COVID19 measures which didn't allow to meet in face the representatives and discuss with the in a more informal way regarding their perspectives and expectations, thus all the interviews were realized online with the use of online tools. This fact made the structure of the interviews stricter in regards of time and limited the potential of a wider discussion. Moreover, the sample included startups from telemedicine sector, IOT sector, biomedical sector and Advertising technologies sector. Their common characteristic was that they were all operating in the regional ecosystem of region of Thessaly. However, a sectoral study of Startups operating exactly on the same field would be much valuable and should be also considered for future researches. Finally, this study has examined only the perspectives of startups and potentially a holistic investigation among different stakeholders of a startup ecosystem would present findings that are more precise. Such as, the benefits of the other stakeholders, the problems the ecosystem faces and the expectations of every actor representing different helixes according to the 3ple helix methodology that have been used within this study.

8. References

Alvedalen, J. and Boschma, R. (2017) A critical review of entrepreneurial ecosystems research: towards a future research agenda, *European Planning Studies*, 25: 887–903

- Archibald, T. W., & Possani, E. (2019). Investment and operational decisions for start-up companies: A game theory and Markov decision process approach. *Annals of Operations Research*, 299(1-2), 317-330. doi:10.1007/s10479-019-03426-5
- Bygrave, W.D., & Hofer, C.W. (1991). Theorizing about entrepreneurship. *Entrepreneurship Theory & Practice*, 16(2), 13–21
- Cavallo, A., Ghezzi, A., Balocco, R., (2019). Entrepreneurial ecosystem research: present debates and future directions. *Int. Enterpren. Manag. J.* 15 (4), 1291–1321.
- Cervantes, P., Nardi, (2012) B. Building a Mexican startup culture over the weekends, Proc. 4th Int. Conf. Intercult. Collab. 11-20. doi:10.1145/2160881.2160884.
- Chesbrough, H. (2003). *Open Innovation: The new Imperative for Creating and Profiting From Technology*. Boston: Harvard Business School Press IN Rocha, C. F.
- Mamédio, D. F., & Quandt, C. O. (2019). Startups and the innovation ecosystem in industry 4.0. *Technology Analysis & Strategic Management*, 31(12), 1474-1487. doi:10.1080/09537325.2019.1628938
- Colombo, M. G., & Piva, E. (2008). Strengths and weaknesses of academic startups: A conceptual model. *IEEE Transactions on Engineering Management*, 55(1), 37-49. doi:10.1109/tem.2007.912807
- Cukier, D., Kon, F., & Lyons, T. S. (2016). Software startup ecosystems evolution: The new york city case study. *2016 International Conference on Engineering, Technology and Innovation/IEEE International Technology Management Conference (ICE/ITMC)*. doi:10.1109/ice/itmc39735.2016.9026150
- Basu, P. & Nair, S.K. (2015) “Analyzing operational risk-reward trade-offs for start ups” *European Journal of Operational Research*, Vol. 247, pp. 596-609.
- Blank, S.; Dorf, B. (2012) *The Startup Owner’s Manual: The Step-By-Step Guide for Building a Great Company*; K&S Ranch: Hoboken, NJ, USA,

- Passaro, R., Quinto, I., Rippa, P., & Thomas, A. (2020). Evolution of collaborative NETWORKS supporting Startup Sustainability: Evidences from DIGITAL FIRMS. *Sustainability*, 12(22), 9437. doi:10.3390/su12229437
- Clarysse, B., & Bruneel, J. (2007). Nurturing and growing innovative start-ups: The role of policy as integrator. *R&D Management*, 37(2), 139-149. doi:10.1111/j.1467-9310.2007.00463.x
- Clarysse, B., Wright, M., Bruneel, J., & Mahajan, A. (2014). Creating Value in Ecosystems. ERC Enterprise Research Centre, 22(August), 1164–1176. <https://doi.org/http://dx.doi.org/10.1016/j.respol.2014.04.014>
- Condom-Vilà, P. (2020). How technology evolution and disruption are defining the world's entrepreneurial ecosystems: The case of Barcelona's startup ecosystem. *Journal of Evolutionary Studies in Business*, 5(1), 14-51. doi:10.1344/jesb2020.1.j067
- Crowne M (2002) Why software product startups fail and what to do about it. In: Engineering Management Conference. IEEE, Cambridge, pp 338–343
- Davila, A., Foster, G., & Gupta, M. (2003). Venture capital financing and the growth of startup firms. *Journal of Business Venturing*, 18(6), 689-708. doi:10.1016/s0883-9026(02)00127-1
- Davidsson, P.; Honig, B. (2003) The role of social and human capital among nascent entrepreneurs. *J. Bus. Ventur.* 18, 301–331.
- Dawson, C., & Henley, A. (2012). “Push” versus “pull” entrepreneurship: An ambiguous distinction? *International Journal of Entrepreneurial Behavior & Research*, 18(6), 697–719.
- Doern, R., Williams, N., & Vorley, T. (2018). Special issue on entrepreneurship and crises: Business as usual? An introduction and review of the literature. *Entrepreneurship & Regional Development*, 31(5-6), 400-412. doi:10.1080/08985626.2018.1541590
- Duening, T.N., Hisrich, R.A. and Lechter, M.A. (2014), *Technology Entrepreneurship: Taking Innovation to the Marketplace*, Elsevier Science.

