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**COMPARISON OF AWARDED UNIVERSITY BUSINESS
INCUBATORS: ITALY AND TURKEY**

RELATORE:

CH.MO PROF.SSA SILVIA RITA SEDITA

LAUREANDA: ILGIN OZYURT

MATRICOLA N. 1150791

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The present work is original and has not already been submitted, in whole or in part, for the achievement of an academic qualification in other Italian or foreign universities. The candidate declares that all the materials used during the preparation of the thesis have been indicated in the text and in the section "Bibliographical references" and that any textual quotations are identifiable through the explicit reference to the original publication.

Signature of the Student

I want to thank my father for everything he made real for me.
I wouldn't be here without him.
I hope he is watching me.

ABSTRACT

Based on the diffusion and the effects of university business incubators this thesis work examining university business incubators based on their networking activities in respect to different geographical scopes and intentions of the networking. A large and growing body of literature has investigated on networking activities of university business incubators and outputs of networked incubators. Networking is one of the main competitive advantages of all models of business incubators and also it has a huge impact on the development of the entrepreneurial environment. However, to the author's best knowledge, very few publications can be found available in the literature that addresses the issue of the geographical scope of networking how it differentiates its' development structure. Due to this reason, the objective of this thesis is aiming to analysis the networking activities in different geographical scopes; local, national and international and how do they structure in two different countries. Sample university business incubators are from two different countries, one from 'developed country' and one from 'developing country' to illustrate the main partners of both incubators according to their geographical scopes, how do they create those partnerships, what are the main activities that they realize together, is there any intermediate third parties and government policies behind of it. What kind of activities are conducting in both university business incubators in order to become more international and finally in respect to their networking activities what kind of industrial partners both UBIs have and how do they create those relationships.

This study has determined the relationship between all the partners of a university business incubator and incubator itself. In consideration of previous academic studies about the topic and contributions of this thesis work, now we can gain a better understanding of cause-effect relation of partnership choices and activities in diversified geographical scopes of a university business incubator.

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INTRODUCTION

University Business Incubator is widely considered to be one of the most important models of Business Incubators. Main reasons for this esteem are not only because of the priority of universities being non-profit but contributing world knowledge, public interest and research & development and also according to some researchers; university incubators, in particular, provide important access to university resources (e.g., knowledge, talent, and equipment) that help promote the growth of member firms (Link and Scott 2005, Löffsten and Lindelöf 2005; Mian 2011).

Universities not only create the link between knowledge and economic knowledge (Braunerhjelm, Acs, Audretsch, Carlsson, 2010; Qian and Acs, 2013) but also create a link with industry. As the concept “Triple Elix” mentioned by Etzkowitz and Leyderdoff, universities are, considered the engine of economic development (Etzkowitz and Leyderdoff, 1995) and represents one of the three components together with industry and government. On the other hand, McAdam and Marlow (2008) note university incubators typically pursue three main objectives: technology transfer, promotion of entrepreneurship, and commercialization of research. Secondary objectives include nurturing entrepreneurial spirit, civic responsibility, image, and financial backing. That we will mention in this work.

In this comprehensive topic of research, we investigated the evolution of the topic, interconnections among the authors and the publications, most important manuscripts about the subject and most frequently used keywords by using systematic literature review of R bibliometrix package in Chapter I and Chapter II.

Based on the systematic literature review results, we discovered that networking activities of university business incubators have to get the attraction of many researchers. This topic plays a vital role in due to its’ scope of impact and influence of diffusion. In the literature, several theories have been proposed to explain the effect of networking as an example of Brüderl and Preisendörfer’s (1998) analysis of business founder networks in Munich, Germany confirmed a ‘network success hypothesis’ that firms with entrepreneurs who have ‘broad and diverse social network[s]’ have stronger survival and growth rates. New firms with greater access to network capital are better able to innovate and acquire knowledge through securing resources that enable them to develop and succeed (Aldrich and Zimmer 1986, 1987; Hoang and Antoncic 2003; Huggins and Thompson 2015; Tello et al. 2012) In respect to all those previous studies has been investigated about the topic we have chosen the focal point of the research on different

geographical scopes of networking activities.

In our thesis, we are elaborating two university business incubators according to their networking activities in different geographical scopes. To introduce these two university business incubations, we would like to mention them briefly.

First university business incubator that we will refer in our study is ‘PoliHub’ from Milan, Italy. Innovation district & Startup Accelerator of Politecnico di Milano University and managing by Fondazione Politecnico di Milano. In the year 2017, PoliHub is quantified by UBI GLOBAL world ranking report as the third world top business incubator which is managed by the university.

Further, second university business incubator is ‘ITU¹ Cekirdek’ from Istanbul, Turkey. Early stage incubator within ITU ARI Teknokent, Istanbul Technical University’s technology development zone. ITU Cekirdek is also quantified by UBI GLOBAL world ranking report as the third world top business incubator which is affiliated by the university.

The business incubator which is managing by the university is directly operated by one or more universities as a definition. On the other hand, a business incubator which is affiliated by the university is not directly operated by but is formally affiliated with one or more partner universities. This is the main difference of management of this two award-winner incubators.

Both two incubators, which are the subject of this thesis, provide a supportive environment to the tenants where they can explore, evaluate and exploit ideas and at the end they transform into economic entrepreneurial initiatives. Moreover, both university business incubators involved in partnerships, networks and other relationships to generate an umbrella for interaction, collaboration and co-operation that will be going to examine.

Despite these similarities which are providing by those two universities there is still a huge gap between Italy and Turkey in terms of their place in the world according to their innovation & entrepreneurial activities. To understand the essentials of this discrepancy, we will focus on main partners of both incubators according to their geographical scopes, how do they create those partnerships, what are the main activities that they realize together, is there any intermediate third parties and government policies behind of it. What kind of activities are conducting in both university business incubators in order to become more international and

¹ ITU stands for Istanbul Technical University

finally in respect to their networking activities what kind of industrial partners both UBIs have and how do they create those relationships.

In addition to the above-discussed, since government policies play an important role in the subject of University Incubators, we also illustrate how government policies are differentiating to create linkage between Universities and Industry and favor to their networking activities. How constructive the European Union to create an international network and what is the challenges for Turkey to reach those networks. How do both countries proceed with their entrepreneurial activities in the international area and what kind of support do they get from the third parties. Is Turkey able to attract foreign investment, how do they achieve to get foreign investment and what kind of difficulties do Italy have to find foreign investors.

Chapter three of our work comprises the analysis, presentation and interpretation of the findings of two university business incubators that we mentioned above. At the end of this thesis, we will be able to understand the similarities and differences of both countries in terms of networking of university business incubators and the role of the third parties and finally, impacts of partnership activities on business incubators. The analysis and interpretation of data are carried out in two phases. The first part, which is based on the results of the questionnaire, that we conducted via Skype interviews. The second part, which is based on the comparison of the results of the interviews is interpreted.

The conclusion and future implications are reported at the end of the thesis.

The remainder of the paper is organized as into three chapters:

Chapter I and II outlines respectively the systematic literature review of ‘Business Incubators’ and ‘University Business Incubators’, Chapter III is the implementation of the case study. Finally, conclusion and future implications are presented in the last part of the thesis.

CHAPTER 1

SYSTEMATIC LITERATURE REVIEW OF BUSINESS INCUBATION

1.1 Introduction to Bibliometrics

One of the earliest definition of bibliometrics describes it as “the application of statistical and mathematical methods to books and other media of communication” (Pritchard 1969). The European Commission on Research and Innovation has defined bibliometrics as “a statistical or mathematical method for counting the number of academic publications, citations and authorship”. Today, bibliometrics is often used to assess scientific research through quantitative studies on research publications. Bibliometric analyses are based on the assumption that most scientific discoveries and research results eventually are published in international scientific journals where they can be read and cited by other researchers. Evaluative bibliometrics – “quantitative measurements of qualitative aspects (such as ‘quality’ or ‘reputation’) of the science system” (van Leeuwen, 2004) – is based on the assumption that the number of citations to a journal article can be considered to reflect the article’s impact on the scientific community².

Nowadays the scientific research and evaluation of the results has become enormous and more complicated. A need of sufficient tools for understanding trends and manage data powerfully quantitative research methods has been developed. Quantitative research methods are research methods dealing with numbers and anything that is measurable in a systematic way of investigation of phenomena and their relationships. It is used to answer questions on relationships within measurable variables with an intention to explain, predict and control phenomena (Leedy 1993). Generally, statistical procedures are quantitative data approaches. Differently from the conventional literature reviews, quantitative literature research brings more reliable, quantifiable and reproducible results by comparing, measuring and analyzing the entries.

Quantitative evaluation of publication and citation data is now used in almost all scientific fields to evaluate growth, maturity, leading authors, conceptual and intellectual maps, trends of a

² Rehn C., Gornitzki C., Larsson A., Bibliometric Handbook for Karolinska Institutet, University Library Bibliometric Team, 2014

scientific community.³ It is mapping the all literature from past to present in order to correspond research performance evaluation.

Bibliometrics could use for different aspects of review of the literature. It could represent the obsolescence, historical growth of the data, figuration of the topic in wider aspects or utilization of data.

1.2. What is Bibliometrix in R?

“Bibliometrix” is a package of R software which provides a set of tools for quantitative research in bibliometrics and scientometrics. In order to receive greater objectivity and accuracy of the results, R software is imposed on this works’ quantitative literature review in order to achieve science mapping in this field. R is a free, open source software which is useful for data cleaning, data analysis and visualization. R performs a wide variety of basic to advanced statistical and graphical techniques and R has more than 4800 packages. The R language is widely used among statisticians and data miners for developing statistical software and data analysis.

In the flow of “Bibliometrix” package of R software usage; the data were imported and converted to R format and then bibliometric analysis of a publication dataset has proceeded and in the end matrices for most commonly studied types of bibliometric networks for example: co-citation, bibliographic coupling, co-authorship and co-word analysis have been revealed. Many different methods for analyzing and visualizing bibliometric networks have been studied by bibliometricians (e.g., Börner, Chen, & Boyack, 2003; Milojević, 2014; Van Eck & Waltman, 2014; Zhao & Strotmann, 2015). Consequently, visualization has become a powerful approach, the results of this bibliometric research also substantiated by networks, charts, and perceptual maps. In this way, the more robust literature review can be elucidated.

1.3. The Dataset

The Web of Science (WoS), maintained by Thomson Reuters, is considered one of the main bibliographic sources of information.

Dataset is the most crucial component of this research. Our dataset has been assessed carefully, filtered according to our criteria and attentively refined from noisy data.

³ Aria M., Cuccurullo C., A brief introduction to bibliometrix, <https://cran.r-project.org/web/packages/bibliometrix/vignettes/bibliometrix-vignette.html>, (21.04.2018)

We accomplished our research through the index of Clarivate Analytics Web of Science (WoS) database which is owned by Clarivate Analytics. Bibliographic data is obtained by querying the ISI WoK database by diverse fields, such as topic, author, journal, timespan. Our processed data from WoS database, with using the keyword of “BUSINESS INCUB*” which is a comprehensive search for the terms which have stem root of “incub” in the core collection of SCI-EXPANDED (Science Citation Index Expanded) and SSCI (Social Sciences Citation Index) from 1985 to present. Our database consists of 320 documents from 113 different sources like journals, books, etc. The total number of keywords which are used by the authors are 874, and the keywords which are used by the website database is 668.

1.4. The results

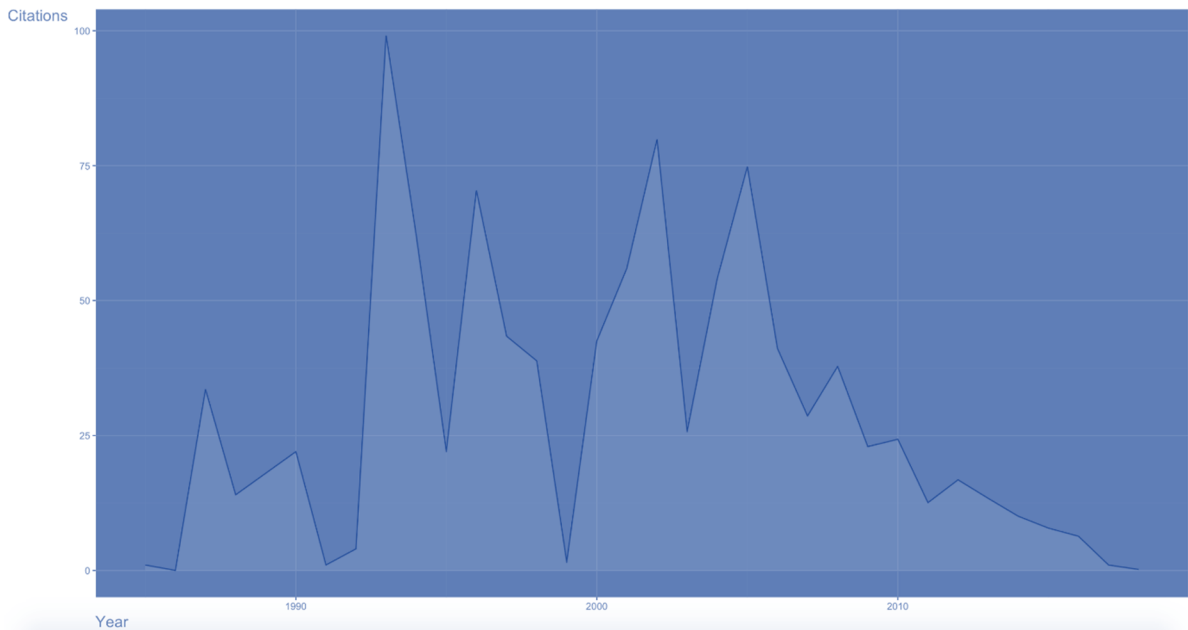
1.4.1. Main Information

In this part, we will present the results of our examination on the data from WoS for our chosen database ‘Business Incub*’. According to our research criteria, possible outcomes are: all the publishing which are enclose the terms as ‘business incubator’, ‘business incubation’ and ‘business incubate’. The purpose of this chapter is to review all the literature of ‘Business Incub*’ of WoS database and trace the historical development of the topic, understand the publication trends over the years, influential articles and their research subjects.

Our results on bibliometrix showed that, worked on database has 320 documents from 113 different sources which correspond to 655 authors and 744 author appearances. The database covers more than 30-year period. Average citations per documents is 21.47. Many publications are internationally co-authored and result from collaborative efforts involving more than one country. We have 61 documents which have a single author and 594 documents have a multi-author. Mean of the documents per author is 0.489 on the other hand authors per document is 2.05. Consequently, authors are more collaborating than publishing individually. As a matter of fact, co-authors per documents index is 2.33 and collaboration index is 2.45.

Based upon this brief information about the dataset we will start to center upon all the topics by one by with the help of Figures and Tables.

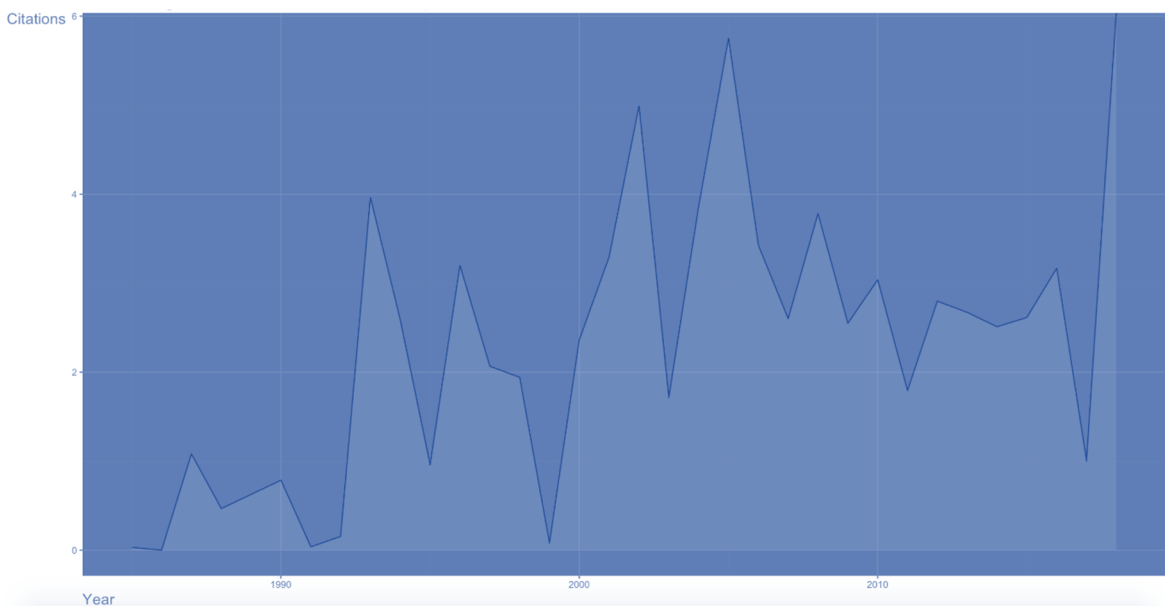
Figure 1: Average Total Citations per year



Source: Author's Elaboration from Bibliometrix

Figure 1 represents average total citations per year from 1985 to present. A huge jump at the beginning of the 90s up to 100 citations per year which followed by two peaks after 2000s around 75 citations per year. From 2010 citations per year started to decrease until today. We can explain 23 articles in the year 2018 by cause of year has not yet been completed on the day that we made the analysis (June,2018). Average Total Citation per year is the total number of citation divided by number of years of the articles was published.

Figure 2: Average Article Citations per year

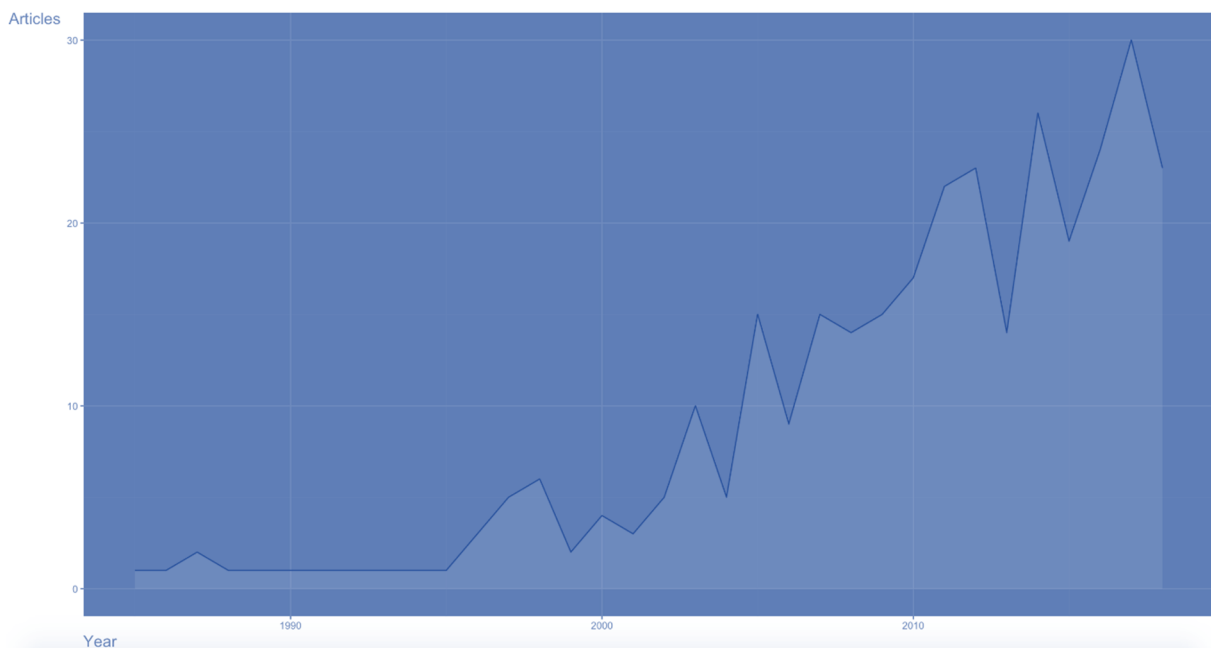


Source: Author's Elaboration from Bibliometrix

Figure 2 shows trends of an average article citations per year from 1985 to present in respect of our dataset constricts.

Unlike Figure 1, average article citations per year after 2010 have not been decreased, but it has been climbing up to the present. More fluctuation is seen in Figure 2. It has reached the highest point in the 2000s. If we compare Figure 1 and Figure 2 we can see that, the graph of the total citations per year does not reflect the article citations per year. Average article citations are more than average total citations according to our bibliometric analysis.

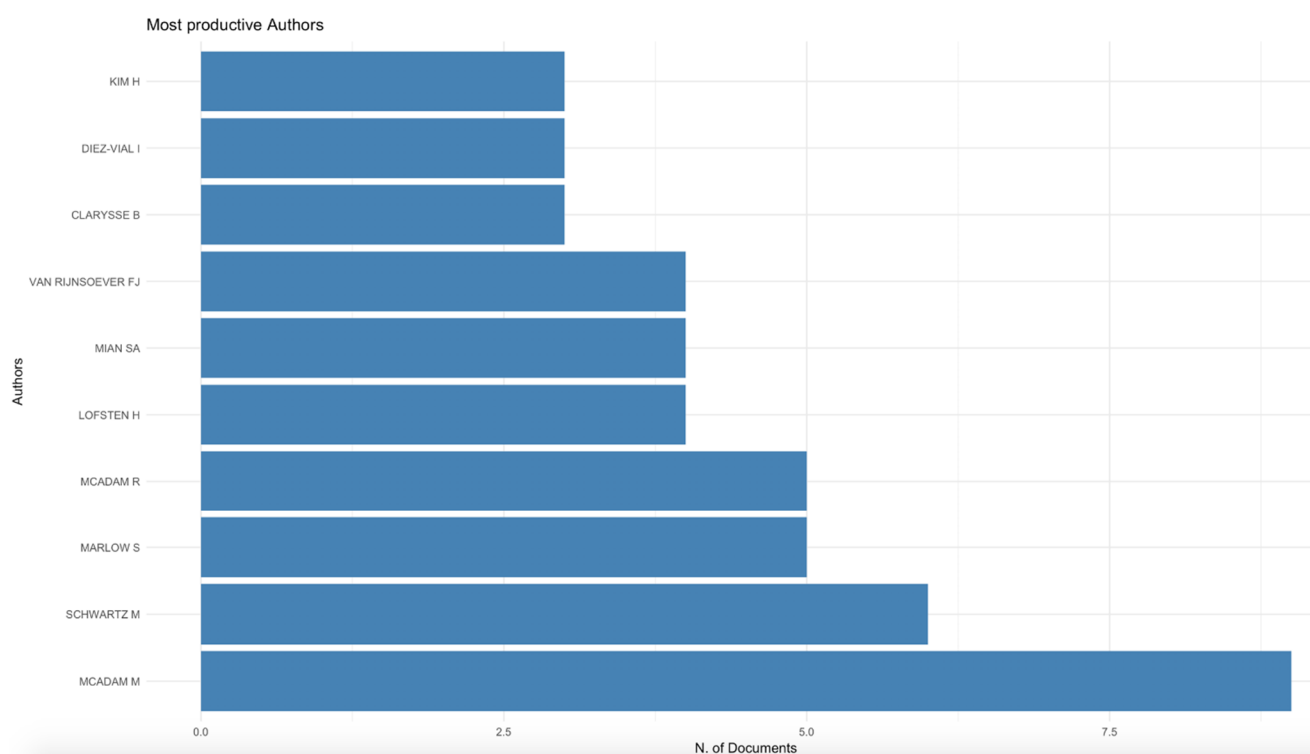
Figure 3: Annual Scientific Production



Source: **Author's Elaboration from Bibliometrix**

If we consider the annual scientific production of the articles, we can observe that until 1995 productivity is at a negligible level. Between the years 1996 and 2002, a slight increase has been started but the level of productivity rockets after 2003. From 2003 on, acceleration progresses until the present year of 2018 with 23 articles. The most productive year is 2017 with 30 articles. We can explain 23 articles in the year 2018 by cause of year has not yet been completed. Furthermore, annual scientific production has an annual growth rate of %10.29.

Figure 4: Most Productive Authors



Source: **Author's Elaboration from Bibliometrix**

Table 1: Most Productive Authors

<u>Authors</u>	<u>Articles</u>
1 MCADAM M	9
2 SCHWARTZ M	6
3 MARLOW S	5
4 MCADAM R	5
5 LOFSTEN H	4
6 MIAN SA	4
7 VAN RIJNSOEVER FJ	4
8 CLARYSSE B	3
9 DIEZ-VIAL I	3
10 KIM H	3

Source: **Author's Elaboration from Bibliometrix**

Results of the most productive authors are shown in Figure 4 and Table 1. Mcadam Maura is the most prolific author with 9 articles followed by Schwartz Michael, Marlow Susan, Mcadam Rodney and the others.

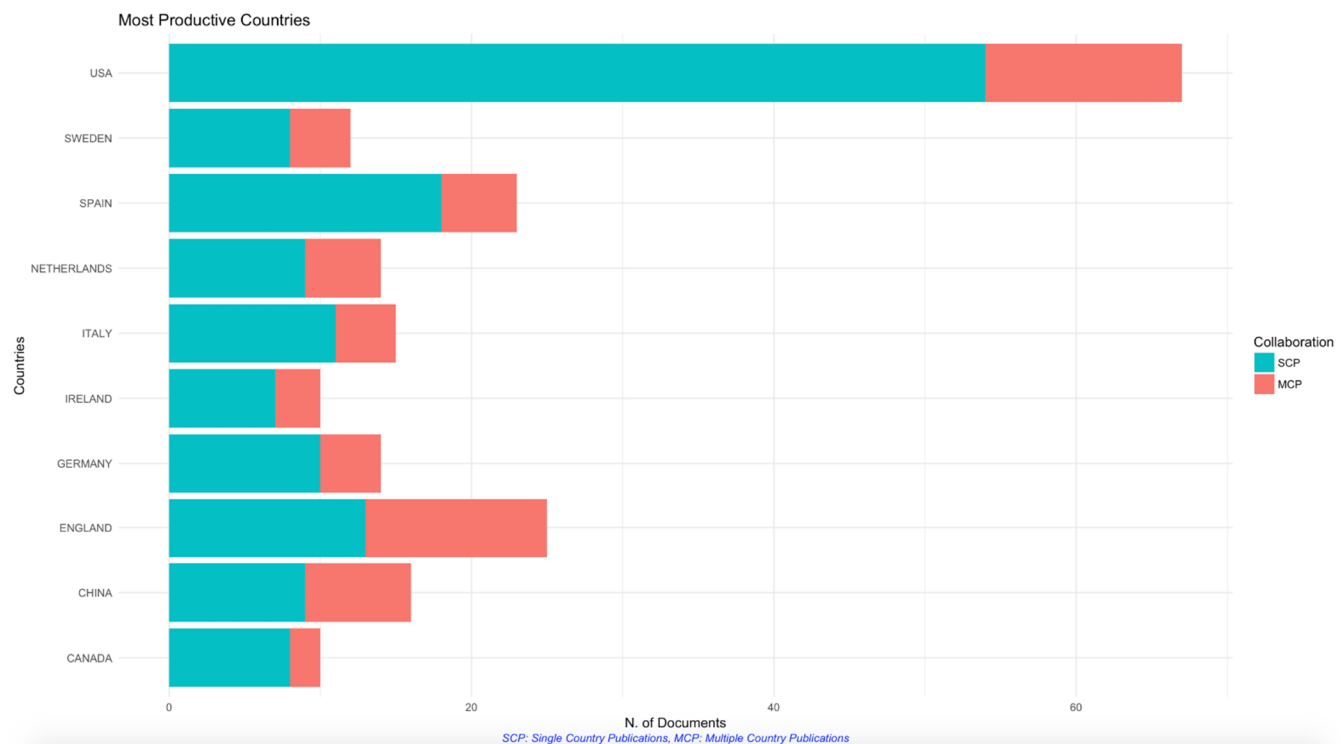
Mcadam Maura, top-productive author of our dataset, mainly work on woman entrepreneurship, technology entrepreneurship and family businesses, she is a professor of ‘Dublin City University’.

Schwartz Michael was associated with ‘Leibniz-Institut für Wirtschaftsforschung’ Halle, Germany until 2012. His articles were mostly case studies from Germany incubators. Now he is working ‘KfW Bankengruppe’ in Frankfurt am Main.

Marlow Susan, Professor of Entrepreneurship at ‘Nottingham University’, United Kingdom. Her focal studies are about gender-based entrepreneurship, Small and medium enterprises and closure, failure and market exit of small firms.

Mcadam Rodney, Professor of Innovation management from ‘Ulster University’, United Kingdom primarily focuses on Knowledge management, business models and Small and medium enterprises.

Figure 5: Most Productive countries



Source: Author’s Elaboration from Bibliometrix

Table 2: **Most Productive Countries**

Country	Articles	Freq	SCP	MCP
1 USA	67	0.2190	54	13
2 ENGLAND	25	0.0817	13	12
3 SPAIN	23	0.0752	18	5
4 CHINA	16	0.0523	9	7
5 ITALY	15	0.0490	11	4
6 GERMANY	14	0.0458	10	4
7 NETHERLANDS	14	0.0458	9	5
8 SWEDEN	12	0.0392	8	4
9 CANADA	10	0.0327	8	2
10 IRELAND	10	0.0327	7	3

SCP: Single Country Publications MCP: Multiple Country Publications

Source: **Author's Elaboration from Bibliometrix**

Considering the most productive countries of corresponding the authors, we have two criteria: Single Country publications and Multiple Country publications. We can see that United States of America is the first country with 67 articles, 54 Single country and 13 multiple country publications about business incubators, even emergent number of articles from England is following United States there is still significant gap between first country and all the other ones in the list. England has 25 articles almost equal number of SCP and MCP. Followed by Spain, China and Italy. Italy is at fifth ranking with 15 articles, which four of them are MCP. From the Figure 5, it can be seen that by far the greatest publication type of all countries is Single Country Collaboration. None of the counties prefer to collaborate internationally rather than nationally. To summarize most productive counties, we can interpret that scientific production has dependence on the counties where Business Incubation is more realizing, in correlation with realization more scientist and researchers are working on the topic.

Table 3: Total Citations per Country

Country	Total Citations	Average Article Citations
1 USA	2232	33.313
2 ENGLAND	602	24.080
3 SWEDEN	367	30.583
4 BELGIUM	337	37.444
5 IRELAND	293	29.300
6 ITALY	289	19.267
7 GEORGIA	225	75.000
8 SPAIN	220	9.565
9 GERMANY	216	15.429
10 NETHERLANDS	213	15.214

Source: **Author's Elaboration from Bibliometrix**

Total citations per country, Table 3 shows similarities to most productive countries, Table 2. In respect of US and England as ranking, eight countries out of ten of most productive countries are also in the table of total citations. Only China and Canada are out of the list and instead of those countries, we can see Belgium and Georgia. First country on ranking, USA, has remarkable high number of total citations compare to all other countries. Citations have more narrow scope and focusing mainly on scientific impact. Whereas a productive country with lots of articles doesn't have to be scientifically effective like the example of China and Canada. Spain is at third ranking at productive countries table despite of it, it is at eight ranking at total citation per country list. On the other hand, Sweden is not productive in respect to the Table 2 but has high scientific effect in terms of citation number.

Table 4: Most Relevant Sources

Most Relevant Sources	Articles
1 TECHNOVATION	33
2 JOURNAL OF TECHNOLOGY TRANSFER	24
3 JOURNAL OF BUSINESS VENTURING	12
4 R & D MANAGEMENT	12
5 JOURNAL OF BUSINESS RESEARCH	11
6 ECONOMIC DEVELOPMENT QUARTERLY	10
7 INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	10
8 JOURNAL OF PRODUCT INNOVATION MANAGEMENT	7

9 RESEARCH POLICY	7
10 ENTREPRENEURSHIP THEORY AND PRACTICE	6

Source: **Author's Elaboration from Bibliometrix**

The reputation of a scientific journal dominates the publication choice by researchers and it is mainly determined by this Impact Factor (also called ISI Impact Factor) - a metric that reflects how frequently the totality of a journal's recent papers is cited in other journals. Based on the Web of Science citation index database, it compares the citation impact of one journal with another (Agarwal, 2016). According to this feature Table 4 reflects most relevant sources in our dataset.

The ranking of the citations is highly relying on the name of the journal you are published in. On the other hand, undoubtedly more you are cited more you are important and your article is more valuable in the community. There is a strong correlation between the number of citations and importance of journals that you are published in.

Table 4 presents an overview of the top-tier management journals for 'business incub*' 'Technovation' has remarkably high articles than the other sources. It is the international journal of technological innovation, entrepreneurship and technology management which is leading by J.Linton. It is an interdisciplinary journal which considers innovation in both the perspectives of process and product and also social innovations. It can be found that, some articles about the role of Business Incubators, analyses of innovation performance, regions and companies.

'Journal of Technology Transfer', second journal in our table, is a source which is available since 1977. IT is the official journal of the technology transfer society with an emphasis of management practices and strategies for technology transfer. This journal is specified on analyzing the University& Industry relationship, that we will see on the results of second dataset 'University Business Incub*'.

'Journal of Business Venturing' is a journal dedicated to entrepreneurship for share of theories, narratives and consequences of entrepreneurship. 'R&D Management' has same number of articles with 'Journal of Business Venturing'. 'R&D Management' targets both practicing managers and academic researchers in R&D and innovation management. Correspond to the companies in order to manage their R&D activities.

Table 5: **Most Relevant Keywords**

Author Keywords (DE)			Articles Keywords Plus (ID)	
1	ENTREPRENEURSHIP	47	PERFORMANCE	81
2	BUSINESS INCUBATORS	24	INNOVATION	71
3	BUSINESS INCUBATOR	21	ENTREPRENEURSHIP	47
4	INNOVATION	20	FIRMS	44
5	INCUBATOR	15	SCIENCE PARKS	42
6	INCUBATION	14	BUSINESS INCUBATORS	37
7	INCUBATORS	13	TECHNOLOGY-BASED FIRMS	33
8	TECHNOLOGY TRANSFER	12	KNOWLEDGE	29
9	ECONOMIC DEVELOPMENT	8	NETWORKS	27
10	BUSINESS INCUBATION	7	GROWTH	26

Source: **Author's Elaboration from Bibliometrix**

WoS records include two types of keywords: Author Keywords, those provided by the original authors, and Keywords Plus, those extracted from the titles of the cited references by Thomson Reuters. Keywords Plus, generated by an automatic computer algorithm, are words or phrases that appear frequently in the titles of an article's references and not necessarily in the title of the article or as Author Keywords (Garfield, 1990; Garfield & Sher, 1993). For our dataset Table 5 lists the most relevant keywords. 'Entrepreneurship' is on the top of the list of 'Author Keywords' with 47 times of usage by the authors. Akin words 'Business Incubators' and 'Business Incubator' are in the second and third ranking with a little difference from the fourth keyword 'Innovation' which is used 20 times. 'Incubator', 'Incubation' and 'Incubators' are another very similar group of keywords of the authors in the list. From this table, we can see that most relevant keywords resulted in the lowest usage of those words: 'Technology Transfer', 'Economic Development' and lastly 'Business Incubation'.

Table 5 provides also an overview of second group of keywords: 'Articles Keywords Plus' which are chosen by WoS. Those keywords differ from the first group as a context of the keyword list. 'Performance' lies on the first place even that word is not on the authors keywords list. On the other hand, keywords like 'Innovation', 'Entrepreneurship' and 'Business Incubators' are common in the both lists. Whereas the common words in the both keyword list, most of them are different and introduce us the new concepts related to the subject.

1.4.2. Analysis of Cited References

Analysis of cited papers is used as a measure of impact of individual articles, periodicals, authors, etc. and has become an accepted practice in almost all scientific communications and a well-established part of information research. (Mishra, 1997)

In the first part of the results, we analysed general information of the dataset. Now we will pursue with cited references of our dataset ‘Business Incub*’

Table 6: **Most frequent cited documents**

Most frequent cited documents	Appearances
COLOMBO MG, 2002, RES POLICY, V31, P1103,	52
BOLLINGTOFT A, 2005, J BUS VENTURING, V20, P265,	51
AERNOUDT R, 2004, SMALL BUS ECON, V23, P127,	50
BERGEK A, 2008, TECHNOVATION, V28, P20,	46
HACKETT S M, 2004, J TECHNOLOGY TRANSFE, V29, P55,	46
CHAN KF, 2005, TECHNOVATION, V25, P1215,	39
AERTS K, 2007, TECHNOVATION, V27, P254,	37
GRIMALDI R, 2005, TECHNOVATION, V25, P111,	30
EISENHARDT KM, 1989, ACAD MANAGE REV, V14, P532,	29
ALLEN DAVID N, 1990, ENTREP THEORY PRACT, V15, P61	28

Source: **Author’s Elaboration from Bibliometrix**

The table above illustrates frequency table of the most cited references. Colombo (2002), ‘How effective are technology incubators? Evidence from Italy’ is the chart-topping article which is worked on ninety Italian new technology-based firms (45 of the companies were on-incubator and 45 of them were of-incubator). This article is providing the comprehensive set of indicators in order to evaluate whether if the science parks are an important element of a technology policy favor on NTBFs. This article provides original empirical evidence on how effective are Italian technology incubators that are situated with Science parks and in Business incubator centers. Colombo’s work followed by Bøllingtoft (2005), ‘The networked business incubator – leveraging entrepreneurial agency?’ used social capital theory to understand why networked incubator, a new model of Business Incubator, has emerged and what distinguishes it from the more traditional incubator model. This study devoted to one networked incubator in Denmark for 6 months of period.

Thirdly, the article from Aernoudt (2004), 'Incubators: Tool for entrepreneurship?' which compared European incubators with US models and applied conceptual analysis with an analysis of economic reality illustrated typology of business incubators. Bergek (2008), 'Incubator best practice: A framework' developed a framework that can serve as a basis for identifying best practice incubator models for policymakers' resource allocation decisions which also worked on sixteen Swedish incubators with a holistic approach. She revealed a combination of outcome indicators to identify best practice models and for more rigorous evaluation of incubator performance.

On the other hand, Hackett (2004), 'A Systematic review of business incubation research' focused on the process of incubators rather than on the incubator facility by using a systematic literature review. Hackett argued that, very little is known about the actual process of incubation and residents' expectations and perceptions of incubator communication once they take up residence. The present study focuses on communication during the incubation process within an award-winning university business incubator.

Chan (2005), 'Assessing technology incubator programs in the science park: The good, the bad and the ugly' is an assessment framework of technology incubators in the science park. It has been worked on six technology start-ups in Hong Kong science park to examine the effectiveness of incubators from the perspective of venture creation and development process by using nine sets of identified criteria. Furthermore, Aerts (2007), 'Critical role and screening practices of European business incubators' screened practices by European business incubators in the year 2003 and compared these results with the American incubators in the 1980s with a linear regression model to improve screening profile of incubators to picture better improvement opportunities in European incubators.

Grimaldi (2005), 'Business incubators and new venture creation; an assessment of incubating models' is a work which distinguishes incubating models and their business model characteristics evolution over time which worked on eight Italian incubators. Eisenhardt (1989), 'Building theories from case study research' give the broader perspective of the process of inducting theory using case studies from specifying the research questions to reaching closure. This article is used as a base fundamental for case study researches.

Table of most frequent cited manuscripts has identified the most cited articles about business incubators until today. They are the core sources which are cited most frequently by the other authors to expand and develop the subject of 'business incubators'. Articles are mostly based on case studies from all over the world.

More details on most frequently cited manuscripts with the details of theory, empirical

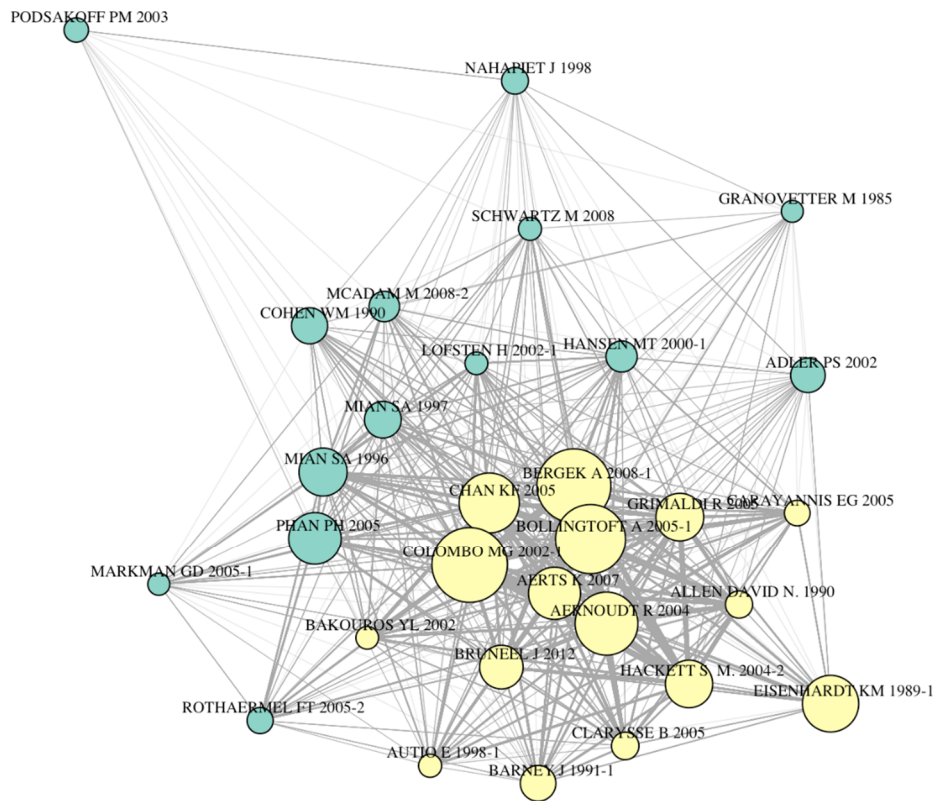
analysis, methodology, main issues argued and outstanding differences of each article will be given in the appendix of Chapter 1.

1.4.3. Bibliometric Networks

A bibliometric network consists of nodes and edges. The nodes can be for instance publications, journals, researchers, or keywords. The edges indicate relations between pairs of nodes. The most commonly studied types of relations are citation relations, keyword co-occurrence relations, and co-authorship relations. (van Eck, 2014)

Bibliometric networks are usually weighted networks. Edges are displaying the relation of two knots whereas the strength of the relation. Networks can be integrated, like an example of co-citation network or keyword co-occurrence or fractured, like authors' coupling. In this work, co-citation network, authors' coupling, country collaboration, keyword co-occurrence, conceptual structure map, factorial map of most cited articles and lastly historical citation networks as been discussed comprehensively to trace the quantitative literature development of 'business incub*' subject.

Figure 6: Co-citation Network



Source: **Author's Elaboration from Bibliometrix**

Two publications are co-cited if there is a third publication that cites both publications (Marshakova, 1973; Small, 1973). The more two publications are co-cited, the stronger the relationship is between them and the higher the probability that they belong to the same research stream. Co-citation is an especially convenient method for tracing the intellectual roots of an academic field through the identification of its foundational works (Vogel, 2012).

The useful dimensions to understand how to comment co-citation networks are:

- Central and peripheral position of nodes;
- Their proximity and distance;
- Strength of ties
- Clusters
- Bridging contributions

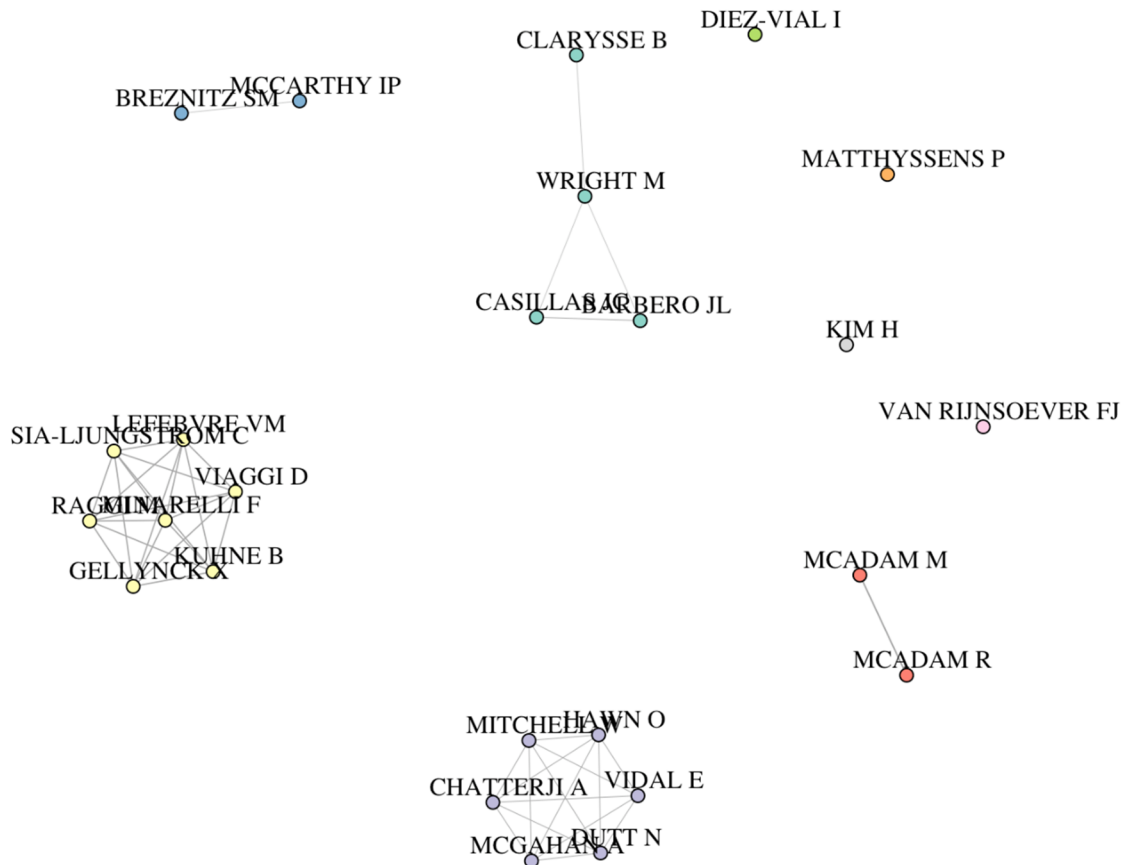
Furthermore, if we continue by analyzing our co-citation network with the dimensions above, we can say that, Colombo (2002) is cited together in the center of the network with Bøllingtoft

(2005), Bergek (2008), Aenoudt (2004) and Chan (2005) with strong, thick ties. These articles have the highest number of citations because they are the researchers that set this research field, they are the core researchers, likewise, all the case studies mentioned in their work belong to the different parts of the world they all providing significantly important features of business incubators. All the main articles of our co-citation network were mentioned in the previous part “Most frequent cited manuscripts” in detail. Barney (1991) and Eisenhardt (1989) work on the research base view of the company, has more general researches that is the reason why they are little bit far away from the center. We can say the same fact for Rothaermel (2005), who’s work belong to university- industry relationship mainly.

There are two main clusters in our co-citation network represent by two different colors; green and yellow nodes. Bibliometrix package is using a type of clustering algorithms called ‘walktrap community detection’ of community structure detection. Clusters based on the similarity of their co-citation patterns. The resulting clusters are interpreted to indicate dominant themes within the collection. The main group of the articles (yellow nodes) are all from the ‘Table 6: Most frequently cited documents’ and principally they focused on assessing incubator effectiveness, incubating models, incubator programs, evaluation of BIs, value adding contributions of BIs and incubation strategies.

Secondary group of articles (green nodes) alternatively assessing business incubators with other disciplines or from other periphery aspects like an example of copyrights& intellectual property, science parks and academic& industry links, joint R&D projects aspects. The most periphery articles belong to Podsakoff (2003) which is mentioning leadership. In addition to this, Granovetter (1985) discusses about social relations, Schwartz (2008), about industry relationship.

Figure 7: **Authors' Coupling**



Source: **Author's Elaboration from Bibliometrix**

Bibliographic coupling is the opposite of co-citation. Two publications are bibliographically coupled if there is a third publication that is cited by both publications (Kessler, 1963). Coupling can be defining connections among the publications in respect to their same core reference source. The Author's coupling network is helpful for driving forward the authors net who are working in the same subject based upon their sources and discovering regular study groups and pivotal authors.

In our author's coupling network, we see a large number fractured networks among the authors of the dataset. Authors' coupling network above mainly driven by the fact that, the authors who create a network, publish also an article together. They create themselves a community of scientist which are working on the specific topic together.

If we take a look in detail to the networks we see some group of international authors network: Gellynck Xavier, Kühne Bianka, Minarelli Francesca, Sia-Ljungström Clarissa, Viaggi Davide, Lefebvre Virginie and Raggi Meri. They published an article together in year 2014 with the

name 'SME's preference for innovation networks: A choice experimental approach' which evaluates the importance of selected characteristics of innovation networks.

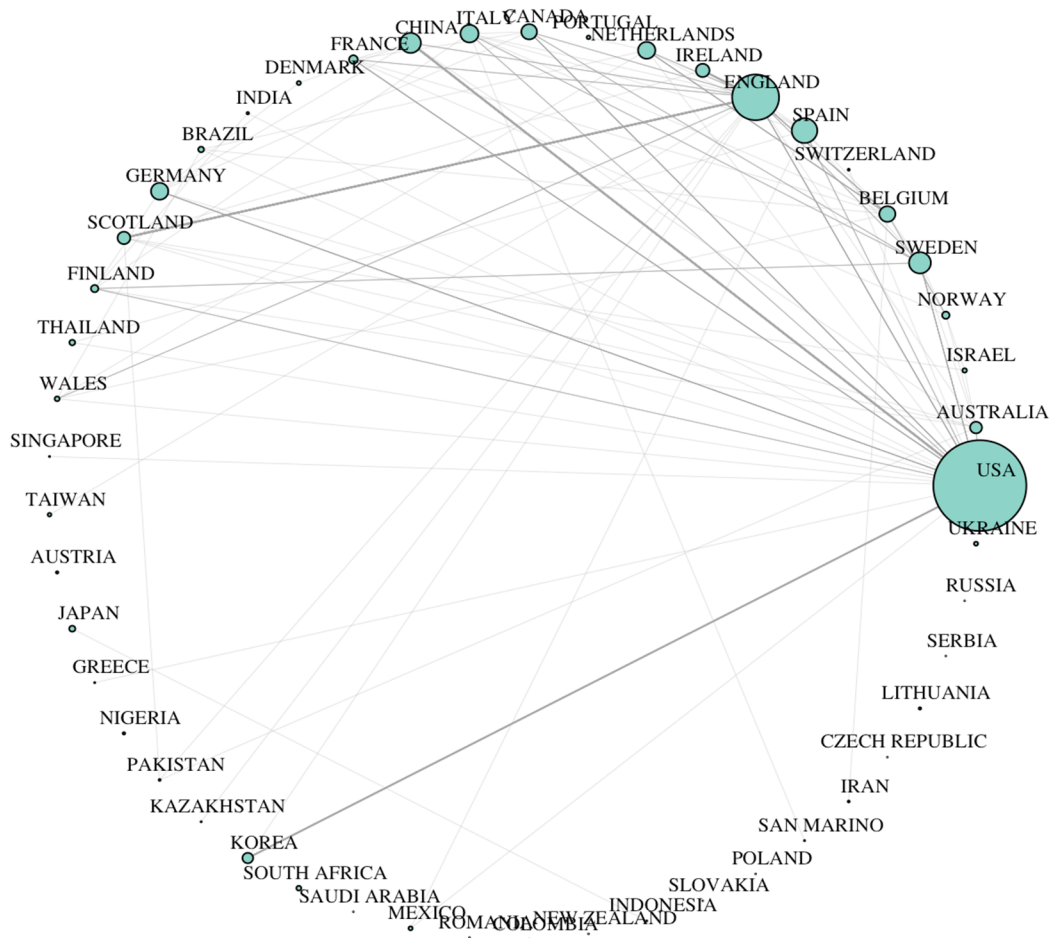
The network of Dutt Nilanjana, Hawn Olga, Vidal Elena, Chatterji Aaron, McGahan Anita and Mitchell Will has also an article named 'How open system intermediaries address institutional failures: The case of business incubators in emerging-market countries' in year 2016 which they worked on understanding of how, why and when intermediaries emerge to address institutional failures.

Mcadam Maura and Mcadam Rodney have strong coupling relation because they have dense collaboration together. To set an example: 'High tech start-ups in University Science Park incubators: The relationship between the start-up's lifecycle progression and use of the incubator's resources' in year 2008, 'The networked incubator: The role and operation of entrepreneurial networking with the university science park incubator (USI)' in year 2006, 'The evaluation of the Proof of Concept process and absorptive capacity of University's technology transfer activities' in year 2009, 'An exploratory study of Principal Investigator roles in UK university Proof-of-Concept processes: an Absorptive Capacity perspective; from 2010.