- Etzkowitz, H. (2008). *The triple helix: University-industry-government. Innovation in action*. New York: Routledge. <https://doi.org/10.4324/9781315620183>
- Giardino, C., Unterkalmsteiner, M., Paternoster, N., Gorschek, T., & Abrahamsson, P. (2014). What do we know about software development in startups? *IEEE Software*, 31(5), 28-32. doi:10.1109/ms.2014.129
- Grewal, R., & Tansuhaj, P. (2001). Building organizational capabilities for managing the economic crisis: The role of market orientation and strategic flexibility. *Journal of Marketing*, 65(2), 67–80.
- Gurel, B. & Sari, I.U. (2015). Strategic Planning for Sustainability in a StartUp Company: A Case Study on Human Resources Consulting Firm, *European Journal of sustainable Development*, vol. 4, no 2, pp.313- 322.
- Hormiga, E. Xiao, L., & Smallbone, D. (2018). Entrepreneurial Dynamics and Institutional Changes. Volume 3, Number 1, 1-16, doi:10.1344/jesb2018.1.j035 doi.org/10.1344/JESB201x.x.j0xx
- Humala, I.A. (2015), “Leadership toward creativity in virtual work in a start-up context”, *Journal of Workplace Learning*, Vol. 27 No. 6, pp. 426-441, doi:10.1108/JWL-08-2014-0059.
- Ives, A. R., and Stephen R Carpenter. Stability and diversity of ecosystems. *science*, 317(5834):58–62, 2007.
- Jahanmir, S.F. (2016), “Paradoxes or trade-offs of entrepreneurship: exploratory insights from the Cambridge eco-system”, *Journal of Business Research*, Vol. 69 No. 11, pp. 5101-5105, available at: <http://dx.doi.org/10.1016/j.jbusres.2016.04.087>.
- Krajcik, V., and Formanek, I. (2015). Regional startup ecosystem. *European Business & Management*, 1(2):14–18, 2015.
- Kao, R. W. (1993). Defining entrepreneurship: Past, present and? *Creativity and Innovation Management*, 2(1), 69-70. doi:10.1111/j.1467-8691.1993.tb00073.x

- Kask, J., & Linton, G. (2013). Business mating: When start-ups get it right. *Journal of Small Business & Entrepreneurship*, 26(5), 511-536. doi:10.1080/08276331.2013.876765
- Kim, Y., W. Kim, and T. Yang (2012). “The Effect of the Triple Helix System and Habitat on Regional Entrepreneurship: Empirical Evidence from the US,” *Research Policy* 41(1), 154–166
- Koput, K. (1997), “A chaotic model of innovative search: some answers, many questions”, *Organization Science*, Vol. 8 No. 5, pp. 528-542.
- Kuckertz, Andreas, Leif Br€andle, Anja Gaudig, Sebastian Hinderer, Carlos Arturo Morales Reyes, Alicia Prochotta, Kathrin M. Steinbrink, and Elisabeth S. C. Berger. (2020). “Startups in Times of Crisis—a Rapid Response to the COVID-19 Pandemic.” *Journal of Business Venturing Insights* 13: e00169
- Leydesdorff, L., & Meyer, M. (2003). The Triple Helix of university-industry-government relations. *Scientometrics*, 58(2), 191–203. <https://doi.org/10.1023/A:1026276308287>
- Lipińska, A. (2018). Areas and Forms of Operation of Academic Business Incubators alongside Startup Organizations. *Przedsiębiorczość i Zarządzanie*, 19(9.3), 423-440.
- Long, W. (1983). The meaning of entrepreneurship. *American Journal of Small Business*, 8(2), 47-59. doi:10.1177/104225878300800209
- Mäkinen, S., Dedehayir, O., (2012). Business Ecosystem Evolution and Strategic Considerations: A Literature Review. *Proceedings of the 18th International Conference on Engineering, Technology and Innovation 2012, ICE*.
- Maritz, A., A. Perenyi, G. de Waal, and C. Buck. (2020). “Entrepreneurship as the Unsung Hero during the Current COVID-19 Economic Crisis: Australian Perspectives.” *Sustainability* 12 (11): 4612.
- Marmer, M.; Herrmann, B.L.; Dogrultan, E.; Berman, R.; Eesley, C.; Blank, S.(2011) Startup genome report extra: Premature scaling. *Startup Genome* 2011, 10, 1–56.
- Motoyama, Y., & Watkins, K. K. (2014). Examining the connections within the startup ecosystem: A case study of st. louis. *SSRN Electronic Journal*. doi:10.2139/ssrn.2498226