Barbero Jose L, Casillas Jose C, Wright Mike network created because they have used same sources and also collaborated in year 2013 such in the article as: 'Do different types of incubators produce different types of innovations', where they worked on case study of 80 incubators to distinguish innovation types in different incubator archetypes. Further, Clarysse Bart and Wright Mike has another collaboration with the article named 'Understanding a new generation incubation model: The accelerator' in 2016 about accelerator types and key design parameters of them.

Matthyssens Paul; Diez-Vial Isabel, Kim Hong and van Rijnsoever Frank J are not coupled with the other authors but they appear in the network singly.

Figure 8: **Country collaboration**



Source: **Author's Elaboration from Bibliometrix**

Country collaboration network visualizes all collaboration patterns, there are 52 countries total in our 'business incub*' dataset according to our 'Country collaboration network'. United States of America is the most collaborated country with high impact rate. USA is collaborated with Korea and France most, has more thicker edge with both countries. With the same aspect, we can see that England and Scotland has strong collaboration linkage. According to network above, countries who are geographically close to each other, collaborate more like an example of: Wales, England, Ireland and Scotland; San Marino and Italy; Finland, Sweden and Norway. On the other hand, there are also many different collaboration patterns for example: Pakistan and Australia; Iran and Belgium; India and Finland.

dimensions; as words are more similar in distribution, the closer they are represented in the map (Cuccurullo, Aria & Sarto, 2016).

In our conceptual structure map, results are plotted on a two-dimensional map and we have main two clusters of documents which express common concepts. One cluster is small with few concepts and the on the other hand, other cluster contains numerous concepts which are close to each other. This map helps us to visualize the topics which are covered by scholars and explains us what are the most important concepts in our field of ‘business incub*’. We see that concept of ‘Businesses’ is in the middle of our big conceptual cluster of entrepreneurship, represents with small triangle icon. All the other concepts are gather around ‘Businesses’ concept, closest concepts are: ‘Firm’, ‘Future’, ‘Performance’, ‘Industry’, ‘Business Incubators’, ‘Competitive advantage’ and ‘Strategy’. To the contrary, frame-concepts of the big clusters are: ‘Model’, ‘Regional-Development’, ‘Empirical-Evidence’, ‘Network’ and ‘Cooperation’.

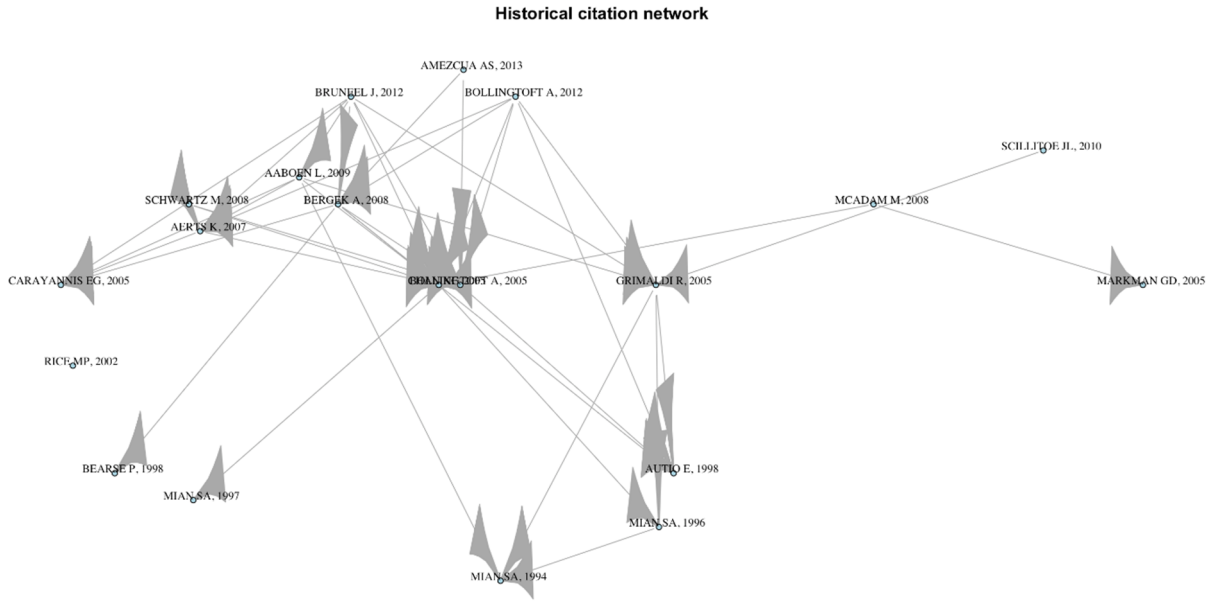
If we now continue with the small cluster we will see that there are only frame-concepts of the cluster, which are: ‘Location’, ‘Economic-Development’ and ‘Economy’. Which explains the main concept of the cluster: ‘economic- development’ which is separate from the main concept and considerably small in comparison.

After all bibliometric analysis of the dataset, lastly, we will analysis the historical development of the topic. The historiographic map is a graph proposed by E. Garfield to represent a chronological network map of most relevant direct citations resulting from a bibliographic collection.⁵

It is a useful tool to identify most influential papers and trace its year-by-year historical development. In this paper, we have a network which as 20 nodes (articles) from the year 1994 to 2013 in respect to our dataset.

⁵ Aria M., Cuccurullo C., A brief introduction to bibliometrix, <https://cran.r-project.org/web/packages/bibliometrix/vignettes/bibliometrix-vignette.html>, (12.06.2018)

Figure 11: Historical citation Network



Source: Author’s Elaboration from Bibliometrix

Table 7: Chronology of the Articles

Paper	Year	LCS	GCS
1 MIAN SA, 1994, TECHNOVATION	1994	10	62
2 MIAN SA, 1996, RES POLICY	1996	22	175
3 MIAN SA, 1997, J BUS VENTUR	1997	18	175
4 AUTIO E, 1998, J SMALL BUS MANAG	1998	21	64
5 BEARSE P, 1998, ECON DEV Q	1998	10	37
6 RICE MP, 2002, J BUS VENTUR	2002	9	138
7 MARKMAN GD, 2005, J BUS VENTUR	2005	9	198
8 CARAYANNIS EG, 2005, TECHNOVATION	2005	16	88
9 GRIMALDI R, 2005, TECHNOVATION	2005	30	149
10 CHAN KF, 2005, TECHNOVATION	2005	39	136
11 BOLLINGTOFT A, 2005, J BUS VENTUR	2005	51	167
12 AERTS K, 2007, TECHNOVATION	2007	37	110
13 BERGEK A, 2008, TECHNOVATION	2008	46	176
14 MCADAM M, 2008, TECHNOVATION	2008	11	98
15 SCHWARTZ M, 2008, TECHNOVATION	2008	8	47
16 ABOEN L, 2009, TECHNOVATION	2009	11	27

17 SCILLITOE JL, 2010, TECHNOVATION	2010	8	56
18 BRUNEEL J, 2012, TECHNOVATION	2012	26	87
19 BOLLINGTOFT A, 2012, TECHNOVATION	2012	8	39
20 AMEZCUA AS, 2013, ACAD MANAGE	2013	8	29

Source: **Author's Elaboration from Bibliometrix**

According to the Historical citation network, we can easily group our literature in three levels of historical development. In the first group which includes Mian (1994); Mian (1996); Mian (1997); Autio (1998) and Bearse (1998) researches were more focused on value-added dimensions of business incubators, assessment of new technology-based firm and their nurturing process, performance benchmarking and management of business incubators. This discrepancy could be attributed to understanding the capabilities and measurements of business incubators which is almost-new concept in general.

If we continue with the second group there is a bigger number of publications comparing to the first group. Most productive year is 2005 which has highly influential articles. Rice (2002); Markman (2005); Carayannis (2005); Grimaldi (2005); Chan (2005); Bøllingtoft (2005); Aerts (2007); Bergek (2008); Mcadam (2008); Schwartz (2008); Aaboen (2009) is in this group. We can easily see that apart from Mcadam (2008) and Markman (2005) all the other articles are close to each other according to their distance of the network. This group of articles mainly discuss about business incubator types, types of business assistance in the business incubators, networked incubators, screening incubator activities apart from Markman (2005) and Mcadam (2008) which are focused on university based technology transfer and technology commercialization.

In the last group which on the top of the network with an attribute of being the newest articles according to our dataset. There are articles of Scillitoe (2010); Bruneel (2012); Bøllingtoft (2012) and lastly Amezcua (2013). Which are mainly stressing the topics of survival rates of the new organizations and networking. Last articles in our dataset belongs to the year 2013.

1.5. Appendix of the Chapter

In the appendix of the Chapter, there are ten most cited articles about the topic with a deeper analysis of their theory, empirical analysis, methodology, main issues argued and key findings/contributions.

AUTHOR	ARTICLE	THEORY	EMPIRICAL ANALYSIS	METHODOLOGY	MAIN ISSUES ARGUED	KEY FINDINGS/ CONTRIBUTIONS
COLOMBO, 2002	How effective are technology incubators? Evidence from Italy	Whether if the science parks are important element of a technology policy favor of NTBFs	90 Italian new technology-based firms (45 on and 45 off incubator comparison) similar companies which are established after 2000 in technology based sectors	-Chi-squared test -Tobit models	To provide original empirical evidence on how effective are Italian technology incubators that are situated within SPs and BICs	<ul style="list-style-type: none"> -More comprehensive set of indicators than previous studies -The characteristics of their founders, in terms of educational background, prior working experience, and motivations of the entrepreneurial choice -The growth and innovative performances of firms, and their propensity towards networking: we use a wider set of indicators, including adoption of new technologies and establishment of formal collaborative relations with other institutions (both universities and business firms) -The access to external financing in the form of public subsidies

BOLLINGTOFT, 2005	The networked business incubator—leveraging entrepreneurial agency?	Social capital theory to understand why networked incubator, new model of BI has emerged and what distinguishes it from the more traditional incubator model. -Network theory	6 months of ethnographic data collected in one networked incubator in Denmark in year 2002	Interpretative methodology that recognizes the importance of social interaction and the socially constructed nature of social reality	What is it that facilitates or hinders networking in a networked incubator? Regarding networking and cooperation, the social aspects of the incubator cannot be ignored	-Empirical observations and the theory on BIs and social networks -Bottom-up approach -Participatory approach
AERNOUDT, 2004	Incubators: Tool for Entrepreneurship?	Lack of entrepreneurship and the underdevelopment of seed financing and business angel networks	Examples of incubator types from Europe, comparing with US	Conceptual analysis with an analysis of economic reality, both in the U.S.A. and in Europe	Dynamic process of <i>incubatio</i> and concludes by underlining the importance of close links between incubators and business angel networks	-Definition of typology of business incubators -Application of European models in US and Europe
BERGEK, 2008	Incubator best practice: A framework	Develop a framework that can serve as a basis for identifying best practice incubator models for policy makers' resource allocation	16 Swedish incubators	Best practice identification requires a holistic approach	Combination of outcome indicators, are used to identify best practice models and to distinguish between different models that are	-Develop a framework that can serve as a basis for identifying best practice incubator models and for more rigorous evaluations of incubator performance

HACKETT, 2004	A Systematic Review of Business Incubation Research	decisions and for those involved in incubator activities at the practical level	Literature review on: Incubator development, Incubator configurations, Incubatee development, Incubator-incubation impacts and theorizing about incubators-incubation		Systematic literature review	equally effective in achieving certain goals	-Focusing on the process of incubation rather than on the incubator facility and its configuration will draw attention to the underlying causes of new venture development in an incubator-incubation environment
CHAN, 2005	Assessing technology incubator programs in the science park: the good, the bad and the ugly	Assessment framework of technology incubators in the science park	6 technology startups in Hong Kong science park	Case study	To examine the effectiveness of incubators from the perspective of venture creation and development process	-9 sets of criteria are identified and incorporated in the assessment framework: advantages from pooling resources, sharing resources, consulting services, positive effect from higher public image, networking advantages, clustering effect, geographic proximity, cost subsidies and funding support	
AERTS, 2007	Critical role and screening practices of	Main aim is to show a Picture of incubators	Linear regression model	Screening practices by European business incubators in 2003 and	To successfully promote innovation, the incubator	-Tenant survival rate is positively related to a more balanced screening profile	

	European business incubators	List of incubator 'characterizing' variables to highlight the main differences between the types of incubators and to describe the incubating models	two incubating models derived from case studies of 8 Italian incubators	compare these results with the American incubators in the 1980s	business should be geared to other elements in the system	
GRIMALDI, 2005	Business incubators and new venture creation: an assessment of incubating models	List of incubator 'characterizing' variables to highlight the main differences between the types of incubators and to describe the incubating models	two incubating models derived from case studies of 8 Italian incubators		Evolution of incubator business models over time have been driven by the evolution of company requirements and needs, which in turn has prompted incubators to diversify their offer of services	<p>-Two models of Incubators: Non-profit and For-profit and all their characterization:</p> <p>-Institutional mission, Industrial sectors of investment Location, Market, Origin of ideas, Phase of intervention, Incubation period. Sources of revenue Services, Management team</p>
EISENHARDT, 1989	Building Theories from case study research	Explains the process of inducing theory using case studies from specifying the research questions to reaching closure	<p>Priori specification of constructs, triangulation of multiple investigators, within- case and cross-case analyses, and the role of existing literature</p>	Descriptive study		- Describes the process of theory building from case studies

CHAPTER 2

SYSTEMATIC LITERATURE REVIEW OF UNIVERSITY BUSINESS INCUBATION

2.1. The Results

2.1.1. Main Information

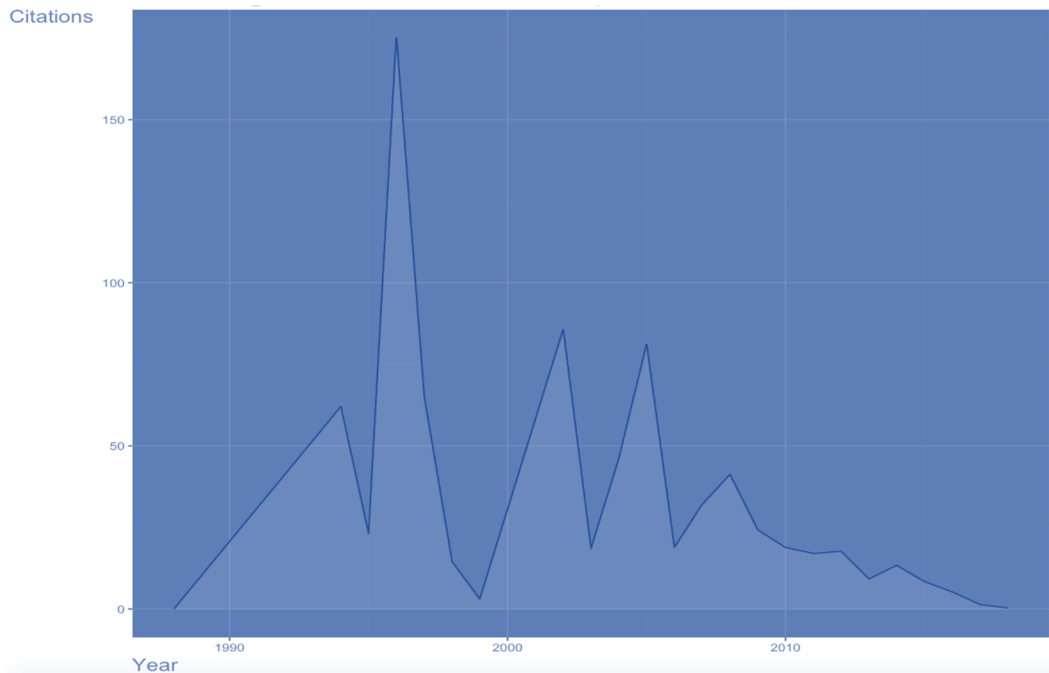
In the literature on ‘Business Incub*’, the relative important role of ‘University Business Incub*’ has been subject to considerable studies. The central focus of this thesis is comparing award-winner university business incubators of two different countries, Italy and Turkey. Before starting with our research methodology, in this chapter, we quantitatively analysed bibliometric peculiarities of ‘University Business Incub*’ by using R software. The results of ‘University Business Incub*’ dataset shows similarities with its’ interconnected super-category ‘Business Incub*’. The aim of this chapter is alike previous chapter, to provide an overview of the development of the topic from quantitative aspect, to examine the development of the trends and to understand main arguments of the articles about the selected topic.

According to our research criteria, possible outcomes are: all the publishing which are enclose the terms as ‘university business incubator’, ‘university business incubation’ and ‘university business incubate’. The results of the dataset showed that, this sub-category database has 122 documents from 61 different sources which correspond to 247 authors and 282 author appearances. The database relatively smaller than the its’ super-category, previous dataset. The database comprises years from 1988 until today. Average citations per documents is 22.62, in some degree higher than ‘Business Incub*’ dataset.

Dataset has 24 documents which have a single author and 223 documents which have a multi-author. The multi-author articles outnumber by single author articles. Mean of the documents per author is 0.494 on the other hand authors per document is 2.02. Therefore, authors are more collaborating than publishing individually like the ‘Business Incub*’ dataset results. Furthermore, co-authors per documents index is 2.31 and collaboration index is 2.42, almost similar with ‘Business Incub*’ dataset. Author’s Keywords are 378, on the other hand Keyword Plus, keywords chosen by the WoS is 316.

After reviewing the main information of the results, will start to address the headings of bibliometrix results as well as Chapter 1.

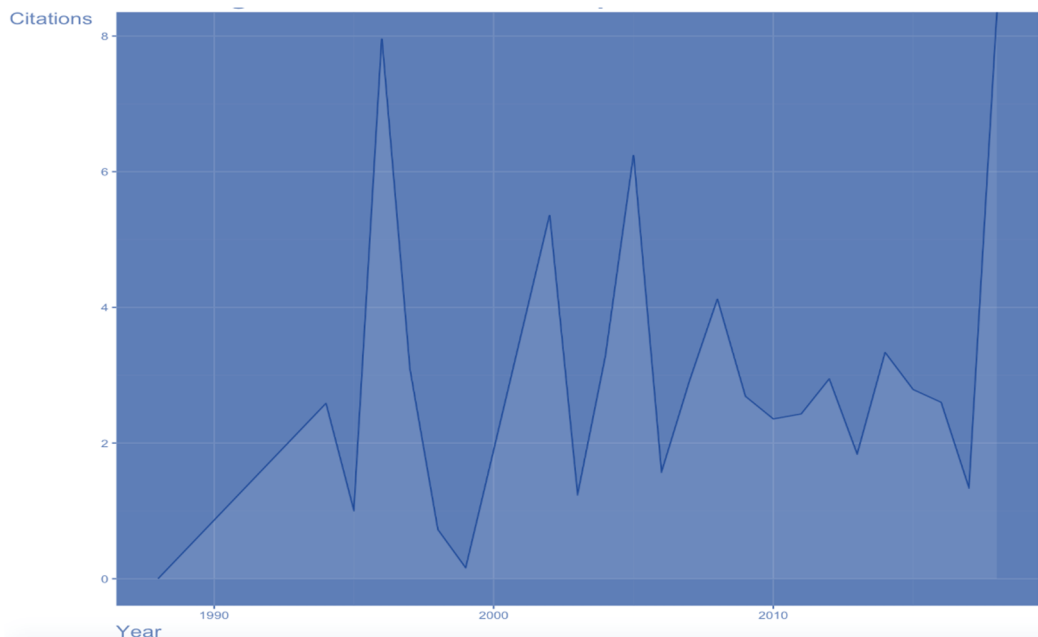
Figure 12: Average Total Citations per year



Source: Author's Elaboration from Bibliometrix

Figure 12 outlines average total citations per year from 1988 to 2018. Total citations graph shows dramatic increasing trend at the end of 1990 raised more than average 150 citations per year and moderately other two other jumps at the beginning of 2000s. From 2010 there is gradually slump in the graph.

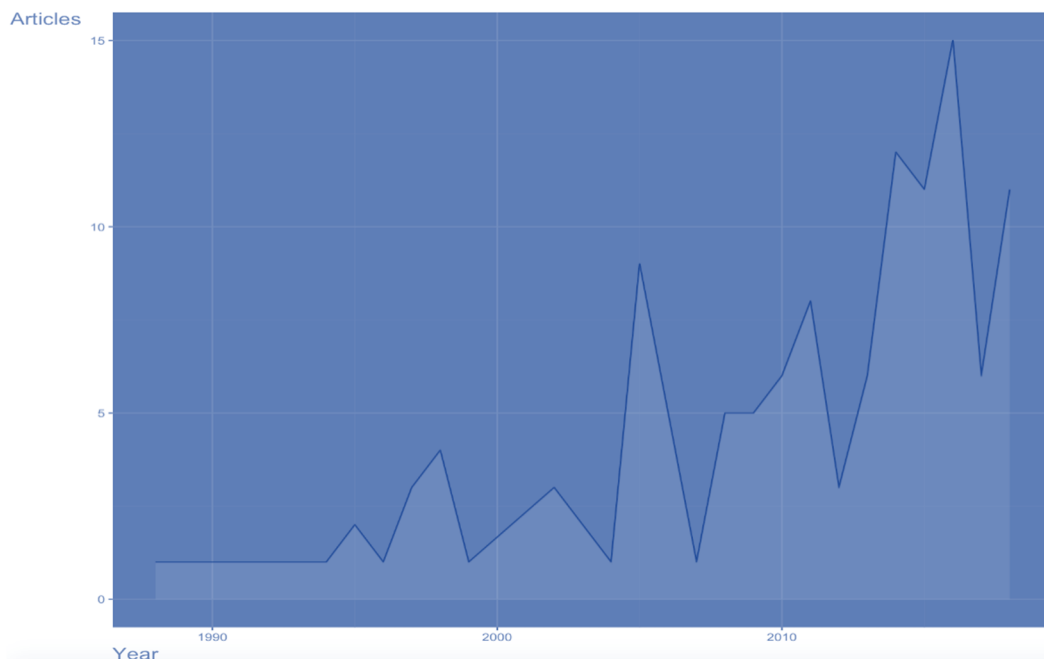
Figure 13: Average Article Citations per year



Source: Author's Elaboration from Bibliometrix

On the other hand, average article citations per year has more fluctuations by years. It has same increasing trends of average total citations per year but instead of drop in recent years, there are little jumps still going on until today. We can say that, especially last years' average article citations are more than last years' average total citations according to our bibliometric analysis. Even though, average total citation goes down articles still has high citation rates.

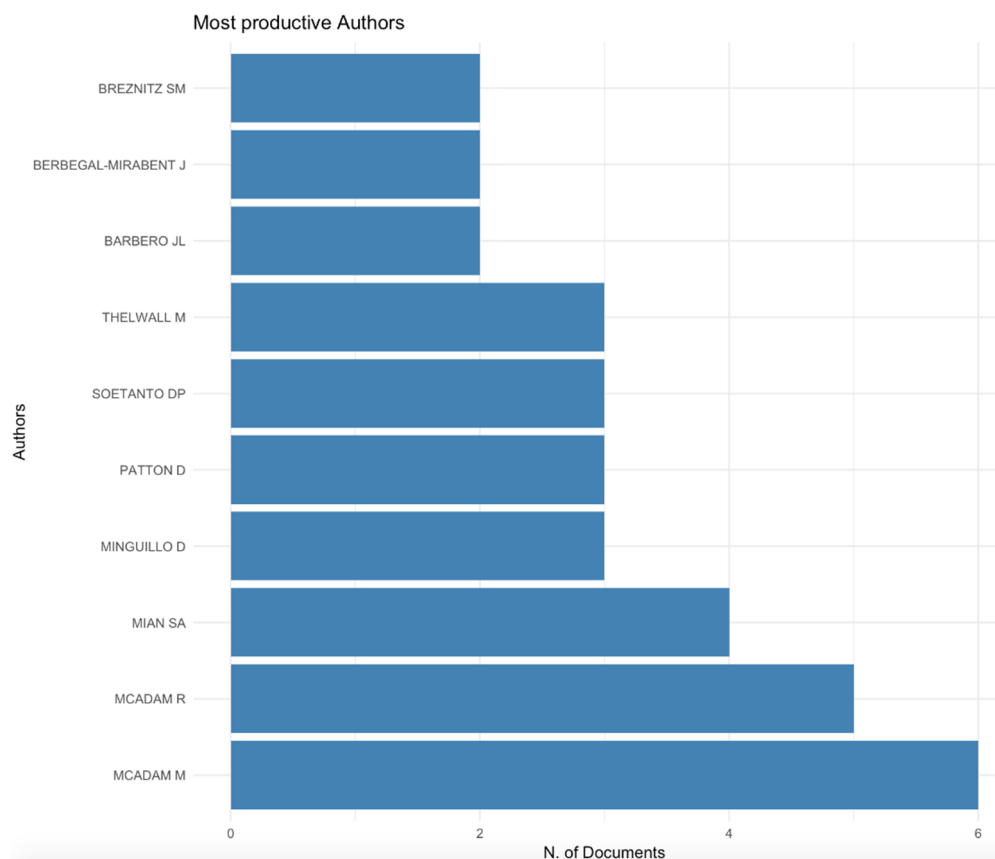
Figure 14: Annual Scientific Production



Source: **Author's Elaboration from Bibliometrix**

When we continue with annual scientific production of the articles, we can see from the Figure that, it has a grow-up trend with many numbers of fluctuations. 1998 and 2005 are the first years when the productivity increase. After 2008, productivity escalates except the year 2012. Most productive year is 2016 with 15 articles about the topic. Annual percentage of growth rate is slightly higher than 'Business incub*', it is %10.98. Current year has 11 articles in the time when the dataset examined. (June 2018)

Figure 15: Most Productive Authors



Source: **Author’s Elaboration from Bibliometrix**

Table 8: Most Productive Authors

Authors	Articles Authors
1 MCADAM M	6
2 MCADAM R	5
3 MIAN SA	4
4 MINGUILLO D	3
5 PATTON D	3
6 SOETANTO DP	3
7 THELWALL M	3
8 BARBERO JL	2
9 BERBEGAL-MIRABENT J	2
10 BREZNITZ SM	2

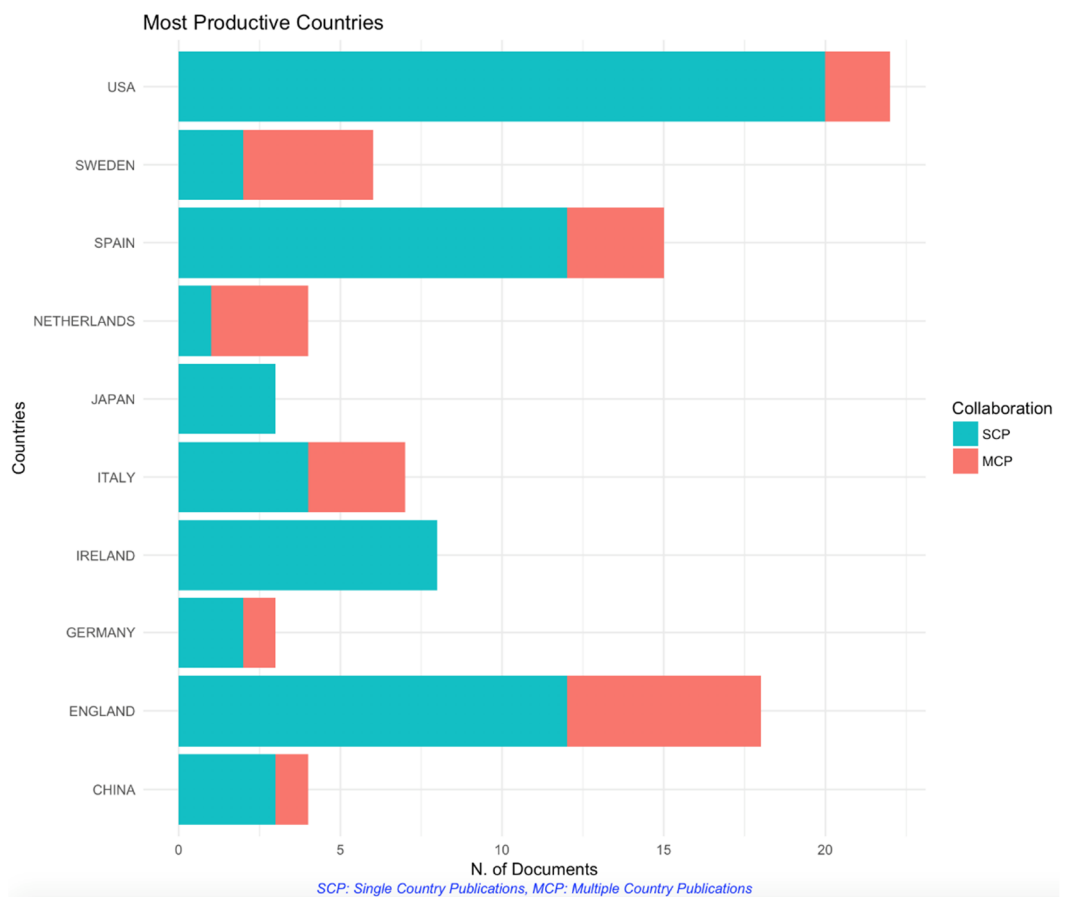
Source: **Author’s Elaboration from Bibliometrix**

Figure 15 and Table 8 represents the most productive authors of ‘University business Incub*’ dataset. Mcadam Maura is the most prolific authors like the first dataset, there she is on the top of the list with 6 articles. She is followed by Mcadam Rodney, Mian Sarfraz A, Minguillo David and others. by Mcadam Maura, Mcadam Rodney and Mian Sarfraz A are the only common authors of both dataset. We can say that, most of the authors who are working on university business incubators are different than business incubators.

Apart from the common authors, Minguillo David is a professor at KTH Royal Institute of Technology in Stockholm, Sweden. Using bibliometrics and Scientometrics methodologies in his researches.

Patton Donald, professor at University of California, mostly working on case studies related to American business incubators. On the other hand, Soentanto Danny is a professor from United Kingdom, associated with Lancaster University Management School focus on academic spin-offs. Additionally, Berbegal-Mirabent Jasmina is from Spain, Universitat Internacional de Catalunya. Her focal point is university-industry partnership in her researches.

Figure 16: Most Productive Countries



Source: Author’s Elaboration from Bibliometrix

Table 9: **Most Productive Countries**

Country	Articles	Freq	SCP	MCP
1 USA	22	0.1849	20	2
2 ENGLAND	18	0.1513	12	6
3 SPAIN	15	0.1261	12	3
4 IRELAND	8	0.0672	8	0
5 ITALY	7	0.0588	4	3
6 SWEDEN	6	0.0504	2	4
7 CHINA	4	0.0336	3	1
8 NETHERLANDS	4	0.0336	1	3
9 GERMANY	3	0.0252	2	1
10 JAPAN	3	0.0252	3	0

SCP: Single Country Publications MCP: Multiple Country Publications

Source: **Author's Elaboration from Bibliometrix**

Results of the most productive countries are shown in Figure 16 and Table 9. According to information above, we can say that: in this dataset, differently from the first dataset, there is not huge different between USA and other countries in the Table. United States of America has 22 articles, 90% of the articles are single country publications. We can say that, American authors collaborating between each other instead collaborating with other countries. USA is followed by England with 18 articles, in the third ranking there is Spain by a narrow margin difference. Ireland and Japan are the two countries which are not collaborated with other countries but only in their respective country. Conversely, Sweden and Netherlands are collaborating internationally more than in nationally. Similarly, to the first dataset, results of the second dataset shows that countries chose Single Country Collaboration frequently rather than Multiple Country Publications.

To summarize most productive counties, we can interpret that scientific production has dependence on the counties where University Business Incubation is more realizing, in correlation with realization more scientist and researchers are working on the topic exactly same feature of 'Business Incubation' dataset results.

Table 10: Total Citations per Country

Country	Total Citations	Average Article Citations
1 USA	933	42.4
2 ITALY	264	37.7
3 ENGLAND	220	12.2
4 IRELAND	204	25.5
5 GEORGIA	197	197.0
6 SWEDEN	145	24.2
7 CHINA	141	35.2
8 SPAIN	138	9.2
9 ISRAEL	81	40.5
10 BRAZIL	77	38.5

Source: **Author's Elaboration from Bibliometrix**

Total citations per country table has similar features with the Table 9, most productive countries. USA is again top of the list, has remarkable high number of total citations compare to all other countries. Citations have more narrow scope and focusing mainly on scientific impact. USA is followed by Italy in place of England. England move to third ranking, it means that even though Italy is not as productive as England or Ireland in respect to most productive countries (in fifth ranking), it has more scientific impact in the topic.

Netherlands, Germany and Japan is in the list of most productive countries, but not in total citations per country. This means their publications doesn't cite considerably. Seven of the countries are same in both tables. Additionally, countries like Georgia, Israel and Brazil appears in Table 10. Although they are not productive, they have high scientific impact.

Table 11: **Most Relevant Sources**

Most Relevant Sources	Articles
1 JOURNAL OF TECHNOLOGY TRANSFER	18
2 TECHNOVATION	15
3 JOURNAL OF BUSINESS VENTURING	5
4 INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	4
5 R & D MANAGEMENT	4
6 JOURNAL OF BUSINESS RESEARCH	3
7 JOURNAL OF SMALL BUSINESS MANAGEMENT	3
8 RESEARCH POLICY	3
9 SCIENTOMETRICS	3
10 TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT	3

Source: **Author's Elaboration from Bibliometrix**

As we mentioned in the Chapter 1 most relevant sources results are highly related to Impact factor of the Journals. According to Table 11, we have two journals with high impact factor; 'Journal of Technology Transfer' with 18 articles and 'Technovation' with 15 articles. Similar to first dataset, first two journals are same but in different ranking.

'Journal of Technology Transfer' is specified on analyzing the University & Industry relationship second journal in our table, that is the reason why it is on the top. In all likelihood, this journal contains most of the work on University Business Incubators. Moreover, 'Technovation' is the international journal of technological innovation, entrepreneurship and technology management which is leading by J.Linton as we mentioned in Chapter 1. It is an interdisciplinary journal which considers innovation in both the perspectives of process and product and also social innovations.

Apart from the common journals with first dataset, we have new journals in the most relevant sources table. 'Journal of Small Business Management' is circulated in 60 countries around the world, is an important source of small business research, additionally it is the official journal of the International Council for Small Business (ICSB).

Nonetheless 'Scientometrics' is concerned with the quantitative features and characteristics of science and scientific research.

Lastly, 'Technology Analysis & Strategic Management' is well-known international research journal, linking the analysis of science and technology with the strategic needs of policy makers and management.

Table 12: **Most Relevant Keywords**

Author Keywords (DE)			Articles Keywords Plus (ID)	
1	ENTREPRENEURSHIP	15	INNOVATION	39
2	INNOVATION	13	PERFORMANCE	31
3	TECHNOLOGY TRANSFER	12	BUSINESS INCUBATORS	20
4	BUSINESS INCUBATORS	10	SCIENCE PARKS	20
5	INCUBATOR	10	FIRMS	19
6	INCUBATORS	8	TECHNOLOGY-BASED FIRMS	19
7	INCUBATION	7	ENTREPRENEURSHIP	18
8	ACADEMIC SPIN-OFFS	5	INCUBATORS	14
9	BUSINESS INCUBATOR	5	KNOWLEDGE	14
10	CHINA	5	START-UPS	12

Source: **Author's Elaboration from Bibliometrix**

Hereby, we examine the most relevant keywords of the dataset. Table 12 has two main features as we mentioned in Chapter 1, keywords picked by authors and keywords picked by database WoS. 'Entrepreneurship' is on the top of the list of 'Author Keywords' with 15 times of usage by the authors, followed by 'Innovation', 'Technology Transfer'. 'Business Incubators', 'Incubator', 'Incubators' and 'Incubation' agnate words appear often in the list of keywords by authors. From this table, we can see that most relevant keywords resulted in the lowest usage of those words: 'Academic Spin-offs' and 'China'. For the first time a name of one country appears in the keyword list. It shows that number of articles about China is emerging.

When we continue analyzing the second group of keywords; 'Articles Keywords Plus' which are chosen by WoS, we can see that, those keywords have wider context than author keywords. 'Innovation' lies on the first place which is common keyword for both lists. On the other hand, keywords like 'Performance', 'Science Parks' and 'Firms' are the example of the keywords which are only in 'Articles Keyword Plus'. Whereas the common words in the both keyword list, more than half of them are different and introduce us the new concepts related to the subject.

2.1.2. Analysis of Cited References

In this part of the results, we will work on analyzing the cited references in terms of most frequent cited manuscripts. Most frequent cited manuscript table delivers significant overview about the most influential and well-known articles about the topic. There we have most 10 cited manuscripts in our dataset which extract from WoS database.

Table 13: **Most frequent cited documents**

Most frequent cited documents	Appearances
AERNOUDT R, 2004, SMALL BUS ECON, V23, P127	22
COLOMBO MG, 2002, RES POLICY, V31, P1103	22
MIAN SA, 1996, RES POLICY, V25, P325	21
BOLLINGTOFT A, 2005, J BUS VENTURING, V20, P265	18
MIAN SA, 1997, J BUS VENTURING, V12, P251	18
PHAN PH, 2005, J BUS VENTURING, V20, P165	18
BERGEK A, 2008, TECHNOVATION, V28, P20	16
HACKETT SM, 2004, J TECHNOLOGY TRANSFE, V29, P55	16
BAKOUROS YL, 2002, TECHNOVATION, V22, P123	13
BRUNEEL J, 2012, TECHNOVATION, V32, P110	13

Source: **Author's Elaboration from Bibliometrix**

When we look at the list of most frequent cited manuscripts of University incubators we see that, both 'business incubators' and 'university business incubators' share five articles in common like Colombo (2002); Bøllingtoft (2005); Aernoudt (2004); Bergek (2008); Hackett (2004). Additional to the authors above, there is an article of Mian (1996), 'Assessing value-added contributions of university technology business incubators to tenant firms' a multiple-case design with a national survey to evaluate whether University technology business incubators provide the nurturing environment for the development of new technology-based start-ups. Questioning 'What contributions do university incubators make to new technology-based start-ups in the form of various services provided?' and 'What additional benefits accrue from university relationships? What are some of the implications for technology-based firms?'. Followed by another article from Mian this time from 1997, 'Assessing and managing the university technology business incubator: an integrative framework' a work to create UTBI

performance assessment framework on thirty-five-year-old or older US-based facilities and their twenty-nine tenant firms.

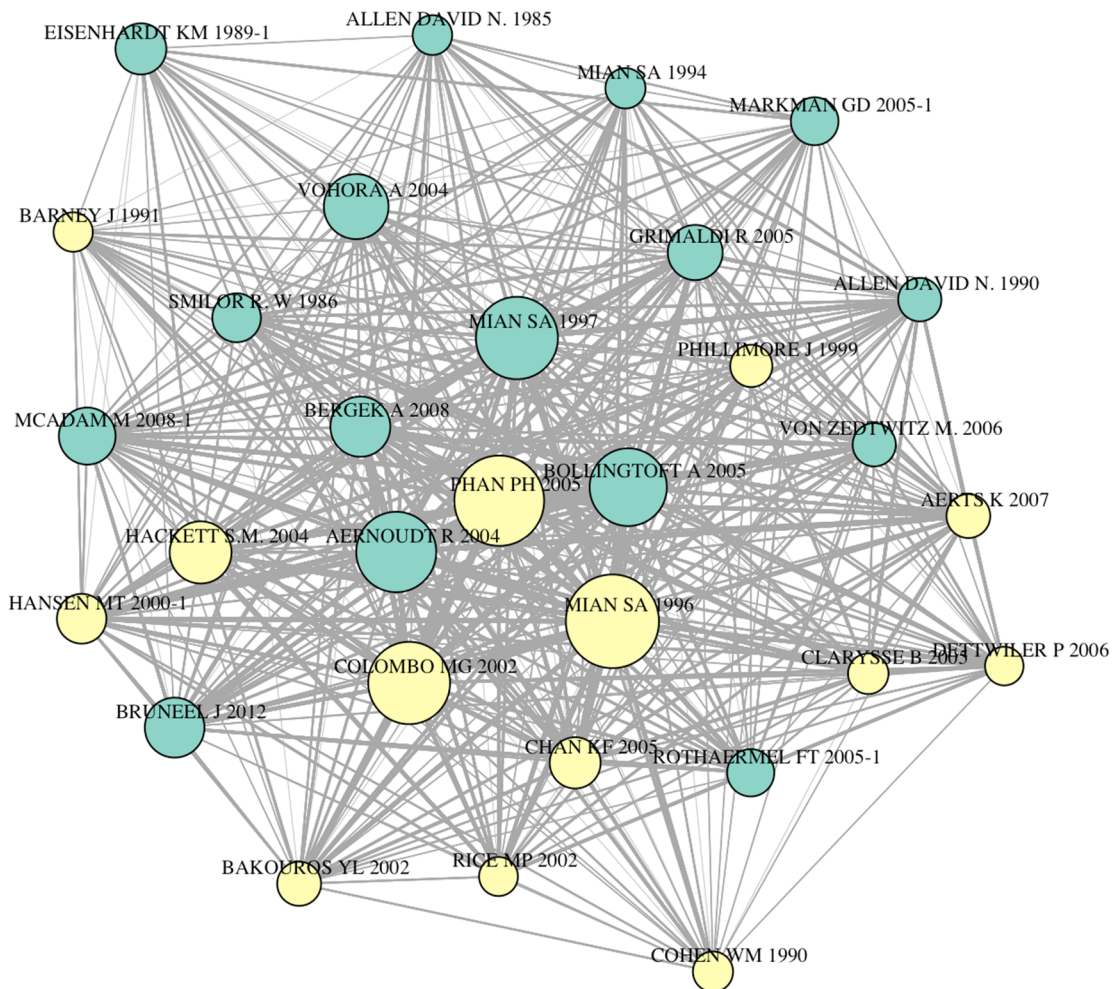
When we continue with Phan (2005), ‘Science parks and incubators: observations, synthesis and future research’ we see a work with a theoretical model which demonstrates how each sheds light on an unexplored dimension of emerging literature of science parks and incubator analysis and mentions the lack of clarity of performance and its measurements. Bakouros (2002), ‘Science park, a high-tech fantasy? an analysis of the science parks of Greece’ is a case study from three science parks of Greece about the evaluating of science park performance in terms of university-industry interactions. Lastly, Bruneel (2012), ‘The Evolution of Business Incubators: Comparing demand and supply of business incubation services across different incubator generations’ another case-study work about seven business incubators and their tenants set out to research if older generation business incubators updated their service portfolio to cover today’s incubation paradigm, and the extent to which the service portfolio fits each generation of BI tenants.

More details on most frequently cited manuscripts with the details of theory, empirical analysis, methodology, main issues argued and outstanding differences of each article will be given in the appendix of Chapter 2.

2.1.3. Bibliometric Networks

Bibliometric networks are important elements in the understanding of the relations of different attributes. Similar to Chapter 1, co-citation network, authors’ coupling, country collaboration, keyword co-occurrence, conceptual structure map, factorial map of most cited articles and lastly historical citation networks as been demonstrated to provide more robust literature review.

Figure 17: Co-citation Network



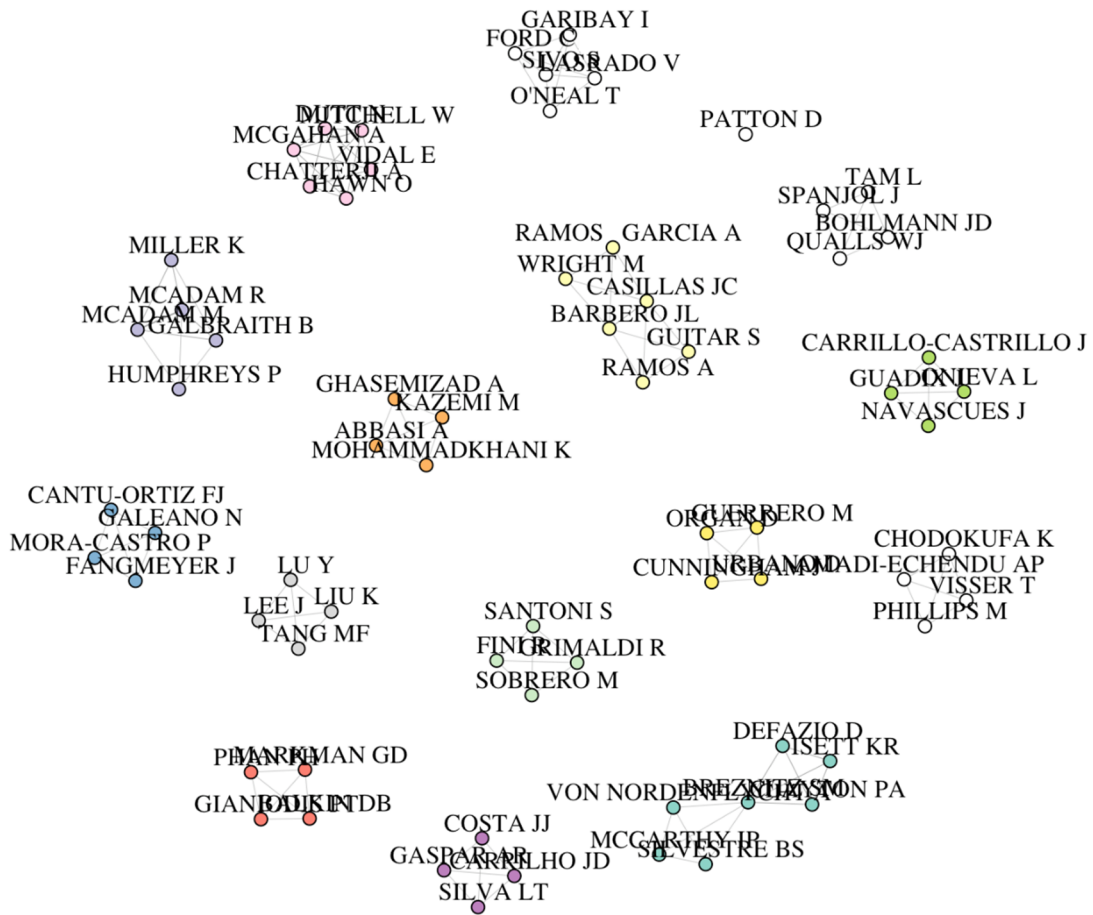
Source: **Author's Elaboration from Bibliometrix**

As discussed in the Chapter 1, co-citation network in R bibliometrix uses ‘walktrap community detection algorithms’ which is an approach based on random walks. The general idea is that if you perform random walks on the graph, then the walks are more likely to stay within the same community because there are only a few edges that lead outside a given community. Walktrap runs short random walks of 3-4-5 steps, depending on one of its parameters, and uses the results of these random walks to merge separate communities in a bottom-up approach (Ickowicz, 2014).

Here, obtained dataset of ‘university business incub*’ provides more interwoven clusters comparing to ‘business incub*’ dataset. We can observe that clusters are not standing apart from each other. Composed clusters of first dataset swapped, yellow nodes are subjecting ‘university business incub*’ closer to ‘science parks’ aspect, on the other hand green nodes are

elaborating the topic more as a part of ‘Incubation process’ concept. All the articles which are in the main focus of the co-citation network already illustrated in previous sections.

Figure 18: **Authors’ Coupling**



Source: **Author’s Elaboration from Bibliometrix**

From this figure above it is clear that ‘Authors’ Coupling’ network of ‘University Business Incub*’ has more author appearance than first dataset. All those fractured networks are created by the authors who are working on the same field according to their coupling analysis.

Even though same network of authors also appears like an example of Dutt Nilanjana, Hawn Olga, Vidal Elena, Chatterji Aaron, McGahan Anita and Mitchell Will with the article ‘How open system intermediaries address institutional failures: The case of business incubators in emerging-market countries’ almost all other coupling networks are indigenous of the second dataset. We see many number of new collaborations.

Moreover, Miller Kristel, Mcadam Rodney, Mcadam Maura, Galbraith Brendan and Humphreys Paul collaborated for the article ‘An exploratory study of Principal Investigator roles in UK university Proof-of-Concept processes: An Absorptive Capacity perspective’.

Mcadam Rodney and Mcadam Maura have bigger network in this dataset in discordance with the first dataset.

There are richer collaborations from different part of the world in Figure 18, as an example Ghasemizad Alireza, Kazemi Mohammad, Abbasi Ali and Mohammadkhani Kamran from Iran they published 'Improvement of technology business incubators' effectiveness: An explanatory model' in year 2011 which is about the influencing factors in Technology Business Incubator's effectiveness and their explanatory model.

When we continue with other networks among the authors we see that, Cantu-Ortiz Francisco J, Galeano Nathalie, Mora-Castro Patricia and Fangmeyer James: 'Spreading academic entrepreneurship: Made in Mexico' a collaboration which analyses three deficiencies in Mexico's entrepreneurship ecosystem: research skills, high technology, and technology transfer. On the other hand, Tang Mingfeng, Lee Jaegul, Liu Kun and Lu Yong collaborated from China for article named 'Assessing government-supported technology-based business incubators: evidence from China technology transfer'.

Coupling of Silva Laura Tarrafa, Carrilho Joao Dias, Gaspar Adelio R and Costa Jose J 'Indoor climate assessment: A case study at a business incubation centre' worked on a business incubation center linked to the one university in Portugal.

As we mentioned before, besides from the number of the networks, fractured networks are also containing more authors in this dataset. The network of 'Breznitz Shiri M' consist of more than one network of authors. First network contains the authors Clayton Paige A, Defazio Daniela, Isett Kimberley R and Breznitz Shiri M, name of the article is: 'Have you been served? The impact of university entrepreneurial support on start-ups' network formation' from 2018. Further, second network of 'Breznitz Shiri M' is with the article 'A typology of university research park strategies: What parks do and why it matters' together with McCarth Ian P, Silvestre Bruno S, Von Nordenflycht Andrew.

Moreover, there are many other collaborations, for instance, Fini Riccardo, Grimaldi Rosa, Santoni Simone and Sobrero Maurizio collaborated for 'Complements or substitutes? The role of universities and local context in supporting the creation of academic spin-offs'. Guerrero Maribel, Urbano David, Cunningham James and Organ Damien, on the other hand, created a network with the article 'Entrepreneurial universities in two European regions: A case study comparison'. In the article which they adopted institutional economics and resource-based view to compare entrepreneurial universities in two European regions (Spain and Ireland) using an in-depth qualitative approach based on multiple case studies between 2006 and 2010.

Then again, there is a coupling of Amadi-Echendu Anthea Patricia, Phillips Magaret, Chodokufa Kudakwashe and Visser Thea for 'Entrepreneurial Education in a Tertiary Context:

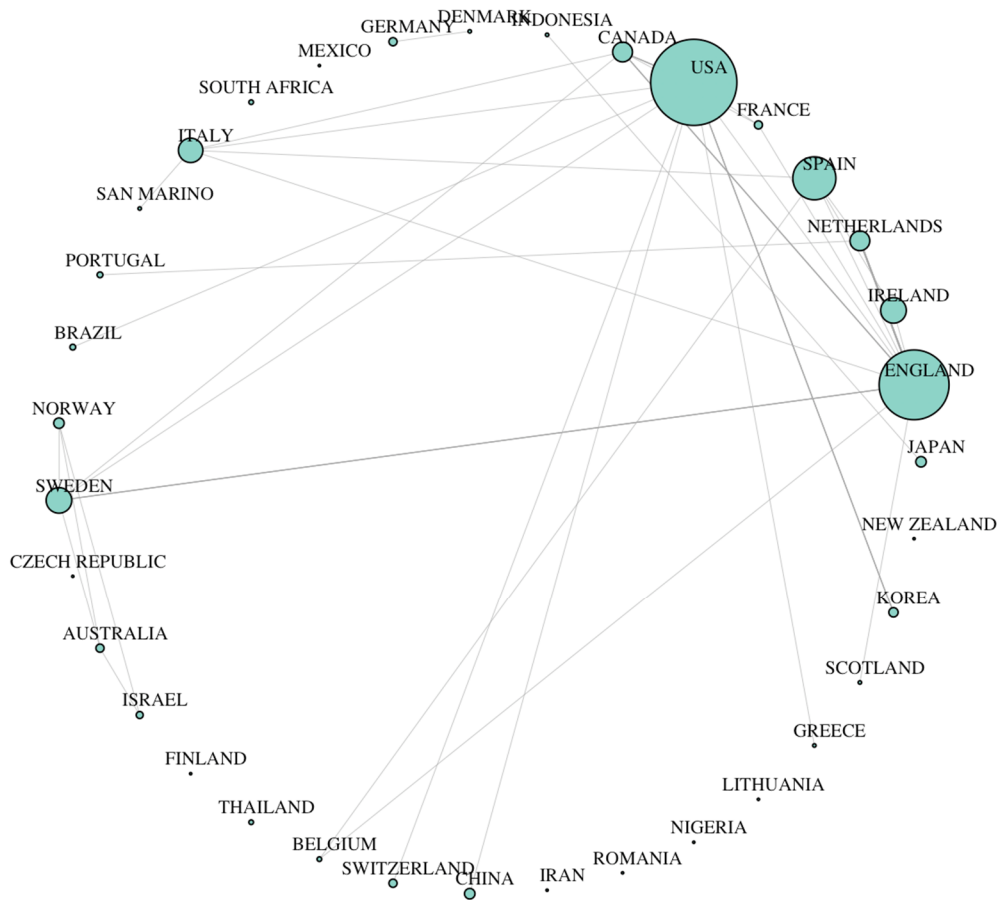
A perspective of the University of South Africa' article. 'Success variables in science and technology parks' from Guadix Jose, Carrillo-Castrillo Jesus, Onieva Luis and Navascues Javier about establishing a series of models to identify the strategies of successful parks.