Ojaghi, H., Mohammadi, M., & Yazdani, H. R. (2019). A synthesized framework for the formation of startups' innovation ecosystem. *Journal of Science and Technology Policy Management*, 10(5), 1063-1097. doi:10.1108/jstpm-07-2018-0071

Pangarkar, N., & Wu, J. (2012). Industry globalization and the performance of emerging market firms: Evidence from China. *International Business Review*, 21(2), 196-209. doi:10.1016/j.ibusrev.2011.01.009

Passaro, R., Quinto, I. and Thomas, A. (2017), "Start-up competitions as learning environment to foster the entrepreneurial process", *International Journal of Entrepreneurial Behavior and Research*, Vol. 23 No. 3, pp. 426-445, doi: 10.1108/ijebr-01-2016-0007.

Presutti, M., Boari, C. and Majocchi, A. (2011), "The importance of proximity for the start-ups' knowledge acquisition and exploitation", *Journal of Small Business Management*, Vol. 49 No. 3, pp. 361-389, doi: 10.1111/j.1540-627X.2011.00331.x.

Rocha, C. F., Mamédo, D. F., & Quandt, C. O. (2019). Startups and the innovation ecosystem in industry 4.0. *Technology Analysis & Strategic Management*, 31(12), 1474-1487. doi:10.1080/09537325.2019.1628938

Salamzadeh, A., Farsi, J. Y., Motavaseli, M., Markovic, M. R., & Kesim, H. K. (2015). Institutional factors affecting the transformation of entrepreneurial universities. *International Journal of Business and Globalisation*, 14(3), 271-291.

Salamzadeh, A., & Kawamorita Kesim, H. (2015). Startup companies: Life cycle and challenges. *SSRN Electronic Journal*. doi:10.2139/ssrn.2628861

Stubner, S., T. Wulf, H. Hungenberg, (2007) "Management Support and the Performance of Entrepreneurial Start-Ups – An Empirical Analysis Of Newly Founded Companies in Germany", *Management Support*, vol. 59, pp. 138-159,

Schumpeter, Joseph A. 1912. *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge: Harvard University Press (1934) IN

Godin, B. (2008). In the shadow OF SCHUMPETER: W. Rupert maclaurin and the study of technological innovation. *Minerva*, 46(3), 343-360. doi:10.1007/s11024-008-9100-4

Tripathi, N., Pertti Seppanen, Ganesh Boominathan, Markku Oivo, Kari Liukkunen, (2019) Insights into Startup Ecosystems through Exploration of Multi-vocal Literature, Information and Software Technology, doi: <https://doi.org/10.1016/j.infsof.2018.08.005>

Van de Ven, A.H. (1986), "Central problems in the management of innovation", Management Science, Vol. 32 No. 5, pp. 590-607.

Wang, Y. L., Ellinger, A. D., & Jim Wu, Y. -C. (2013). Entrepreneurial opportunity recognition: An empirical study of R&D personnel. Management Decision, 51(2), 248–266.

WEF. (2013). Entrepreneurial Ecosystems around the Globe and Company Growth Dynamics. Report Summary for the Annual Meeting of the New Champions. World Economic Forum. September.

WEF. (2014). Entrepreneurial Ecosystems around the Globe and Early-Stage Company Growth Dynamics. World Economic Forum. January.