Another collaboration for the article named 'New Product Team Decision Making: Regulatory focus effects on number, type and timing decisions' is more likely about improving management skills and guiding teams' new product decisions from Spanjol Jelena, Tam Leona, Qualls William J, Bohlmann Jonathan D. By contrast to all coupling networks in Figure 18, Donald Patton is the only author who stands alone.

Another big coupling network is created by the common author 'Barbero Jose L' in respect to the article with Casillas Jose C, Ramos Alicia and Guitar Susana 'Revisiting incubation performance: How incubator typology affects results'. Then, other article which also appeared in first dataset from Casillas Jose S, Wright Mike has collaborated with 'Barbero Jose L' in year 2013 in the article: 'Do different types of incubators produce different types of innovations'.

Lastly, we see in our authors' coupling network another community which appeared with 'Do graduated university incubator firms benefit from their relationship with university incubators?' from Lasrado Vernet, Sivo Stephen, Cameron Ford, O'Neal Thomas and Garibay Ivan where they examined whether firms graduating from university incubators attain higher levels of post-incubation performance than firms participating in non-university affiliated incubators.

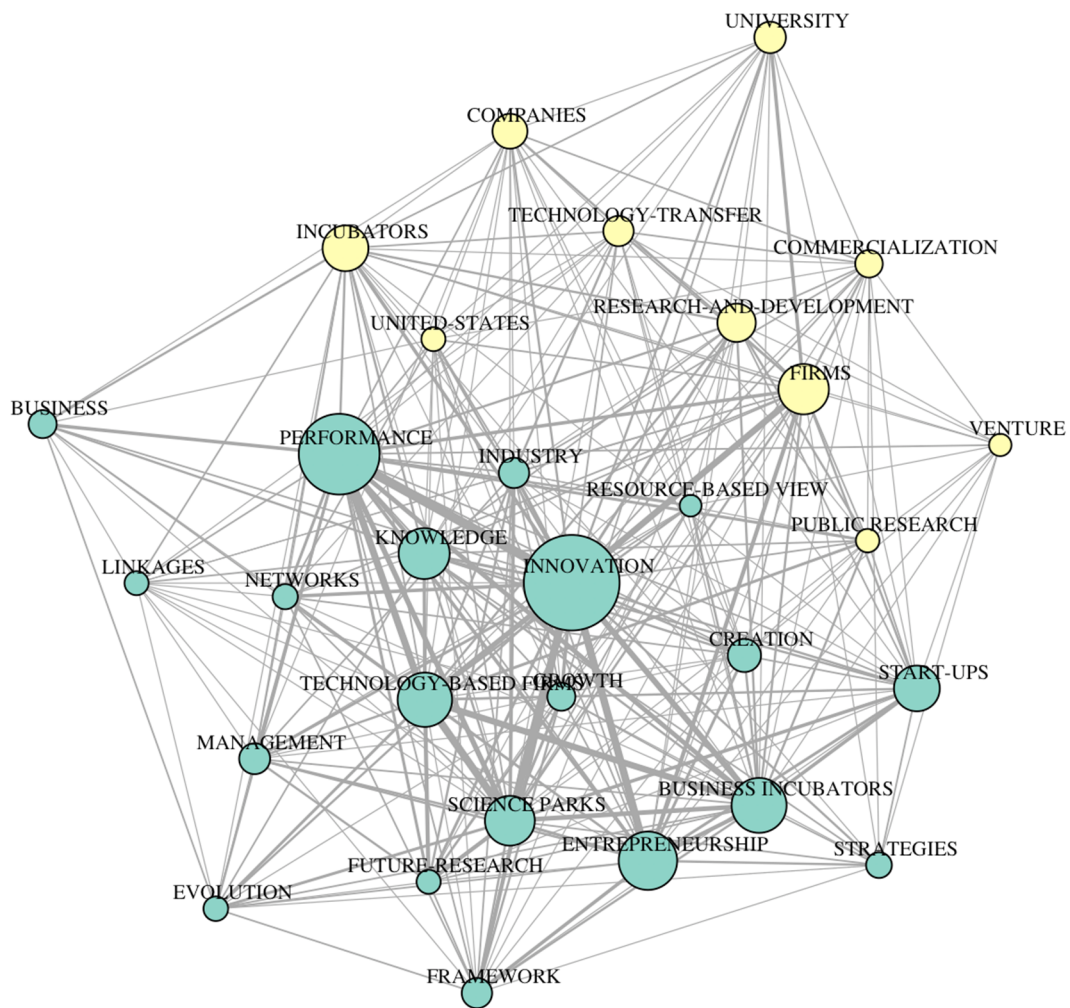
Figure 19: Country Collaboration



Source: Author's Elaboration from Bibliometrix

Figure 19, Country collaboration demonstrates the collaboration map of the countries in global. Respectively to dataset structure, there is smaller range of countries, count of 35. United States of America is the most collaborated country with high impact rate and collaborated with Korea most, that is the reason why that both country have more thicker edge. England comes second and has a strong link with Sweden in respect to works of the authors David Minguillo and Mike Thelwall. Those authors have many number of articles together. According to network above, there is less collaboration than the Business incub* among the countries. The countries which are collaborated more were examined in in Figure 16 and Table 9.

Figure 20: **Keyword Co-occurrences**



Source: **Author's Elaboration from Bibliometrix**

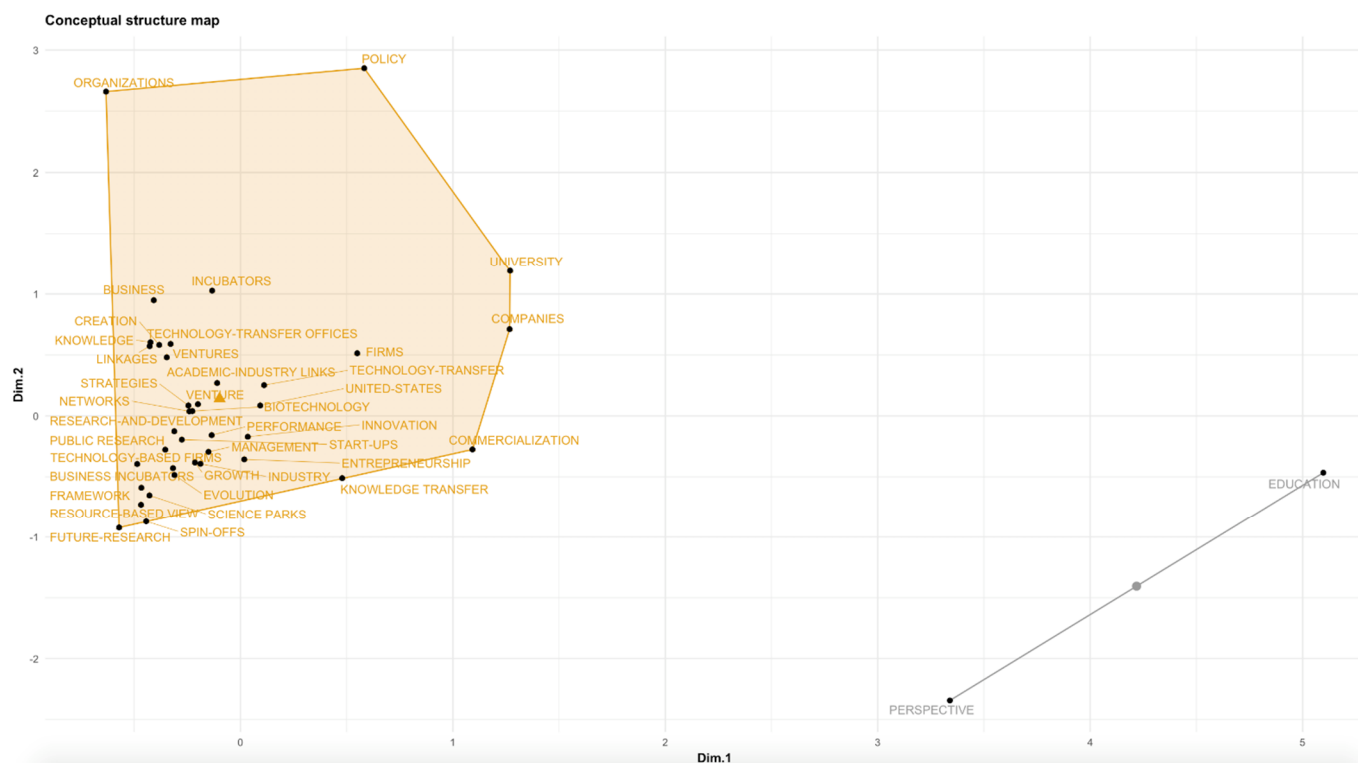
As we mentioned in the Chapter 1, Keyword co-occurrences are the keywords which have connections among each other according to their usage. The main group of keywords here almost the same of 'Business Incub*' as might be expected. Since 'University Business Incub*' is sub-dataset of 'Business Incub*' most of the features of the results are almost identical.

It is important to highlight the fact that, when we compare the two datasets according to their keyword co-occurrences networks, some keywords lie more in the center and some move out to more external position from the center but they are still same group of keywords. Here, in Figure 20, we see that: 'Innovation', 'Performance', 'Technology-based firms', 'Knowledge', 'Growth' and 'Industry' are center-grouped of keywords. 'Science Parks', 'Business

Incubators’, ‘Companies’, ‘Future Research’, and ‘Research Based View’ are surrounding the central keywords.

Second cluster has some new keywords like: ‘Public research’, ‘Commercialization’, ‘Technology-Transfer’ and ‘University’. ‘United States’ appears also in this cluster. Despite the fact that dataset is ‘University Business Incub*’ keyword of ‘University’ stays outside from the main keyword group. We speculate that this might be due to authors keyword selection in the database.

Figure 21: Conceptual Structure Map



Source: Author’s Elaboration from Bibliometrix

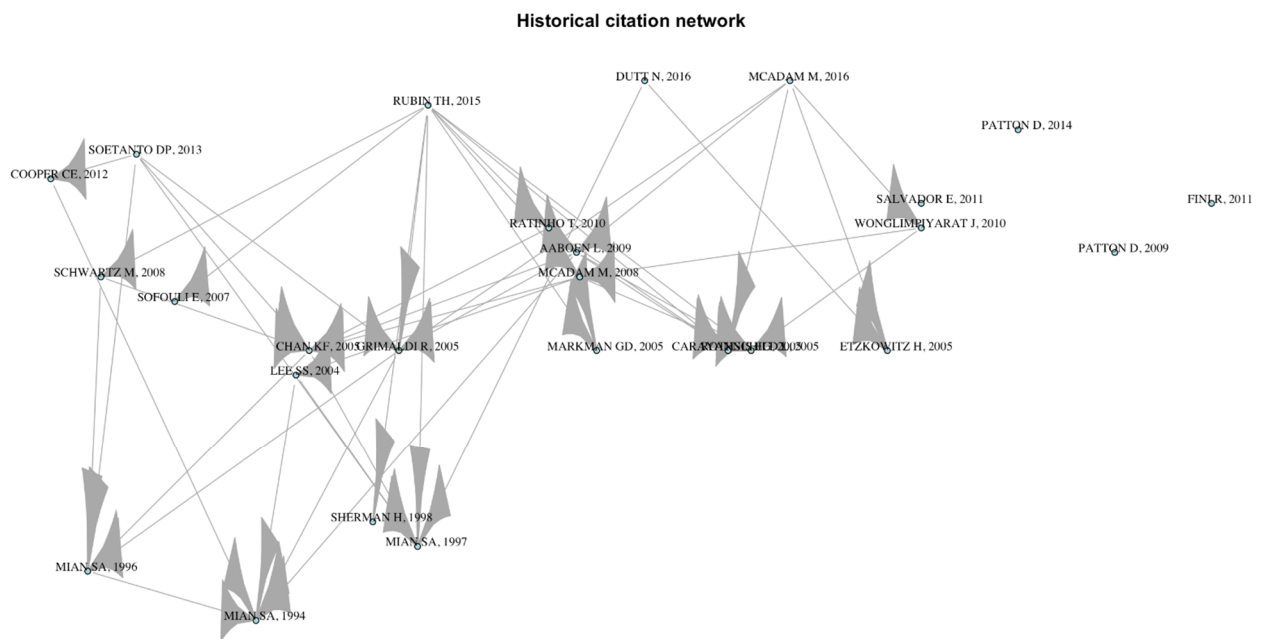
Conceptual Structure map of University Business Incubator dataset, likewise the previous dataset, expressed by two clusters. Particularly, main cluster related to ‘Triple Helix’ concept of the Triple Helix of University- Industry- Government relationships initiated in the 1990s by Etzkowitz (1993) and Etzkowitz and Leydesdorff (1995).⁶ When we are discussing the University Business Incubation processes, policies are important factor of development of it. That is the reason why concepts like ‘Organizations’, ‘Policy’, ‘University’, ‘Companies’,

⁶ The Triple Helix concept, Stanford University, https://triplehelix.stanford.edu/3helix_concept, (08.07.2018)

‘Commercialization’, ‘Knowledge Transfer’ and ‘Future Research’ are binder as well edge concepts. The midmost concept of the main cluster is ‘Venture’ represented by triangle. Closest concepts to ‘Venture’ are: ‘Academic-Industry links’, ‘Strategies’, ‘Technology Transfer’, ‘Networks’ and ‘Research and Development’. Second cluster has two concepts ‘Education’ and ‘Perspective’. Those concepts are afar concepts to our main ‘Venture’ concept in the dataset but they are significant enough to be appear in the map.

Finally, our last analysis is about historical development of the topic. ‘University business incub*’ dataset predictably has almost same historical citation network as ‘business incub*’ dataset that we analysisd in the first chapter. We can say that university business incub* topic is developed mostly in last recent years. We have a literature from 1994 to 2016. This time, literature development is divided into four levels.

Figure 22: **Historical citation network**



Source: **Author’s Elaboration from Bibliometrix**

Table 14: **Chronology of the Articles**

Paper	Year	LCS	GCS
1 MIAN SA, 1994, TECHNOVATION	1994	10	62
2 MIAN SA, 1996, RES POLICY	1996	21	175
3 MIAN SA, 1997, J BUS VENTUR	1997	18	0
4 HERMAN H, 1998, ECON DEV Q	1998	3	49
5 LEE SS, 2004, J SMALL BUS MANAG	2004	6	46
6 CHAN KF, 2005, TECHNOVATION	2005	12	136
7 ETZKOWITZ H, 2005, RES POLICY	2005	3	77
8 MARKMAN GD, 2005, J BUS VENTUR	2005	9	197
9 CARAYANNIS EG, 2005, TECHNOVATION	2005	7	88
10 GRIMALDI R, 2005, TECHNOVATION	2005	11	149
11 ROTHSCHILD L, 2005, TECHNOVATION	2005	5	58
12 SOFOULI E, 2007, J TECHNOL TRANSF	2007	2	32
13 SCHWARTZ M, 2008, TECHNOVATION	2008	4	47
14 MCADAM M, 2008, TECHNOVATION	2008	10	98
15 PATTON D, 2009, J TECHNOL TRANSF	2009	3	22
16 AABOEN L, 2009, TECHNOVATION	2009	5	27
17 WONGLIMPIYARAT J, 2010, J TECHNOL TRANSF	2010	2	21
18 RATINHO T, 2010, TECHNOVATION	2010	6	63
19 FINI R, 2011, RES POLICY	2011	3	66
20 SALVADOR E, 2011, J TECHNOL TRANSF	2011	2	19
21 COOPER CE, 2012, J TECHNOL TRANSF	2012	6	22
22 SOETANTO DP, 2013, J TECHNOL TRANSF	2013	4	28
23 PATTON D, 2014, INT SMALL BUS J	2014	2	15
24 RUBIN TH, 2015, TECHNOVATION	2015	2	23
25 DUTT N, 2016, ACAD MANAGE J	2016	2	9
26 MCADAM M, 2016, TECHNOVATION	2016	2	10

Source: **Author's Elaboration from Bibliometrix**

Historical development of 'university business incub*' provides the same origin articles as business incubators concerning to essential articles in the literature but by the time it differed itself from the business incub*.

In the first group, we have almost same articles: Mian (1994); Mian (1996); Mian (1997) and Herman (1998). Distinctly from the first dataset, Herman (1998) was researched about university-sponsored technology incubators by using key dimensions.

In the second group, we have articles predominantly from the year 2005 except the one of Lee (2004) about networking within the incubator. Chan (2005); Markman (2005); Carayannis (2005); Grimaldi (2005) are same as business incub*. Major focal points of this level of articles are university-industry-government relations, critical success factors and case studies from different part of the world. Another important author Etzkowitz, who introduced the concept of 'Triple Helix, also exists in this group.

When we continue with the third level we see a wider range of papers from 2007 to 2011.

Mcadam (2008); Schwartz (2008); Aaboen (2009) are common articles with previous dataset. University spin-offs, success impact of university linkages, policy context of Science parks is the discussion of this level of articles. Patton (2009) suggested some salient factors to exit strategies.

In the last group, we see articles from 2012 to 2016, there is ongoing scientific contribution to the topic university business incubators. This level of articles examines topics such as Business incubators in emerging-market countries, network analysis, collaborations between incubates and graduated incubates and explore university incubators in regional level.

The results of historical citation network above prove that, university business incub* topic has broader article set and consequently more demographic development in compare to business incub* dataset.

2.2. Appendix of the Chapter

In the appendix of the Chapter, there are ten most cited articles about the topic with a deeper analysis of their theory, empirical analysis, methodology, main issues argued and key findings/contributions.

AUTHOR	ARTICLE	THEORY	EMPIRICAL ANALYSIS	METHODOLOGY	MAIN ISSUES ARGUED	KEY FINDINGS/ CONTRIBUTIONS
AERNOUDT, 2004	Incubators: Tool for Entrepreneurship?	Lack of entrepreneurship and the underdevelopment of seed financing and business angel networks	Examples of incubator types from Europe, comparing with US	Conceptual analysis with an analysis of economic reality, both in the U.S.A. and in Europe	Dynamic process of <i>incubatio</i> and concludes by underlining the importance of close links between incubators and business angel networks	-Definition of typology of business incubators -Application of European models in US and Europe
COLOMBO, 2002	How effective are technology incubators? Evidence from Italy	Whether if the science parks are important element of a technology policy favor of NTBFs	90 Italian new technology-based firms (45 on and 45 off incubator comparison) similar companies which are established after 2000 in technology based sectors	-Chi-squared test -Tobit models	To provide original empirical evidence on how effective are Italian technology incubators that are situated within SPs and BICs	-More comprehensive set of indicators than previous studies -The characteristics of their founders, in terms of educational background, prior working experience, and motivations of the entrepreneurial choice -The growth and innovative performances of firms, and their propensity towards networking: we use a wider set of indicators, including adoption of new technologies and establishment of formal collaborative relations

	Assessing value-added contributions of university technology business incubators to tenant firms	UTBI provide nurturing environment for the development of NTBF	National survey of 6 representative UTBI	Multiple-case design with survey	What contributions do university incubators make to new technology-based start-ups in the form of various services provided? What additional benefits accrue from university relationships? What are some of the implications for technology-based firms?	with other institutions (both universities and business firms) -The access to external financing in the form of public subsidies -Value-added aspects perceived by the clients -UTBI services like university image, laboratories& equipment, student employees
MIAN, 1996						
BOLLINGTOFT, 2005	The networked business incubator—leveraging entrepreneurial agency?	Social capital theory to understand why networked incubator, new model of BI has emerged and what distinguishes it from the more traditional incubator model.	6 months of ethnographic data collected in one networked incubator in Denmark in year 2002	Interpretative methodology that recognizes the importance of social interaction and the socially constructed nature of social reality	What is it that facilitates or hinders networking in a networked incubator? Regarding networking and cooperation, the social aspects of the incubator cannot be	-Empirical observations and the theory on BIs and social networks -Bottom-up approach -Participatory approach

MIAN, 1997	Assessing and managing the university technology business incubator: an integrative framework	-Network theory	UTBI performance assessment framework	35-year-old or older US based facilities and their 29 tenant firms	Survey	Components are identified for assessing and managing UTBIs	3 performance dimensions: 1. Program sustainability and growth 2. tenant firm's survival and growth 3. contributions to the sponsoring university's mission
PHAN, 2005	Science parks and incubators: observations, synthesis and future research		A study to fill the lack of clarity of performance and its measurements		Theoretical model	Demonstrate how each sheds light on an unexplored dimension of this emerging literature of science parks and incubator analysis	- Synthesizing the findings of the papers about identifying the nature of performance and outlines a broader research agenda
BERGEK, 2008	Incubator best practice: A framework		Develop a framework that can serve as a basis for identifying best practice incubator models for policy makers' resource allocation	16 Swedish incubators	Best practice identification requires a holistic approach	Combination of outcome indicators, are used to identify best practice models and to distinguish between different models that are	-Develop a framework that can serve as a basis for identifying best practice incubator models and for more rigorous evaluations of incubator performance

HACKETT, 2004	A Systematic Review of Business Incubation Research	Literature review on: Incubator development, Incubator configurations, Incubatee development, Incubator-incubation impacts and theorizing about incubators-incubation		Systematic literature review	equally effective in achieving certain goals	
BAKOUROS, 2002	Science park, a high-tech fantasy? An analysis of the science parks of Greece	Role of science parks	3 science parks of Greece	Case study	Evaluate science park performance in terms of university– industry interactions and on-park companies’ synergies	-Focusing on the process of incubation rather than on the incubator facility and its configuration will draw attention to the underlying causes of new venture development in an incubator-incubation environment -All the cases in the study has different level of links with external partners (formal, informal)

<p>BRUNEEL J, 2012</p>	<p>The Evolution of Business Incubators: Comparing demand and supply of business incubation services across different incubator generations</p>	<p>Do incubators have adjusted their value proposition to incorporate recent incubation paradigms or have simply remained operating as originally founded?</p>	<p>7 Business incubators and their tenants</p>	<p>Case study</p>	<p>Set out to research whether older generation BIs updated their service portfolio to cover today's incubation paradigm, and the extent to which the service portfolio fits each generation of BI tenants</p>	<p>-7 case studies representing the three generations of BIs, we observe no significant differences across generations in terms of their service portfolio -Only firms located in third generation BIs make full use of the service portfolio</p>
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CHAPTER 3

UNIVERSITY BUSINESS INCUBATORS COMPARISON: AN AWARD-WINNER EXAMPLES FROM ITALY AND TURKEY

3.1. The Research

Basing on the vertical scope, segment scope, geographical focus, industry focus of Porter's (1986) four competitive scope elements and additionally, consideration of distinctive strategic objectives such as for-profit or not-for-profit, von Zedtwitz (2003) classified business incubators into five main models. These business incubators are regional business incubators, university incubators, virtual incubators, independent commercial incubators, and company-internal incubators. The five different incubator models can be further differentiated by the three remaining scope dimensions of segment, geography, and industry:

- Segment scope allows incubators to generate startups from distinct sources. University incubators typically give preference to faculty and student entrepreneurs. Corporate incubators prefer their own employees to external entrepreneurs. Other incubators tend to keep their doors open to a variety of sources.
- The geographical focus is a natural competitive factor for regional business incubators since their mission is to support new business locally. Networks are crucial for successful incubation, and since networks are usually limited to certain regions, many incubators strive to establish a good local presence.
- Industry focus can be another competitive dimension for incubation, not only because of the professional expertise and competencies of incubator managers but also because of their ability to create synergy among incubating entrepreneurs (Von Zedtwitz, 2006).

Despite the classification of business incubators, today we know that each model of business incubator could have the same competitive factors. Could university business incubators also have the same aim as regional business incubators in terms of their mission to support new business locally? A recent study argued that university incubators provide more resources to member companies than other incubators and provide 'greater connectivity and legitimacy with respect to important contingencies associated with key industry and community stakeholders' (Lasrado et al. 2016). Moreover, it is well-known fact that, university business incubators have

a great role as being a bridge between the academic world and the business world. The main goal of university-related incubators is to transform research and development findings into new products or technologies, that is, they are primarily interested in development as an end in itself, rather than nurturing and developing entrepreneurial talent, companies, and profits, as is the case in order types of incubators. (Bøllingtoft, 2005). Based on the diffusion and the effects of university business incubators, this chapter is examining university business incubators based on their networking activities in respect to different geographical scopes and intentions of the networking.

In the literature, much research on networking activities of university business incubators has been done. A large and growing body of literature has investigated on networking activities of university business incubators and outputs of networked incubators. Networking is one of the main competitive advantages of all models of business incubators and also it has a huge impact on the development of the entrepreneurial environment. The networked incubator incorporates and promotes mechanisms that foster partnerships between the incubator firms and other external parties thus, facilitating the transfer of knowledge and expertise between small start-ups, thereby laying the foundation for fruitful relationships (Hansen, 2000). However, to the author's best knowledge, very few publications can be found available in the literature that addresses the issue of the geographical scope of networking how it differentiates its' development structure. Due to this reason, the objective of this chapter is to analysis the networking activities in different geographical scopes; local, national and international and how do they structure in country comparison.

If we look at the dictionary⁷ definitions of following geographical scopes:

-local: 'from, existing in, or serving a particular place or small area'

-national: 'relating to countries or to one particular country'

-international: 'involving more than one country'

Pivoting on dictionary definitions of geographical notions, scope of this work is starting from local: small area of networking (city, commune, region, local foundations) continues with more wider aspect, national: whole country (governance policies, state supports, private companies, public companies) and finally, international: global (collaboration with other countries, national





⁷ Cambridge Dictionary, <https://dictionary.cambridge.org>, (08.09.2018)

and international funding, participation of international networks, international companies).

Embracing the presentation of all notions above will head us to be able to compare two different countries. Italy and Turkey are the two countries which are comparing in this study. Italy, as a part of the European Union, is ranked as ‘Moderate Innovators’ which has a performance between 50% and 90% of the EU average according to Innovation Scoreboard 2017. Since Turkey is not part of European Union, it is not evaluated in European Innovation Scoreboard, but as a reference of comparison, Turkey was listed at number 43 with 38.90 points in ‘Global Innovation Index’. According to the same index of 2017, Italy was at number 29 with 46.96 points on the other hand.

In the light of Global Innovation Index, if we compare those two countries according to ‘Innovation linkages’ indicators, the result can be seen in Figure 23 that, Italy is at the place 35 and Turkey is at 75 in the overall ranking. Innovation linkages indicator based on few criteria such as ‘University/ Industry research collaboration’, ‘GERD (Gross expenditure on R&D) financed by abroad’, Joint venture/ strategic alliance deals’ and ‘Patent families filed in at least two offices’. When we take a look at the criteria in the comparison table we see that, Turkey is far below of Italy in all of them. Hinging on Figure 23, it is understood that Turkey has a long way to develop favorable innovation environment.

Figure 23: Comparison of Italy and Turkey

BUSINESS SOPHISTICATION		Turkey		Italy	
The fifth enabler pillar tries to capture the level of business sophistication to assess how conducive firms are to innovation activity.					
		Rank	Score	Rank	Score
Overall		75	29.33	35	39.55
Innovation linkages		96	21.21	43	35.30
University/industry research collaboration 		60	41.15	43	44.68
GERD financed by abroad 		85	1.81	49	15.65
Joint venture/strategic alliance deals 		79	3.87	61	7.12
Patent families filed in at least two offices 		35	5.82	25	18.82

Source:

<https://www.globalinnovationindex.org/analysis-comparison>

To the contrary to Turkey's backward capabilities in the area of innovation, Turkey has two university business incubators in UBI GLOBAL world ranking report. Although its limited nature of innovation in Turkey, university business incubators are able to race with the developed, more innovative countries.

On the other hand, Italy is a moderate innovator according to European Scoreboard 2017. Italy's performance has declined by 0.2% relative to that of the EU in 2010. In respect to the report, relative strengths of the Italian innovation system are in Intellectual assets, Attractive research systems, and Innovators. Relative weaknesses in Italy are in Linkages, Finance and support, and Firm investments.

After drawing a general picture of both countries innovation environment, we will start comparing two university business incubators that we have chosen in our case study.

In order to explain the reasons for sample university business incubators, and why they are chosen, first we have to mention UBI GLOBAL report and what is its scope is.

UBI GLOBAL (University Business Incubators Association) is Stockholm based entrepreneurial firm which is aiming to help business incubators and business accelerators become more efficient and competitive through a comprehensive benchmark. In order to achieve this, UBI conducts a worldwide research among all the business incubators & accelerators, multinational corporations and government innovation agencies. The comprehensive research within the all-university incubators over the world, involves over 600 incubators in 53 countries, 387 different locations. Last research report was done in the year 2017 with data of 2016 by utilization of 21 key performance indicators of 3 main categories and 7 subcategories. Three main categories are: 'Value for Ecosystem', 'Value for Client Startups' and 'Value for Incubation Program'. In the main category of 'Value for Client Startups' there is 'Access to Network' subcategory which we are also focusing on this work. UBI assesses this subcategory according to 'Partners for business development', 'Events for stakeholder engagement' and 'Engaged alumni for peer support'. Our evaluation will be much deeper in terms of types of partnership and aim those relations, additionally, we are assessing investor relations favor by networking activities.

3.2. The Sample

There are multiple deliberate reasons why these two incubators are chosen as the sample of this study. Both incubators are belonging to the technical state universities in big metropolitans. This possessed features to have great contributions to both universities in terms of networking activities and providing academic resources to themselves. Furthermore, both university incubators are providing fully equipped infrastructure for Start-ups, good quality of training programs, seminars from industrial partners, a wide range of mentors, prototyping laboratories, local, national, international partners and investors. Therefore, tenants can explore, evaluate and exploit ideas and at the end, they transform into economic entrepreneurial initiatives. Moreover, both university business incubators involved in partnerships, networks and other relationships to generate an umbrella for interaction, collaboration and co-operation that will be going to examine. In addition, both incubators are managing activities in the same direction, such as co-working spaces in the local context in order to provide richer incubation process to the Startups and provide more space and facilities.

Finally, both university incubators are in the third place in UBI GLOBAL world ranking report, PoliHub as a business incubator which is managed by the university and ITU Cekirdek as a business incubator which is affiliated by the university. On the other hand, this ranking also motives both incubators to become partners with each other in an international network.

3.3. The Method

The purpose of this work is to understand the networking activities of university business incubators in different geographical scopes. Therefore, we decide to pick two university business incubators in two different countries, one from ‘developed country’ and one from ‘developing country’ group to illustrate the main partners of both incubators according to their geographical scopes, how do they create those partnerships, what are the main activities that they realize together, is there any intermediate third parties and government policies behind of it. What kind of activities are conducting in both university business incubators in order to become more international and finally in respect to their networking activities what kind of industrial partners both UBIs have and how do they create those relationships.

In addition to the above-discussed, since government policies play an important role in the subject of University Incubators, we also illustrate how government policies are differentiating to create linkage between Universities and Industry and favor to their networking activities. How constructive the European Union to create an international network and what is the

challenges for Turkey to reach those networks. How do both countries proceed with their entrepreneurial activities in the international area and what kind of support do they get from the third parties. Is Turkey able to attract foreign investment, how do they achieve to get foreign investment and what kind of difficulties do Italy have to find foreign investors.

Having this aim lead us to held exploratory interviews within both incubators. Additionally, with secondary data from PoliHub and ITU Cekirdek websites and documents on the website, we have completed the gaining information from the incubators.

Primary data was collected through structured Skype interviews with management of university business incubators around one hour. Moreover, interviews contain three main sections in order to categorize the information properly.

The first section is about getting the general information about UBIs. Here, we got the numeric information such as a number of incubation proposals, number of incubator's employees, amount of investments for the tenants, most popular incubated field. Besides this, we asked for the brief historical development of the incubators and their milestones. Section two was the main part of the interview, which was about networking activities. Referring to the main partners of different geographical scopes, we asked about the name of the partner, type of relation, activities and the aim of the relations to illustrate all the main partners. In order to investigate partners in all aspects, we also asked about frequency of activities conducting with the partners, strategies and convenience of creating partnerships and if there is an intermediate third party exists. Apart from that, there were questions about future partners and outsourcing. Lastly, tailored questions asked for both incubators in respect to their special programs that they are realizing and main partners of the programs. In the third section, we focused on investor relations, where we had questions about industrial partners, funders, financial supports, government policies, the intermediate role of the government and exit strategies.

First, we interviewed ITU Cekirdek on 19th of October around one hour (65 minutes). Contact person:

- Selma Bahçivanoğlu; the Manager and responsible of International Acceleration who has been working in Cekirdek for five years.

Second interview was done with PoliHub on 26th October also around one hour (62 minutes). Contact person is:

- Federica Biancon; Startup Selection and Investor Relations Leader who has been working in PoliHub for three years.

At the of the thesis, there is the Appendix, where two different questionnaires customized for both incubators can be found. Those questionnaires help us to obtain the Primary data. One hour Skype interviews are done with Three-sectioned questioner.

In order to have a clear overview of each business incubators, after mentioning about the limitations of the thesis work, we will focus both of the university business incubators separately. Then, the comparison will be made according to chosen criteria. Conclusion and future implications will be at the end of the thesis aiming to identify the partnership activities and their consequences on the performance of the university business incubators.

3.5. ITALY – Incubator of Politecnico di Milano: PoliHub

First university business incubator in our sample is PoliHub, the incubator of Politecnico di Milano (Polytechnic University of Milan) from Italy. In the light of the information which is provided by the interviewee, here we will start with general information about PoliHub.

In the beginning, in 2000, PoliHub was born as a body of the university in other words, as a partner of the university who in charge of supporting university spin-offs. The name was also not PoliHub, it was calling ‘Accelerator of Politecnico di Milano’. Then, the initiative has been rebranded as ‘PoliHub’ and relaunched it as how we know it today. The ‘Foundation of Polytechnic of Milan’ (Fondazione Politecnico di Milano) made the biggest investment to PoliHub. Moreover, the other institutions for example Municipality of Milan also intervened. Public administrations were sponsor initiative for the first two years in order to support PoliHub, however as soon as PoliHub became more profitable public administrations have stopped their financial support and since a long time PoliHub is independent.

PoliHub is still not a part of a Science Park, because even though Polytechnic University of Milan has three campuses with 200 laboratories scattered around the city, the university doesn’t have a licensed technology transfer zone yet. Polytechnic University of Milan is investing a lot to the areas of technology transfer development, especially for research projects it is important to requalify them, in the future it can be expected that it will transform into science park.

PoliHub business model becomes successful because PoliHub has been able to combine the university assets and by leveraging on them was capable to gain technical and intellectual property point of view. Especially last 5 years it has been understood that, PoliHub can be much more successful if it can turn itself into an ecosystem in Milan as an innovation district, where there are not only startups but also bigger companies and already established traditional companies where they are close to the university and also close to each other in order to foster this cross-fertilization among the market, startups and the university. That is the reason why

PoliHub gravitated not only startups but also small and medium enterprises and corporations around itself and create its own ecosystem.

By the time PoliHub enlarged this model and opened up its edges and created a couple of success cases where PoliHub has been quite good at the coordination of all the resources inside of the university to build up new innovative product whose intellectual property was not coming from the university. As a result of this success, Polytechnic University of Milan turned into the first technical university in Italy who is able to create this ecosystem. Today, PoliHub enabled some important applied research projects inside Politecnico di Milano, and with the expertise of Fondazione Politecnico di Milano and its extended network, can facilitate the access to funding in order to turn the intellectual property into a real prototype.

Another topic that needs to be addressed is the space expansion model of PoliHub. In contempt of all the theories about incubation process which are also mentioning virtual incubation process, PoliHub convinced that physical proximity is a crucial element of the incubation process, especially in Italy in order to create opportunities. Proximity to universities in order to procure the recruiting of talent and knowledge between startups and big companies, partners, suppliers and customers as a result of being in the same place is much easier than a virtual incubation process. Because of this belief, PoliHub has 6500 square meters of spaces with 120 companies in the portfolio. Those companies are divided into different categories, from the idea phase or the project phase to scale-ups to R&D departments or innovation units of big corporations to SMEs which are decided to keep their operations in PoliHub spaces.

Besides above, Polytechnic University of Milan recently signed a new agreement with incubator 'TUS Star' of Tsinghua University from Beijing. According to that agreement, Polytechnic University of Milan and Tsinghua University will run a joint campus for design skills development, next to PoliHub, which is conceived for Chinese students who will learn from the one of excellence in Italy. Addition to this, TUS Star also invested into many building in the innovation district of Milan, with the aim of internationalizing their portfolio companies in Italy and Europe.

The most recent accretion is made on 1st October 2018 by the launch of the investment fund of Polytechnic University of Milan. 60 Million Euro of the fund dedicated to technology transfer, besides the majority of the investment will be targeting university spin-offs. The investment will use for all different stages of the startup projects from the idea phase to scale up, total in five years. Main investors are 'Cassa Depositi e Prestiti' and 'European Investment Fund'. European Investment Fund and 'Cassa Depositi e Prestiti' will put almost half of the total fund and the rest will be collected from industrial investors, mostly from the manufacturing industry

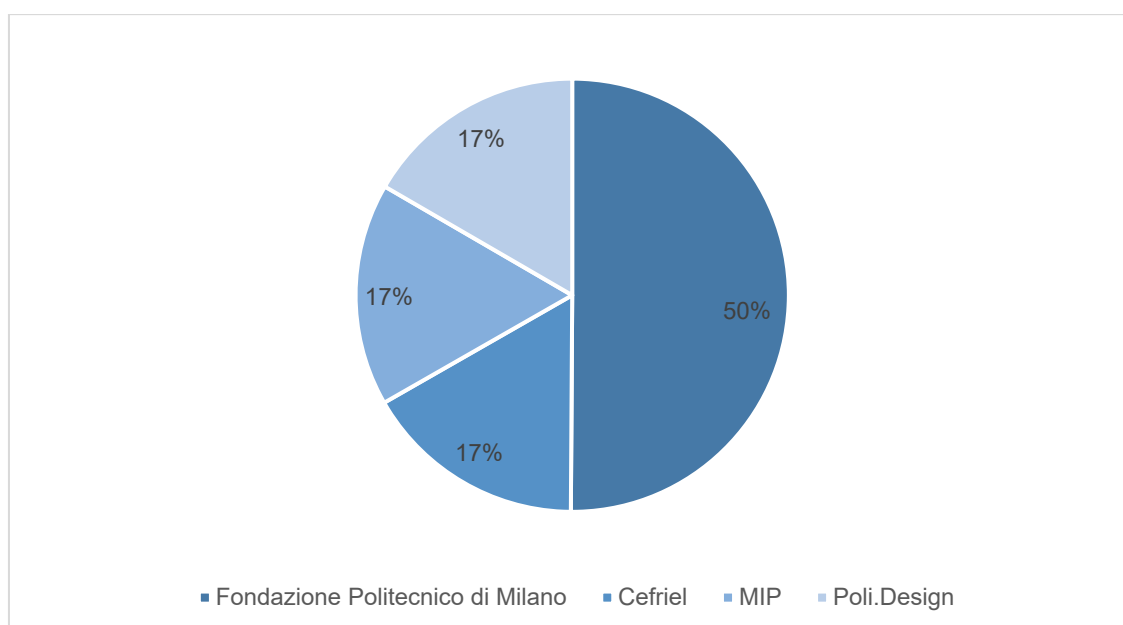
that is particularly strong in Italy. To realize corporate venture capital, industrial partners joining already an established funding instead of creating their own funds.

If we continue with the subject of financial support, PoliHub reached break-even last year, without sponsoring by government funds. PoliHub is completely independent which should be something important to mention because the majority of university incubators are sponsored by government funds but it is not a valid business model for university business incubators in Italy. Consequently, PoliHub had to find its' own sustainability model. This is achieved through collaboration with the corporations that we are going to mention in the following paragraphs. The projects which are running with industrial partners, provide financial resources to be sustainable and pay the all expenditure which is related to the workforce of the university incubator. On the other hand, 40% of PoliHubs' income is coming from the fee that startups and all other companies are paying to be in the innovation district of Polytechnic University of Milan and utilize the spaces and the services.

Apart from above, there are some grants from Lombardy Region and from specific entities/ Public Administrations (e.g form Puglia Region) Polihub works with to foster entrepreneurship in the territory.

Fondazione Politecnico di Milano holds half of the share capital. The rest of the share capital is equally distributed between Cefriel, MIP and Poli.design. Chart below represents the funders with percentage:

Chart 1: Shareholders of PoliHub



Source: **Author's Elaboration**

In PoliHubs' District, most of the startups are already serving the Italian market. As a fact of the Italian entrepreneurial model, foreign investors are expecting Italian startups first to be funded domestically before going international. Foreign investors are willing to invest in Italian startups after they are able to get funding from Italy.

Based on this, PoliHub's priority at the moment is not attracting foreign investors. There are a couple of reasons for it, first as soon as the startups are ready to fundraise in abroad, they are independent of PoliHub. Those startups are able to create their network of investors on their own, also with possible contributions of their previous investors. In the case of venture capital investment, startups look for new investor inside of their country at the initial stages. If we consider the current foreign investment in PoliHub, we can say that the main foreign investment comes from the European community. On the other hand, a couple of startups in PoliHub raised funds from '360 Capital Partners' which is an Italian-French Venture Capital that has offices in Italy and in France.

If we focus on the intermediary role of the government on foreign investments, we can say that unfortunately, the Italian ecosystem is lagging behind comparing the other European countries. The most important government measurements in Italy are run by 'Fondo Italiano d'Investimento' (Italian investment funds) and 'Invitalia', which also promotes several different measurements to fund startups. By looking at the complications the startups have at the beginning, PoliHub launched the technology transfer fund with the belief to support the its' start-ups in the most dedicated phase. The tech-transfer fund being intervened in the beginning phase, to implement the first financial support to the innovative projects on the path of turning them into businesses. Apart from being an investor in 'Cassa Depositi e Prestiti' there is not any other intermediate relationship directs from the government. For regarding foreign investment, there is not any third party who has an intermediary role, PoliHub is completely alone.

On the other hand, the most important measurement from the European community is 'Horizon 2020'. This instrument is very important and some most promising startups able to benefit it, especially because the second phase of this instrument can reach several million investments and it is completely equity free. It can say that for startups, it is the best option, but unfortunately, regarding its competition, it is really hard to get it.

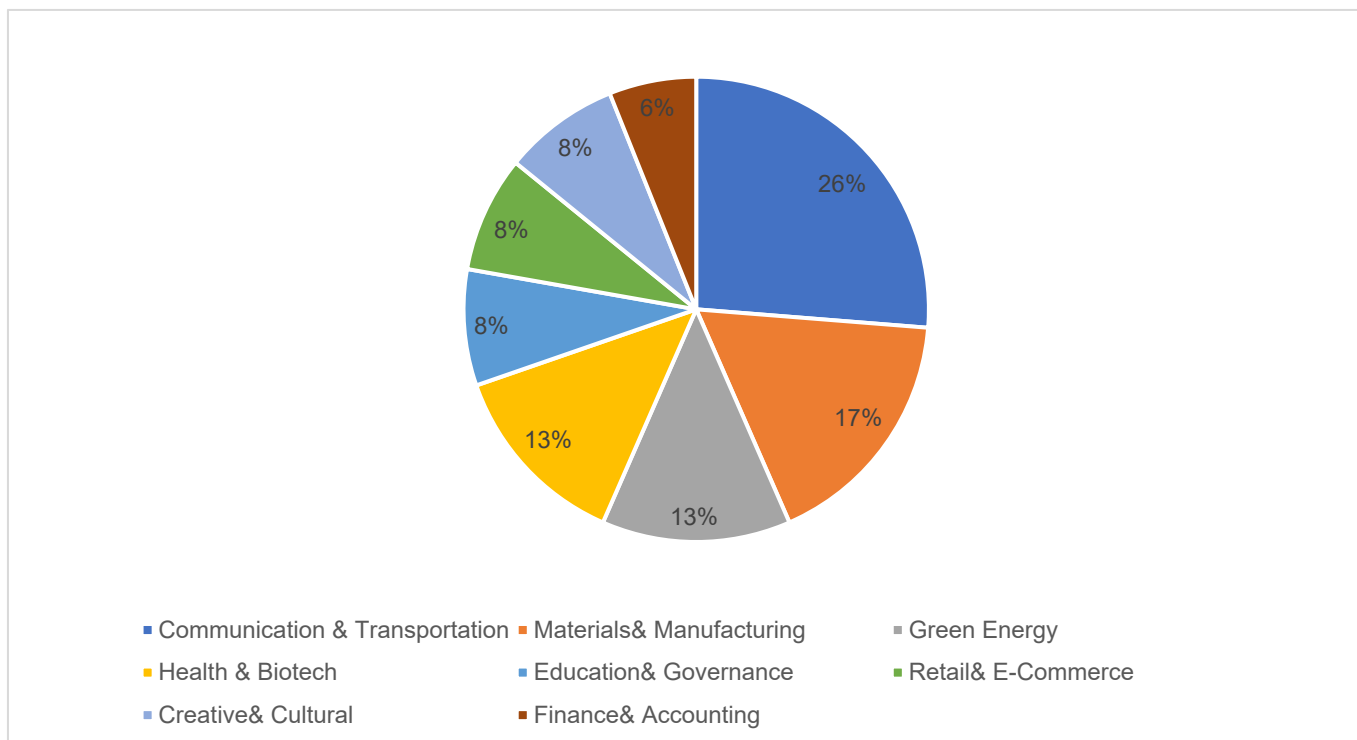
In terms of government policies on exit strategies for the Start-ups in Italy, the only exit done by the university spin-offs are, acquisitions by other companies. It is an M&A rather than an IPO, for those cases, there is nothing relevant government does about M&A.

Lastly, we finish the general information and investor relations of PoliHub with official 2017 data of the incubator:

- 113 incubated Start ups
- 30 Million Euro Cumulative Turnover
- More than 1200 application received
- 8 major acquisitions
- Cumulative fund raised by Start-ups 12 Million Euro

Chart 2 represents the percentage of the client startups operated in the following sectors:

Chart 2: Sectors of client Start-ups



Source: **Author's Elaboration**

After revealing the introductory information about the incubator, here we can proceed with the main part of the interview; Partner analysis according to their geographical scope.

Local Partners of PoliHub: Most important local partners are especially public administration, funders of PoliHub and other local incubators & universities and hubs. All the local partners of PoliHub are appear in the following table.

Table 15: **Local Partners of PoliHub**

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
Municipality of Milan (Comune di Milano)	Main Public Administration partner, financial support at the establishment of PoliHub and stakeholder
Lombardia Region (Regione Lombardia)	Main Public Administration partner, financing activities for laboratories and equipment
Commercial Chamber of Milan (Camera di Commercio di Milano)	Conducting entrepreneurial activities with PoliHub
Camera di Commercio di Lecco	Chamber of Commerce of Lecco, Lombardy. Events, awareness activities realize together
CEFRIEL	Not for profit consortium company founded by Polytechnic University of Milan, 16,6% Shareholder of PoliHub
MIP	Graduate school of Business of Polytechnic University of Milan, 16,6% Shareholder of PoliHub
PoliDesign	Founded by Polytechnoc University of Milan, 16,6% Shareholder of PoliHub
Foundation of Polytechnic of Milan (Fondazione Politecnico di Milano)	Main Shareholder (50%)
Tavoli Expo	Project conceived by the Chamber of Commerce of Milan aiming to scout and promote new entrepreneurial ideas
SiamoSoci	Social innovation group in Milano
Fondazione Cariplo	Willing to sustain the economy, entrepreneurs and students
COBOX	Co-working spaces of Polytechnic University of Milan, free movement for using their facilities
ComoNext	Co-working spaces of Polytechnic University of Milan, free movement for using their facilities
JEMP	Junior Enterprise of Polytechnic University of Milan, free movement for using their facilities
Fondazione Filarete	Hub of Milan University, local university partnership
Unicredit Start Lab	Hub of UniCredit
Iseo Hub	Hub in Brescia established by the help of Polytechnic University of Milan

Barcamper	Private accelerator in Milan
Parco Tecnologico Padano	Techno-park in Lodi, Milan
Humanitas University	Medical School in Milan, local university partnership
Università Luigi Bocconi	Local university partnership
Innovits Lab	Private firm about innovation consulting in Milan

Source: **Author's Elaboration**

The municipality of Milan was sustaining PoliHub financially at the beginning of the establishment. Since many years they are only partners to execute many events, competitions, awareness and monitoring activities together. Public administrations the stakeholders of PoliHub. Due to be a certified incubator, PoliHub runs public service in order to foster the local economy. Local partnership conducting owing to several reasons. For example, grants and government funds are receiving to startups, competitions are organizing together, local partners are sponsors to the expansion plan of some of the facilities, machinery can provide for laboratories. For instance, Lombardia Region has sustained the financing activities for laboratories and equipment.

Most public administration partners are inside the region, and also there are many foundations, like Fondazione Cariplo, which are willing to sustain the economy, entrepreneurs and students in general.

Further, other types of local partners are local incubators and hubs. ComoNext and CoBox are co-working spaces where Polytechnic University of Milan has two other branches. University has a pole in Como and Cremona where ComoNext and CoBox are located. PoliHub has a relationship with those branches because the Foundation of Polytechnic is PoliHubs' main shareholder and meantime shareholder and promoter of those initiatives. In Milan, there is not enough space and facility to locate the laboratories as a result of this, some specific startups which they need laboratories are directed, if they want, to ComoNext where there are the laboratories.

On the other hand, PoliHub also has an institutional relationship with those places in favor of some other opportunities when they arise.

As a part of a university, finding and engaging with local partners is very easy because Polytechnic University of Milan is well recognized and credible university. The frequency of the activities is extremely high since some of the partners of PoliHub are also shareholders.

National Partners of PoliHub: National Partners can be analysed in three groups: First, public administration and second group is corporations & industrial partners. Finally, last group is national foundations, social responsibility programs and national events. Table 16 shows the national partners of PoliHub:

Table 16: **National Partners of PoliHub**

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
Ministry of Economic Development	Policymaker, not a direct relationship with any Incubator
Italian Trade Agency	Collaboration abroad for expos
Chamber of Commerce	Collaboration abroad for expos
AIFI	Italian private equity, Venture capital and Private debt association
Regione Puglia	Public administration of Puglia partnership in order to foster entrepreneurship activities nationally
Unioncamere Lazio	Chamber of Commerce of Lazio
Camera di Commercio Italiana a Londra	Chamber of Commerce of Italy in Londra for international events
Camera di Commercio Italiana a Singapore	Chamber of Commerce of Italy in Singapore for international events
Fondazione Ricerca e Imprenditorialità	National foundation on innovation based in Genoa
Deloitte	Official partner, on board with PoliHub and provide mentorship for innovative projects
Pirelli	Has a joint research center with several departments of the university all the year to accomplish research and development activities
Fondazione Everis	Sponsor scouting activities and mentorship
Fondazione Vodafone	Sponsor scouting activities and mentorship
Fondazione Italiana Accenture	Sponsor scouting activities and mentorship
Novartis	Sponsor scouting activities and mentorship
APSTI	Italian scientific and technological parks network

Digital 360	Multi-channel platform of Italy expert in innovation
EconomyUp	Innovation media, events association
ESN Italia	Erasmus Student Network in Italy
Fight the Stroke	Social responsibility Project
Ingegneria Senza Frontiere	National association on awareness projects
Fondazione Ugo Bordoni	Cultural and Research Institution under the supervision of the Ministry of Economic Development
Italia Startup	Non-profit association supports to the Italian innovation ecosystem
FORUM PA	Society in Palermo founded by Digital 360 to increase the innovation capacity
Italia Camp	National association for social innovation
Global Startup Expo	Innovation event
PNI Cube	National Award for Innovation: StartCup
Startup Initiative	Intesa SanPaolo Incubator
Associazione Prospera	Public Accelerator about sustainability
SMAU	National innovation events, increasing the entrepreneurial culture and business opportunities
Startup Pulse	Media Channel about Innovation, Start-ups in order to increase the ecosystem
StartupBusiness	Media Channel about Innovation, Start-ups in order to increase the ecosystem
StartupItalia	Media Channel about Innovation
La French Tech	French digital startups (Italian branch)
ICT4Executive	Cultural national Project founded by Digital 360
Mi.to Technology	Consulting firm about IP law, technology and business strategy
APCO	Social Responsibility project
Meta Group	International consulting firm based in Rome about innovation and entrepreneurship policies and strategies

Source: **Author's Elaboration**

Public administration group of national partners are supporting PoliHub by the international activities, such as promoting fairs for startups, supporting companies who are willing to expand their business global. That is the reason why PoliHub collaborate with 'Italian Trade Agency' and with the 'Chamber of Commerce' abroad mostly. 'Ministry of Economic Development' is another important partner solely it is not a direct partner, because PoliHub is not privileged entity. The main reason of this relationship is because they are policy makers.

PoliHub has another kind of relationship with the second group of national partners: corporations & industrial partners. The majority of the industrial partners are national. International companies which have a partnership agreement with PoliHub are Italian branches of those international companies in case if they are not Italian international companies.

Deloitte is the main partner of PoliHub due to joint initiatives they are conducting together. Deloitte is also the sponsor of the activities of PoliHub in order to be privileged entity when the startups of PoliHub generate an innovation. During the idea call time of PoliHub, Deloitte is PoliHubs' official partner and they are on board with PoliHub. Moreover, Deloitte provide mentorship for innovative projects. In maturity phase of the startups, Deloitte put the startups in contact with their corporate portfolio in order to bring the new startups quicker to the market. Vodafone, Novartis, Everis, instead, sponsor scouting activities in order to recruit ideas, people and position themselves in an innovative landscape also execute branding, repetition to foster innovation entrepreneurship in Italy. Lastly, for intense projects, industrial partners stay only in research activities. For example, Pirelli has a joint research center with several departments of the university all the year to accomplish research and development activities.

If the industrial partner wants to run an innovative project or marketing project, PoliHub can create a call for ideas, in the cases like that we can say that industrial partners became customers. On the other hand, more outsider partners can also become a part of the partner community, provide their networks and business opportunities. Moreover, they can also provide mentors. PoliHub has a mentor club which contains more than 100 mentors with a different background. The mentors are mostly coming from the big corporations but they are also top executives, former executives, entrepreneurs, investors and business angels. PoliHub is training the mentors, test them on the field, then they become a mentor to startups.

On the other hand, industrial partners also can be sponsors to calls, a channel for CSR (Corporate Social Responsibility) marketing activities of startups, intermediate contact between university and industry, promote the startups, foster the innovation in Italy and create business for startups.

Last group of national partners are mostly for national innovation events, creating awareness, social funding and social responsibility activities targeting the increase of entrepreneurial culture nationally.

Creating a network with national partners can be moderately difficult in terms of the parties that are involved. If they are industrial partners, mostly it requires a high level of decision maker approval like CEO on industrial partner side and director or president of the foundation on incubator side. Even though, being part of a university ecosystem ease the creation of this kind of national partnerships. The frequency of the activities is high.

According to consideration of the governments' intermediate role of networking, except what is done by Italian Trade Agency or Chamber of Commerce which are government related but not a direct effort of the government, the government doesn't have any strong intermediate role in terms of putting effort to prove networking activities.

International Partners of PoliHub: From international networking aspect, all the partners are incubators which are managed or affiliated by a university. There are also few international companies which are supporting PoliHub as software service. Here is the table of the international partners of PoliHub:

Table 17: **International Partners of PoliHub**

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
University of Latvia Student Business Incubator	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
ACE	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
Unternehmertum	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
The Simula Garage	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
Level 1	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
Chrysalis	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
IMT Atlantique	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
Centro Europeo de Empresas e	International university business incubator partner for

Innovacion de Malaga	entrepreneur free movement agreement up to 2 weeks
ITU ARI Teknokent	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks
BusinessFrance	French national agency supporting the international development of the French economy, has a collaboration with PoliHub in terms of foreign investments from France
CYFE	Software
ENOVIA	Software
EIT Digital	Digital innovation and entrepreneurial education organisation

Source: **Author's Elaboration**

PoliHub is building up a network of UBIs all over the world and among them, the majority is coming from UBI GLOBAL ranking list. ITU ARI Teknokent is one of the partners of PoliHub due to that reason. The main goal of this partnership is obtaining an international network for start-ups all over the world. In respect to this partnership, every startup can move freely up to 2 weeks for each incubator within the international incubator network. Thanks to this partnership, startups can meet with the different markets, understand the competencies there and attend incubation programs of other incubators for free. The process is the same for the other startups who are willing to come and visit PoliHub. This partnership model is based on 'zero money' conception, there is no cash in those partnerships.

Another benefit of this partnership is that the scouting activities or calls for ideas from local industrial partners can reach to an international entrepreneurial network. As an example from this year, scouting activities from a local industrial partner was able to receive innovative projects from France, Turkey and Germany thanks to this network through the help of PoliHub. In the aspect of European Union support in terms of networking, PoliHub is not sponsored by the European community. Therefore, at the moment there is no difference for PoliHub for having a partnership with European incubator or incubator not in EU. All the networking activities are one by PoliHubs' own effort until today thus, there is no intermediate parties or policies. For the moment, PoliHub working on to understand if they can access some European grants to become sponsor their activities and to make this partnership network more active.

The same fact of being a part of credible university also valid in terms of creating an international network with other university incubators around the world. Current international partnerships don't require any cash, which means it doesn't involve a high level of decision-

making process. Due to this, partnerships can realize quickly. On the other hand, there is less frequency of activities is with international partners because it is not something incubators do every day.

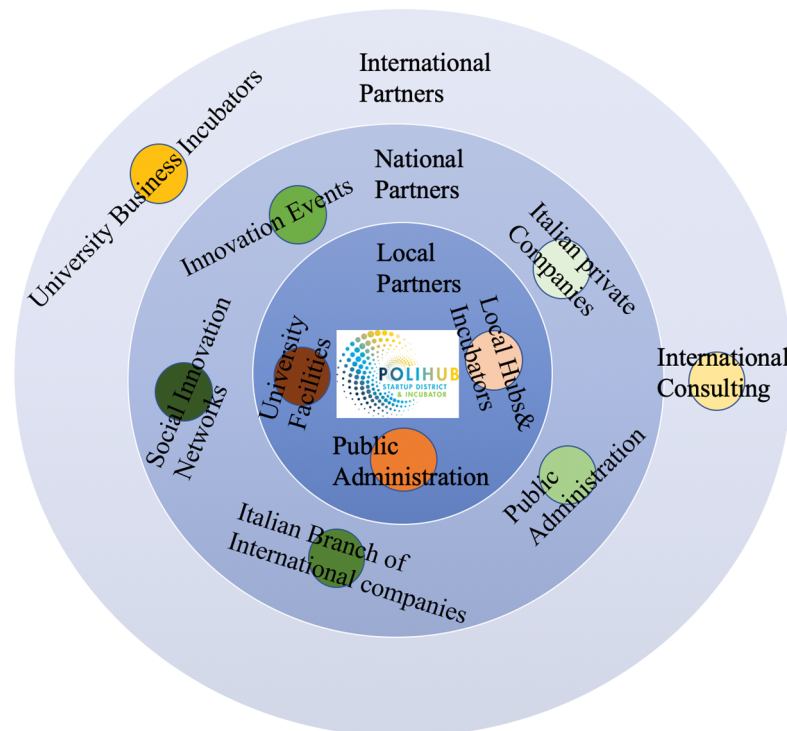
Probably in the future, PoliHub will be able to boost the support, dedicate offer to its' startups in terms of international relationship services. Now, with current PoliHub portfolio, PoliHub is able to support the startups in case they want to internationalize but this service is not providing in a structured or commercial offer. The reason is, there is not a dedicated person for it. In the future, PoliHub is concentrating its effort in order to maximize the effectiveness of the collaboration framework with all the partners. There is a probability to explore Silicon Valley and other lively ecosystems in United States in the future.

Apart from all different geographical scopes of networking activities, there are also some partners which PoliHub is conducting its internal activities together with. Professional services are providing in PoliHub with a network of professional partners. Basic benefits that startups get in PoliHub is services like legal, tax advisory and accounting. Additionally, there is a pitch presentation designer in is PoliHubs' network and available twice a month to provide a review startups pitch and give them feedback for documentation and presentations. There are also external partners to implement legal services. Technology transfer office of Polytechnic University of Milan is running the prior analysis for whom wants to patent their ideas. In general, PoliHub negotiates with professionals to have some discounted price for extra services. As a base, there is a part of free consultancy and then for more specific consulting PoliHub negotiates the agreement to provide discounts for startups. Seminar and training conduct by PoliHub mostly, with a collaboration of Business School Faculty of the university. For education services PoliHub taking the advantage of the university. Lastly, tutorship, consulting and monitoring activities in PoliHub affording internally.

Once the all the partnership activities have been explained with details, then we can show them visually in favor of better representation. The following graph prepared by using all the previous tables of partners of the incubator, summarized in respect to institutions' idiosyncrasy and visualized bracingly. Chart below illustrates from within circle 'Local Partners' to outward circle 'International Partners'. In a nutshell, local partners of PoliHub are: 'University Facilities' which belongs directly university of Foundation of the University, 'Public Administrations' which are mainly facility and laboratory providers. Lastly, 'Local Hubs& Incubators' belongs to other universities, public administration or private companies. In the second group of partners, national partners are taking part. Such as, 'Public Administration' that helps domestic and abroad events, 'Italian Branch of International companies' are mainly mentors, sponsors and research partners of PoliHub. 'Social Innovation Networks' are national

events in order to foster entrepreneurial culture and increasing business opportunities. ‘Innovation Events’ are linked to entrepreneurial culture and increasing innovation economy. ‘Italian private Companies’ are mainly manufacturers aiming for open-innovation and corporate social responsibility. Most confluence group of partners are found in the national partners. Almost whole of the partners in the third group are other university business incubators. Besides of the university incubators, there are also few international consulting institutions.

Chart 3: All partners of PoliHub



Source: Author’s Elaboration

3.5. TURKEY – Incubator of Istanbul Technical University: Cekirdek

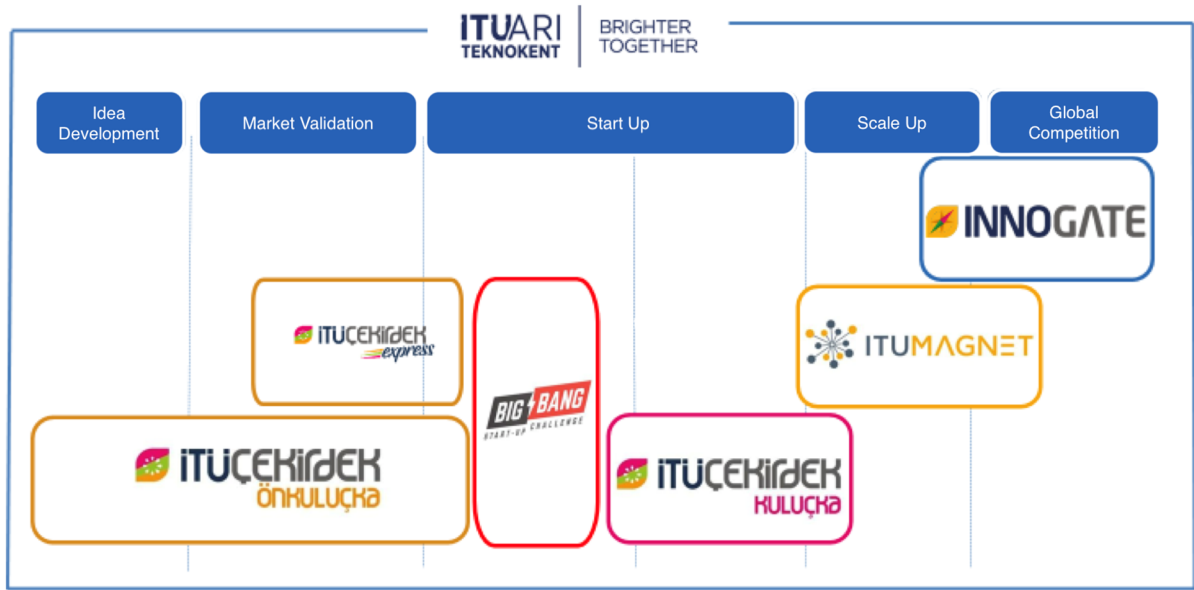
To illustrate better picture about ITU Cekirdek, we would like to start with the brief description of Cekirdek and milestones in its journey.

ITU Cekirdek is an early stage incubator center which was founded in 2012 within ITU ARI Teknokent, which can be defined as Istanbul Technical University’s technology development zone. ‘Teknokent’ (Techno-city in Turkish) is known in the worldwide terminology as ‘science parks’ but it is being used as a techno-cities in turkey. ITU ARI Teknokent has been operating since 2002 in the times when its’ role was finding suitable R&D companies in order to make them benefit the incentives of the zone but should not be understood as facility management.

After filling the zone with the suitable companies and 10 years after the establishment of ITU ARI Teknokent concept of innovation, entrepreneurship and entrepreneurship ecosystem has started to develop with ITU Cekirdek.

Considering ITU ARI Teknokent ecosystem as a whole, due to the fact all the programs complement each other and the activities have an influence one another, we would like to demonstrate all the ecosystem in the figure below with all entrepreneurship programs. All programs of ITU ARI Teknokent which are covering the phases from idea development to global competition.

Figure 24: Programs of ITU ARI Teknokent



Source: **Provided by Interviewee**

Rector of Istanbul Technical University Prof. Mehmet Karaca is chairman of the board of directors of ITU ARI Teknokent at the same time. The general manager of ITU ARI Teknokent is Kenan Çolpan who has entrepreneur roots and vice general manager is Assoc. Professor Deniz Tunçalp. ITU Cekirdek is not for profit entity. At the end of every year, the value Cekirdek created for the entrepreneurship and innovation ecosystem is being interrogated.

ITU Cekirdek team today consists of nearly 20 people. The visionary team changed the structure of ITU Cekirdek in very short years from the UBI which was organizing a call for Start-ups annually to the second best in Europe and third best in the world university-affiliated incubator center.

Due to the low success and survival rates of Start-ups in global, in the year 2015 Cekirdek management has requested to increase the ITU Cekirdeks' capacity from yearly 17 endeavors

up to 250. To reach that huge scale of a jump, Cekirdek increased the number of calls of the acceleration program.

In 2017, ITU Cekirdek organized its acceleration program for four times, with 17 million TL (4.5 million dollars) raised the amount of investment to the contestants of Big Bang. The results of the last call of Big Bang of this year will be announced on 29 November 2018 which has been held 5 times in this year. In consequence of the depreciation of Turkish lira in 2018, investors were willing to take not too many risks even though ITU Cekirdek and its' entrepreneurs have a productive year. In the coming years, Cekirdek going to live once more the excitement of Big Bang and the team is sure that they are going to reach last year's success. Such rapid and large-scale growth shows the success of ITU Cekirdek management model. In contrast to the other university business incubation centers, management of ITU Cekirdek does not provide services like mentorship or education by themselves. Cekirdek management has devoted all its power to operational activities such as finding more mentors, more partners, more trainers and more educational contents. As an example, since 2016 ITU Cekirdek has been applying 'Lean Start-up' model which is taken from Stanford university adapted to Turkey and Turkish entrepreneurial ecosystem.

With all the progressions above, when we look at past 6 years of ITU Cekirdek until today we also see that Cekirdek has created a mentor organization in Turkey almost from zero. Today, ITU Cekirdek has more than 250 mentors and for those mentors, mentor application guidelines have been prepared in order to provide guidance.

In addition, ITU Cekirdek has transformed the formerly prevailing understanding of the entrepreneurship in Turkey. A majority of the new innovative projects were e-commerce and the mobile application until 2013. Under favor of ITU Cekirdek, the entrepreneurial mentality in Turkey has paved the way for technological development in all areas. Biotechnology, automotive started to get support as much as robotics.

After addressing the contributions of ITU Cekirdek to its ecosystem, we can point out financial supports of Cekirdek. To reach its' local network, Cekirdek publicly calls investors and sponsors to join their processes. Cekirdek also has active relationships with many active investors. Cekirdek reach enterprises directly with its' team to engender the companies support the entrepreneurs and startups.

Furthermore, Cekirdek illustrates the value of business incubation by showcasing particular start-ups that match to the strategies and objectives of a potential national or international sponsor. For this purpose, Cekirdek studies the target enterprise from public sources and organize private meetings to understand their business priorities and industry-wide problems.

Then, Cekirdek matches specific start-ups from their alumni and their current programs, based on these observations.

Understanding the mission and the objectives of the potential sponsor are critical, as it helps Cekirdek to speak the same language and illustrate Cekirdeks' respective capabilities that match with sponsor's needs. Different targets for a different financial provider is needed, here some examples: for the Ministry of Development, target might be increasing the technology-based export potential of Turkey. For a large manufacturer, target might be helping its journey to smart manufacturing and industry 4.0. For a large enterprise, target might be establishing an innovative partnership program made up of start-ups.

Cekirdek also provide regular on side visits and guided tours to give companies with a significant and active funnel of startups and to make start-ups their business partners.

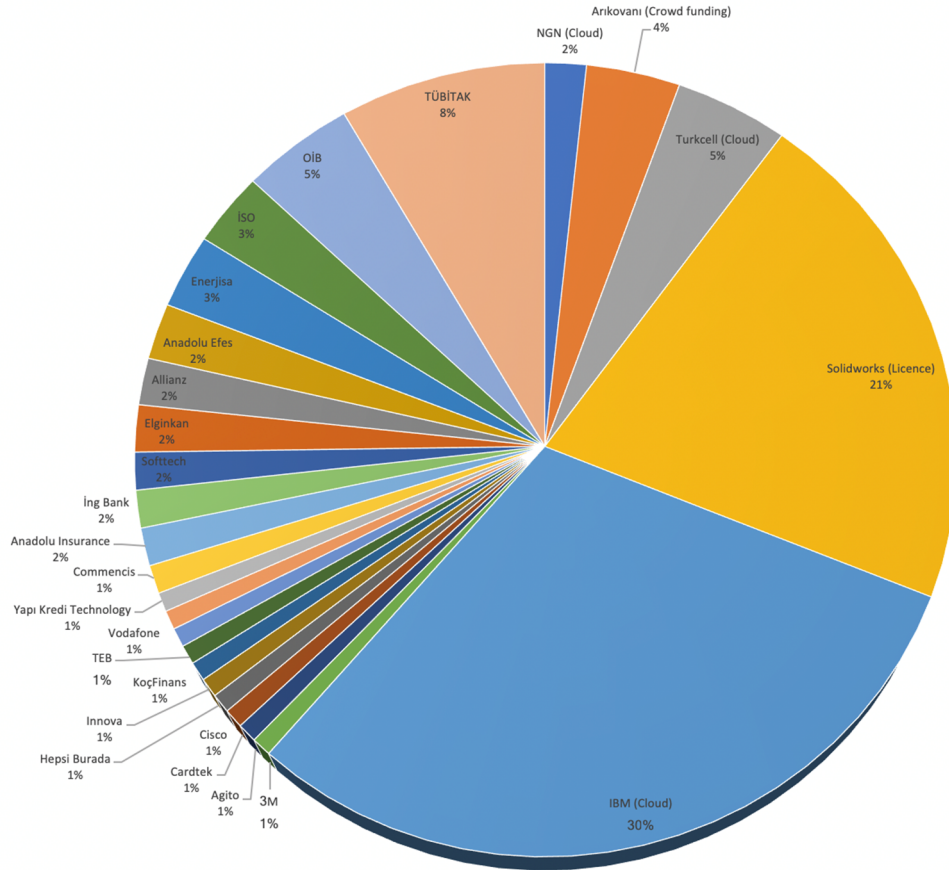
Additionally, ITU Cekirdek team develops large-scale EU funding projects and enterprise sponsorships for business development and start-up financing.

The level of VC⁸-grade investment is very low in Turkey, as a result of the low level of local VCs. To address this problem, ITU ARI Teknokent has joined a consortium as a limited partner, to establish a local VC with the financial support of the European Investment Fund. ITU ARI Teknokent is also establishing a dedicated investment fund with their resources and additional fundraising.

Furthermore, when we take a look at the funders of Cekirdek we see quite different structure than PoliHub in terms of various number of shareholders. Here, there is some information about funders ITU Cekirdek represented in following chart.

⁸ VC stands for Venture Capital

Chart 4: Shareholders of ITU Cekirdek



Source: Author's Elaboration

To introduce foreign investments to the Turkish incubators, we have to mention about the fact of Science parks works as a critical center to assist R&D activities of foreign companies in Turkey. Consequently, some important international technology companies also have offices in ITU ARI Teknokent. ITU ARI Teknokent where ITU Cekirdek is located has a profile of 70% of small, medium and micro-sized companies, 30% large and international firms.

In Turkey, government has direct and indirect intermediate role in order to maximize the foreign investments. As a direct support from the government, there are different types of supports are providing by the Ministry of Trade which start-ups can apply individually or ITU ARI Teknokent can apply as a part of technology development zone. Those incentives special only for technology development zones and involve domestic or foreign investors, business owners, academicians, workers.

The advantages in Technology Development Zones (Science Park) are:

- Profits derived from software development, R&D, and design activities are exempt from income and corporate taxes until December 31, 2023.

- Sales of application software produced exclusively in Technology Development Zones are exempt from VAT until December 31, 2023. Examples include software for systems management, data management, business applications, different business sectors, the internet, mobile phones, and military command control.
- Wages of R&D, design, and support personnel employed in the zone are exempt from all taxes until December 31, 2023. The number of the support personnel covered by the exemption shall not exceed 10 percent of the number of the R&D personnel.
- Investments for the production of the technological products obtained as a result of the R&D projects conducted in the zone may be made in the Technology Development Zone if deemed suitable by the operator company and allowed by the Ministry.
- 50 percent of the employer's share of the social security premium will be paid by the government until December 31, 2023.
- Customs duty exemption for imported products and stamp duty exemption for applicable documents within the scope of R&D, design, and software development projects.

Addition to the tax advantages for Technology Development Zone there are many disparate supports provided by the Ministry of Commerce to the Start-ups individually in terms of internationalization. Such as an example of 'Overseas Market Research Support' and 'Trade Fair Support'. Almost all of these kinds of support require firms to spend first, and then 50% to 60% of the expenses are returned back from the ministry.

Moreover, the Ministry of Commerce has a unique support of name 'Turquality' which is a "national brand-building program", Turquality's goal is to facilitate and support the success of Turkish brands on international arena. To achieve these ambitious goals, Turquality program will broaden its vision to the wider concept of "quality in brand management" and emphasize its support services component with the inclusion of highly customized strategic coaching and consulting.

Apart from the tax benefits and incentives provided by the ministries, getting foreign investment is one of the long-term KPI of INNOGATE program, therefore supporting by ISTKA⁹ plays an important role to realize this KPI. There are many companies which joined to INNOGATE program and penetrated in USA and got investment from USA.

More precisely, thanks to INNOGATE program, 60 companies have anticipated the program in USA and 41 of them still continue to their international activities. The total amount of

⁹ ISTKA stands for Istanbul Development Agency

investment the companies received by INNOGATE is more than \$ 15 million moreover, foreign turnover is over \$ 10 million with this program.

‘Attaché’ support in the abroad is another incentive type should be highlighted under the subject of government intermediate role on foreign investment. During each INNOGATE period, ITU ARI Teknokent contacts with the attaches. The attaches are providing 1-2 hour seminars to promote business relations in the cities (New York, Chicago, San Francisco) where the firms are going to incubate. In addition, before going to the USA with INNOGATE program, officers of business relations from American Consulate of Istanbul visit Cekirdek and meet with the firms.

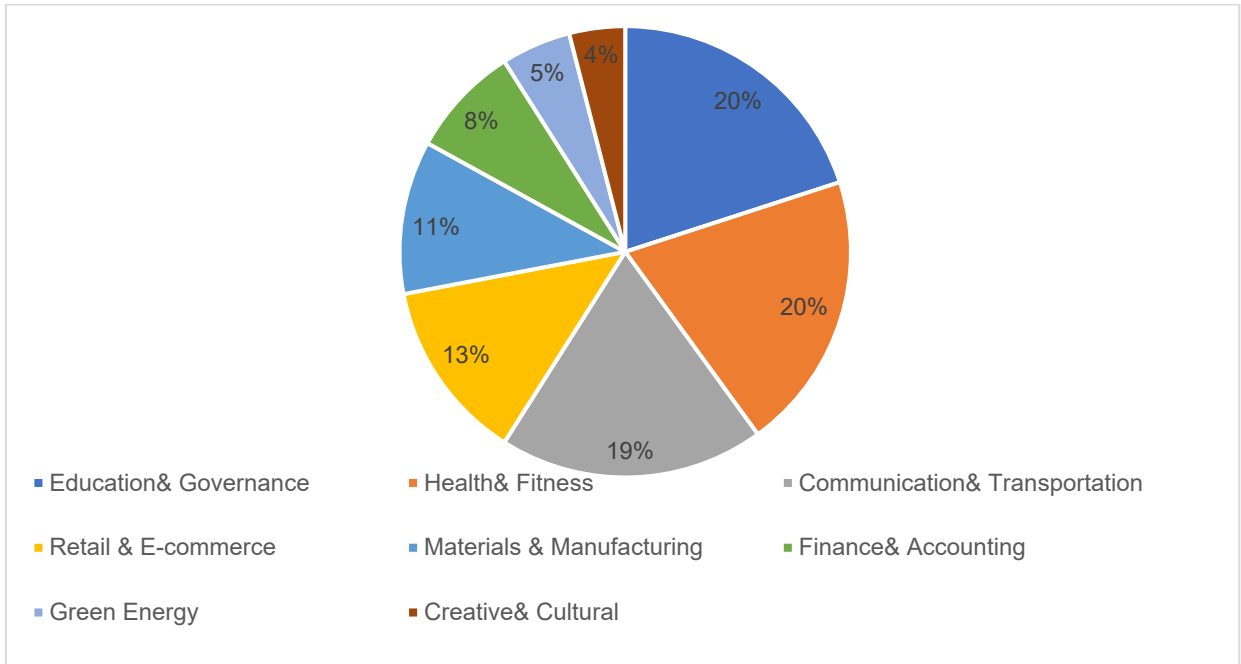
In terms of exit strategies for the Start-ups in Turkey, there is no special policy running by the government. Although, in order to support foreign investors there is an on-going program last couple of years, which named ‘Invest in Istanbul’ powered by Istanbul Development Agency. Program is for foreign investors to consolidate investment support and promotion services, and to assist international investors throughout all bureaucratic steps necessary for starting up and retaining their businesses in Istanbul. The dedicated team of Invest in Istanbul focuses on attracting and securing investment that will maximize long-term economic growth for Istanbul. Residence permit, trade registry, tax registry, social security registry, operating license, construction permits, property acquisition permits, recruitment requests and incentives are the major services provided in this office, by the appointed staff from related governmental institutions. All of these steps are covered by Invest in Istanbul on behalf of international investors for free.

Lastly, we finish the illustration of the general information and investor relations of Cekirdek with official 2017 data of the incubator:

- 8884 in-state, 2414 out-state and 98 international application and 555 accepted client startups in 2017
- Client startups' total investment attracted (2013-2017) - \$21,756,000
- Clients' sales revenues - \$12,000,000
- 1268 jobs created and sustained by your client and recent alumni startups in 2017

The percentage of the client startups operated in the following sectors in 2017 in the following page represents as a chart.

Chart 5: Sectors of client Start-ups



Source: **Author’s Elaboration**

Above we illustrated general information about ITU Cekirdek, now we can move with the second part of the information which is focusing on partnership activities.

Local Partners of Cekirdek: Most important local partners are mainly public administration, other local incubators and one local foundation. Industrial partners are for technical & software support. In the following page, there is the table of all local partners of Cekirdek:

Table 18: Local Partners of Cekirdek

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
Elginkan Foundation	Laboratory support during the establishment, stakeholder
Istanbul Chamber of Industry	Networking activities and funding support for tenants
Istanbul Development Agency	Establishment phase support, laboratory and international incubator support
Radore	Server support
Cardtek	Stakeholder, sponsoring the tenants
Agito	Stakeholder, sponsoring the tenants

Workinton	Private hub, collaboration for free movement among the tenants
Kolektif House	Private hub, collaboration for free movement among the tenants
Habita	Private hub, collaboration for free movement among the tenants

Source: **Author's Elaboration**

Elginkan Foundation supported the laboratory facility during the establishment of Cekirdek. Apart from support at the beginning, the foundation gives grant every year in BigBang contest in order to support entrepreneurship activities.

On the other hand, Istanbul Chamber of commerce supporting the entrepreneurs 200K Turkish Lira in the interest of creating new industrialists. Moreover, the Chamber of commerce has networking activities for the entrepreneurs. It can say that; Istanbul Chamber of Industry supports Cekirdek in the way how the industrial partners do.

Istanbul development agency has been providing its support in various ways. During the establishment period, the agency has supported Cekirdek, for MAGNET program agency created a laboratory and recently agency has been supporting INNOGATE program in the interest of internationalization. INNOGATE is a late stage of entrepreneurship program and there are many firms which experienced incubation process from Cekirdek to INNOGATE. INNOGATE serves for the firms which already reached high turnovers in Turkey and targeting to expand their market opportunities into global. This is a whole ecosystem with all the stages of the incubation process, and the last stage is supporting by ISTKA.

In order to increase the capacity of ITU Cekirdek, management decided to develop free mobility program within other hubs/workplaces in Istanbul. These Hubs, such as Collective House, Habita and Workhaus are private hubs which they usually sell their seats. Even though, they responded positively to the offer of ITU Cekirdek, because those places are also targeting to reach to the entrepreneur. The entrepreneurs who use these Hubs from Cekirdek are renewing every month and in order to create different networking opportunities. The main purpose of this project is to expand the capacity of the ITU Cekirdek and to introduce other institutions in the entrepreneurship ecosystem to the ITU Cekirdek and its' entrepreneurs.

To be a part of a university and being a reliable constitution has an important consideration on establishment of partnership. It is always easy to create new partnerships. Cekirdek brought the proposals to the local partners such as Agito, Cardtek, Elginkan Foundation in the early of

establishment time of ITU Cekirdek. After the success of Cekirdek, other partners have contacted with Cekirdek. Activities with local partners are conducting very often.

National Partners of Cekirdek: National Partners can be analysed in three groups: First, public administration and second group is corporations & industrial partners. Finally, last group is national foundations, social responsibility programs and national events. Table 19 represents the national partners of Cekirdek:

Table 19: National Partners of Cekirdek

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
Ministry of Science, Industry and Technology	Supporting the incubator via grant system, sponsor of the implementation of prototyping laboratory
Ministry of Economy	Supporting the incubator via grant system
TUBITAK	Supporting the incubator and the tenants via grant system
KOSGEB	Supporting the incubator and the tenants via grant system
Union of Automotive Exporters (OIB)	Sponsorship for automotive projects
IBM Turkey	BigBang jury, mentorship and sponsors, networking, Cloud and server service
Microsoft Turkey	BigBang jury, mentorship and sponsors, networking, Cloud and server service
ING Bank Turkey	BigBang jury, mentorship and sponsors, networking
Allianz Turkey	BigBang jury, mentorship and sponsors, networking
EnerjiSA	BigBang jury, mentorship and sponsors
TEB Paribas	Sponsorship for Bigbang contest
Cisco Turkey	Give grants to IoT projects
Amazon Turkey	BigBang jury, mentorship and sponsors
Vodafone Turkey	BigBang jury, mentorship and sponsors
Yapi Kredi Technology	National Bank, sponsorship to the tenants
Anadolu Insurance	BigBang jury, mentorship and sponsors
Anadolu Efes	BigBang jury, mentorship and sponsors

Softtech Turkey	BigBang jury, mentorship and sponsors
3M Turkey	BigBang jury, mentorship and sponsors
Solidworks Turkey	Sponsorship for Bigbang contest
Hepsiburada	Sponsorship for Bigbang contest, stakeholder
Koc Finance	Sponsorship for Bigbang contest
Monitise Turkey	Sponsorship for Bigbang contest, stakeholder, seminars
Fit Solution	E-invoicing service provider
Serdo	Software
Iyzistart	E-commerce support
Innova	Software
Ari Kovani	Crowd funding
ATA Teknokent, Erzurum	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Sanliurfa Teknokent	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Kahramanmaras Teknokent	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Technoscope, Mersin	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Caretta, Antalya	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Depark, Izmir	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Minerva, Izmir	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Viveka, Ankara	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Samsun Teknopark	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators
Girisim Atolyesi, Sakarya	Anatolia Partnership program, disadvantaged group of teknoparks& Incubators

Source: **Author's Elaboration**

There are two main groups of national partners; government and industrial partners. In the first group, government creates a relationship via different type of ministries such as ‘Economy’ and ‘Science, Industry and Technology’ and via TUBITAK (Scientific and Technological Research Council of Turkey), KOSGEB (Small and Medium Scaled Industry Development and Support Directorate) or unions such as ‘Union of Automotive Exporters’. Ministries have various types of grants that entrepreneurs or the incubators can apply for. The same granting system is valid for KOSGEB and TUBITAK.

TUBITAK has ‘Teknogirisim’ (techno-venture) support, worth 200K TL in the year 2018. Since 2015, TUBITAK has been providing the support of ‘Teknogirişim’ grant to the entrepreneurs through the incubators. ITU Cekirdek is one of the first incubators who got the grant in respect to its innovation capacity. Cekirdek sends each year the highest number of entrepreneur application for the grant program to TUBITAK and gets accepted. For this grant program, Cekirdek selects the BIGG entrepreneurs, trains them, supports them to create business plans and sends to TUBITAK. The projects who got elected gets 200K TL and ITU Cekirdek gets 500K TL yearly for their contributions on preparation of the projects and increase the environment of entrepreneurship. TUBITAK grant for incubators is mostly covering operational expenses and education. Ministry of Science, Industry and Technology is a sponsor of the implementation of prototyping laboratory.

Industrial partners support entrepreneurs in BigBang contest as grant support (investor support) but entrepreneurs don’t receive this grant as a batch payment, payments are organizing by Cekirdek according to the entrepreneurs/projects three months KPIs. On the other hand, industrial partners collaborate mostly with Çekirdek as a sponsor. In the BigBang event, which determines the timetable of ITU Cekirdek, these companies give their grant to their projects that they chose in their own fields. Every year BigBang is being held at the end of November, this year it is on 29 November 2018. In BigBang, sponsors those who grant money don't receive any shares, but they have a part in the BigBang jury and sponsors are doing their investment on their choice, not on the common juridical decision. Industrial partners have a chance to meet with the entrepreneurs at the early stages with the help of mentoring activities and jury membership, thus they can hold the entrepreneur's hand earlier and create open innovation for themselves. On the other side, it’s also beneficial for entrepreneurs who are not still sure about their exact path, to have a chance to connect with industrial partners through corporate communications and marketing activities, it is easier to get their bearings. Cekirdeks’ industrial partners always continue to work with Cekirdek by increasing the amount of grants that they are raising ensuing years. Industrial partners start cooperation with the entrepreneurs from the time the project has been started to incubate in Cekirdek. Partner has an opportunity to be in

the jury, mentor, attend to demo days and have one-to-one meetings with the entrepreneurs, these opportunities avail to the industrial partners to cooperate and walk together with the entrepreneur. After this cooperation process, partner gives their grants to the projects in their field and favor themselves to be a part of an open innovation environment or be the first client of the entrepreneur.

There are many companies has been started with corporate sponsorships and transformed into Venture Capital after experiencing ITU Cekirdek. Industrial partners mostly set up their own investment companies to invest in these entrepreneurs. Cekirdek is a pool full of many entrepreneurs, and the corporations can find the entrepreneur they want and support them in the way they want such as mentoring, sponsoring or as a customer.

In general, companies who collaborate with ITU Cekirdek were the companies which were demanding for a shorter period of collaboration at the beginning, such as hackathon activities, but mostly they end up with supporting the entrepreneurs in a much longer period.

Turkey branch of international companies such as ING, Microsoft, IBM, Allianz is also in the partner network of ITU Cekirdek. IBM and Microsoft are providing cloud and server service for entrepreneurs of Cekirdek. Moreover, they also provide education for the services might be useful for the entrepreneurs. Apart from general support to all entrepreneurs they also select one project in BigBang and provide a huge amount of server and cloud service to them. On the other hand, Cisco gives a grant to IoT projects.

The industrial companies have more commercialization mind rather than the attitude of social responsibility when they are aiming the support Cekirdek. Although Cekirdek itself initially emerged as a social responsibility project, solely with the commercial reasons, the main aim is to support technological endeavors which can commercialize in a short time. Likewise, companies are also supporting the projects which are not only innovative but also have the ability to be commercialized. The corporations are supporting Cekirdek to contribute to their larger plans, such as establishing a VC or establishing a mechanism for in-house entrepreneurship, or to become a commercial institution that supports innovation. Although Turkey was lagging to catch the entrepreneurial world, worldwide good examples can observe easily. According to these examples, it can be seen that these large corporations always able to sustain entrepreneurship. The industrial partners which are collaborating with Cekirdek, are learning how to be a mentor and most of them are also demanding services such as mentorship or business planning from Cekirdek trainers as a professional service. In addition to social responsibility, companies do not support an initiative which has a low chance of survival, that is the main reason why entrepreneurs and companies have been starting to collaborate in the early stage. It can say that 80% of the partners bring their partnership request to Cekirdek.

Apart from industrial partnerships, Cekirdek has a national partnership agreement with other university incubators. With its 6 years of know-how, Cekirdek has launched ‘Anatolia Partnership’ program. This program has started in 2017; the main aim is to reach the university incubators or techno-parks in disadvantaged regions which don’t have their own capacity. Within the scope of the program, partner incubator can send an employee to the ITU Cekirdek to experience the management of Cekirdek, its ecosystem, mentors, biggest start-up competition in Turkey (BigBang), to meet angel investors and risk capital companies. Cekidek's aim is to create a mass mobilization and to bring entrepreneurs and investors together from all regions of Turkey.

ITU Cekirdek has started to move their offline training to the online platform in order to share training programs with all the partners all over Turkey. At the same time, partner incubators have a chance to send their entrepreneurs directly to the semi-final of BigBang Start-up contest. BigBang is now is a contest where ITU Cekirdek finalist entrepreneurs are competing with each other to get investment, but from 3-4 years from today, ITU Cekirdek is planning to position BigBang as a stage of entrepreneurs of Turkey and such as Balkan, European and Mena countries. instead of only ITU Cekirdek Start-up projects.

From convenience of the partnership establishment aspect, most challenging issue for partnership is mostly faced during the partnership agreement with industrial partners compared to the other types of the partners. Industrial partners more likely to involve for short term activities because it is kind of a ‘fashion’ to be entrepreneurial company. ITU Cekirdek is trying to convince the industrial partners to contribute in longer term with benefiting ‘open innovation’ environment and creating KPI for companies. Activities with national partners are realizing very often.

In the concern of government support on networking activities, there is not direct support by the government but there are some indirect supports targeting entrepreneurs and incubators/techno parks. KOSGEB and Ministry of Trade have incentives for international fairs also on the other hand for international accelerator support program. The name of the grant of KOSGEB is ‘Technologic product promotion and marketing support program’ which is for entrepreneurs who are willing to attend international fairs and expenses are covering up to 100%.

International Partners of Cekirdek: Most of the international partners are the incubators which are managed or affiliated by a university. There are also few international companies which are supporting Cekirdek as software service. Below there is the table of international partners of Cekirdek:

Table 20: **International Partners of Cekirdek**

NAME OF THE PARTNERS	FEATURES OF THE INSTITUTION
Stripe Atlas	Gives priority to the entrepreneurs of Cekirdek for their application to establish a company in the USA
500	USA investors, if they invest to an entrepreneur of Cekirdek they introduce into their global network.
Hubspot	Sales and marketing funnel management support
Zendesk	Software
Other University Incubators including PoliHub	International university business incubator partner for entrepreneur free movement agreement up to 2 weeks

Source: **Author's Elaboration**

ITU ARI Teknokent has a partnership agreement with PoliHub as well as other international incubators, which comprise usage of incubator facilities for a short time among the entrepreneurs of each university incubators. Yet, the exchange has not been experienced in respect to the recent actualization of the agreement. It is predicted that by the time there will be both sided demand of the entrepreneurs. Cekirdek has office spaces in co-working areas in San Francisco, Chicago, New York and Cambridge and also Cekirdek develop partnership programs with the university incubators in Italy, USA and China.

Stripe Atlas is a Start-up project from the USA has a partnership with Cekirdek, give priority to the entrepreneurs of Cekirdek for their application to establish a company in the USA. On account of INNOGATE program, there are many new international partners who join the network, and they also introduce to Cekirdek.

Particularly, Allianz Turkey and ING Bank Turkey have additional international programs which they introduce Cekirdek entrepreneurs to their international networks.

Moreover, USA based company 500 is supporting Cekirdek, in a manner, if they invest to an entrepreneur of Cekirdek they introduce into their global network.

Lastly, Hubspot and Zendesk are international software providers for ITU Cekirdek. Partnership establishment was easy such as the other geographical scopes, since ITU ARI Teknokent has an accelerator office in New York, San Francisco and Chicago it is also easy for Cekirdek to create the international partnerships. Activities which are accomplishing with international partners are very often.

In the scope of international partnership, we believe INNOGATE program of ITU ARI Teknokent should be mentioned in respect to its enforcement on Cekirdek. ITU ARI Teknokent management created INNOGATE program to enlarge the target market perception of most of the Turkish entrepreneurs which are mainly targeting to make sales within Turkey. Instead of markets such as Qatar, Dubai, Romania, ITU ARI Teknokent decided to introduce United States market to its' entrepreneurs to break the perception of 'unknown market'. Even though the market volume of the UK is 3.8, the US market volume is 24.8 on the other side. Driven from this fact, the management of Cekirdek wanted to create a possibility to the Turkish entrepreneurs to discover huge American market and find customers there.

Based on those facts above, Teknokent managed to implement the project 3-4 months after the idea process. After executing this program for 3 periods alone, Istanbul Development Agency (ISTKA) recommended to ITU ARI Teknokent write a project to them to get funding. Two years after the project was written to ISTKA, the INNOGATE program was started to support by the Istanbul Development Agency. ITU ARI Teknokent is one of the main reasons to be able to implement this program alone at the beginning.

From August 2017 (from the 5th Cohort) on, project support has been provided by ISTKA (Istanbul Development Agency, under Ministry of Industry and Technology but the scope of this support is to only cover the operational costs of ITU ARI Teknokent/Innogate management (flight tickets, accommodation, human resources in USA, office space in USA, etc.) Moreover, from the 4th period on, INNOGATE program has become a paid program for the companies who want to join. Being able to foresee and plan accordingly the budget is the intent of this altering.

Moreover, it is seen that the companies which do not have a target of abroad markets, demand to join the program when it is for free. Companies that intend to participate in the INNOGATE program are expected to survive in the US for 5-6 months with their own budget.

Main aims of this program are to enable innovative technology firms to be invested and to focus on export so that they can grow in the global business arena that will at the end lead to an emergence of globally known Turkish technology brand and to make Istanbul the regional center of innovation and technological enterprises and to contribute Istanbul taking part in the most important entrepreneurial ecosystems' list in the world in the middle run.

After demonstrating all the current partners of ITU Cekirdek, future partners also needed to be pointed out. Cekirdek plans to develop partnerships with major incubators in Europe to provide support and infrastructure for its' start-ups in other parts of Europe with start-up exchange and mobility.

Location of ITU Cekirdek is central geographically in the region, and based on this fact, Cekirdek is planning to expand its' reach towards Balkans, Mediterranean, East Europe and Caucasia and Mena.

As enterprises need more and more open innovation, Cekirdek also plans to develop new projects that bring startups and businesses together. Cekirdek may provide corporate entrepreneurship support to companies and may help them reach the best start-ups in Turkey and abroad.

In addition to those partnerships above, Cekirdek has partners which they are operating their internal activities. For instance:

- There is one patent office that they work together and first Patent application free of charge
- Mentoring service is provided free of charge in ITU Cekirdek and there are three types of mentoring programs.
 - Mentor: Mentoring that will never return to a professional relationship,
 - Adviser: mentoring to return to a professional relationship after a certain period
 - Investor mentor: Both mentoring and investing

ITU Cekirdek has more than 250 mentors, and for managing this big network of mentors, an application purchased from Cekirdeks' own entrepreneur which is developed for the mentor-mentee organization.

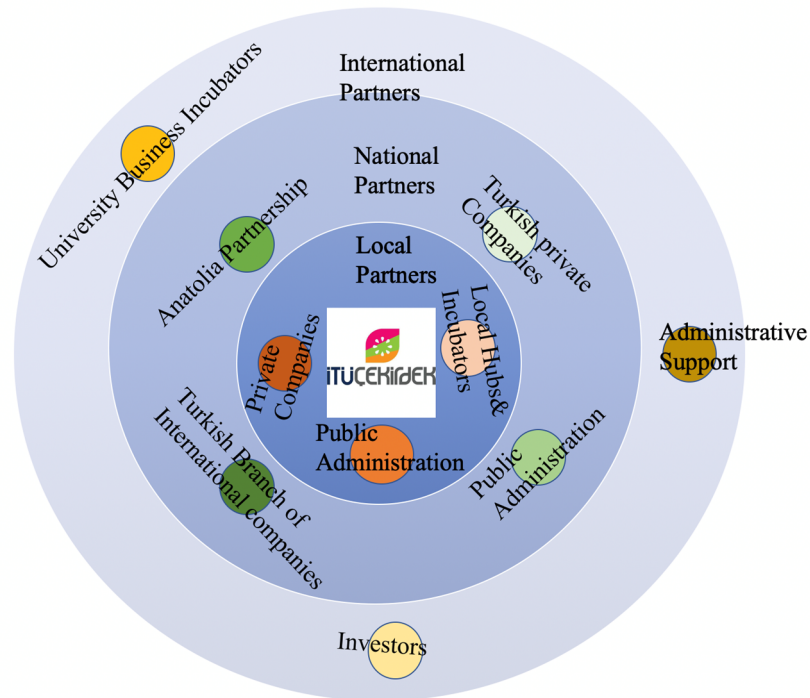
- There are some education contents that Cekirdek is purchasing. Nevertheless, main 'Entrepreneurship Training' which continues 7 weeks in the evenings on weekdays and on the weekends, are providing by Cekirdek.

The partnership analysis continues with the extract visualizing of all the partners discussed above. Thanks to the following chart, we will be able to display all the main group of the partners in each different geographic scope. According to the visual, it can be seen that, scope of the partners expands from inner circle to outwards. In the most inner circle, local partners of Cekirdek are shown. In this group, there is 'Public Administration' provides facility and laboratory to Cekirdek. Other partner type in local scope is 'Local Hubs& Incubators' which are aiming to increase the mobility among the entrepreneurs in Istanbul. 'Private Companies' in local aspect are mainly stakeholders of Cekirdek. On the other hand, national partners are belonging to the second group. Here, there is 'Public Administration' which mostly finance the Cekirdek by providing vary of grants, 'Turkish Branch of International companies' and 'Turkish private companies' are mainly collaborating with Cekirdek due to mentorship, sponsorship, networking activities. 'Anatolia Partnership' program is started by Cekirdek in order to reach the university incubators or techno-parks in disadvantaged regions in order to

increase the entrepreneurial culture nationally. In the last group of partners, there are ‘University Business Incubators’, ‘Administrative support’ and ‘Investors’. Cekirdek has breadth of partners in international scope.

Lastly, above there is a visual representation of all the partners of Cekirdek.

Chart 6: All Partners of Cekirdek



Source: Author’s Elaboration

3.6. Comparison

Networking plays an important role in the maintenance of all types of incubator activities. There is a large volume of published studies describing the role of networked university business incubators. Additional to them, network ties help small, young firms overcome these challenges (Aldrich and Kim 2007; Bøllingtoft 2012) and effective incubators will facilitate network activities for start-ups (Carayannis, 2005). Both university incubators which are the subject of this thesis are officially ‘effective incubators’ and have a high level of the survival rate of their Start-ups. One of the main reason of high level survival rate of the tenants can therefore be assumed as a consequence of industrial links.

Comparison part of the thesis aiming to highlight the consequences of the partnership choices of both university business incubators according to their geographical scope and connections between their activities and their partnership idiosyncrasies. The management structure of the university incubators and government policies have an effect on the choice of partners and the

activities conducting together. Both incubators show similarities and differences in both incubator partner idiosyncrasies in respect to their own environmental divergences.

To compare both university business incubators, seven main comparison criteria is chosen. These criteria are constituted carefully to establish the demonstration partner choices and their outcome impacts. Following table illustrates these criteria and their description.

Table 21: **Main Comparison Criteria & Description**

Main Comparison Criteria	Description
Breadth & Depth	Breadth is width of the partnership in terms of their idiosyncrasies (how many different types of partners they have), depth is strength of the relationship (in terms of frequency and stability)
Local embeddedness	Linkage with local community, consideration of activities, frequency, contributions on fostering the local entrepreneurship
Diffusion of national entrepreneurial culture	How much effort is making in order to fostering the entrepreneurial ecosystem nationally. Events, contests, summits, social responsibility programs
Internationalization	Degree of structured international activities, expansion abroad and part of international networks and activities and as a result attracting a foreign investment
University – Industry Relationship	Contributions in order to create a strong relation between university and industry
Specialization Index	The degree of depending on the specialization of the tenants' operating sectors
Government support	In what way, the government supports the incubators and diversity level of the government support

Source: **Author's Elaboration**

Considering the first criterion of our comparison analysis 'Breadth& Depth', both incubators are examined in terms of their wideness of partnerships and degree of those linkages. Both incubators have mainly same common type of actors such as 'Public Administration' in local and national scope, other university incubators & hubs in local scope, national and international private companies and finally, both incubators are part of same 'international university business incubator' network. Whereby of this international network, PoliHub and ITU Cekirdek

are partners alike all the other university business incubators in the network. In the local aspect, PoliHub has breather partnerships than ITU Cekirdek. This fact can be seen in the list of the local partners of PoliHub (Table 15).

PoliHub has a connection with private and public hubs, foundations and numerous university facilities. On the other hand, relationship with the public administration is greatly strengthened, since they are stakeholders as well as sponsors for the facilities and machinery. Despite same financial support structure from the public administration is also valid for Cekirdek, public administrations who are working directly with Cekirdek are creating those partnerships based upon grant programs, which can be interpreted as a lower degree of deepness according to PoliHub. Besides, international partners are wide for Cekirdek. Apart from the university business network, Cekirdek has a network of foreign investors. Moreover, in terms of the depth of the partnership activities, both incubators have deep industrial relationships. Wide range variety of activities are performing together with industrial partners. Such as sponsorship, jury membership in the contest, mentorship, scouting activities, research activities, corporate social responsibility, open-innovation, venture capital.

The second criterion is ‘Local Embeddedness’ which focuses on linkage with the local community, from the point of activities managing together, including contributions on fostering the local entrepreneurship. As it mentioned in the examination of the first criterion, for PoliHub, local embeddedness is in a high level in respect to close relations with all public administrations, various university and foundation of university facilities, science parks, private hubs. PoliHub operates public service with the municipality as a result of being a certified incubator, together with events, competitions, awareness and monitoring activities. Since Polytechnic University of Milan sprawls around the city and other cities in the region, this causes also a high degree of the local entrepreneurial ecosystem to foster. Tenants of PoliHub can move freely among the other co-working spaces around the city and region such as ComoNext and CoBox. All those local connections created smoothly with few efforts due to Polytechnic University of Milan’s credible university reputation.

There are a number of similarities between PoliHub and Cekirdek in terms of local embeddedness. Both incubators received financial and facility support from public administrations during the establishment phase. Therefore, both incubators have a social responsibility to increase the entrepreneurial activities not only among the university students but embracing all local society. Relationships in both incubators show a similar pattern from the standpoint of bonding activities. For example, free movement possibility is also obtaining

for ITU Cekirdek tenants. In Cekirdek, tenants can move among private hubs around the city such as Collective House, Habita and Workhaus. In respect to all local links, Cekirdek also managed to create readily all those connections as being a part of a reliable university. In the local aspect, Cekirdek has more industrial partners whereas PoliHub has a deeper relationship with university facilities.

Furthermore, the third criterion is 'Diffusion of national entrepreneurial culture' where both incubators are assessed by in terms of their efforts in order to foster the entrepreneurial ecosystem nationally. PoliHub has a great number of linkages with national innovation events, summits, contests and social responsibility programs. All those partnership activities are targeting to increase the awareness, entrepreneurial culture and business opportunities. Events are realizing not only in Lombardy but all the regions of Italy, and broad in scope in terms of their subjects. Such as green energy, social innovation, high-tech, manufacturing. Those events include marketing activities of startups, promote the startups, foster the innovation in Italy and create business for startups.

Apart from those national events, PoliHub has created a mentor club to contribute to the entrepreneurial ecosystem. Mentor club consists of various activities about mentorship. PoliHub has more than 100 mentors with a different background. The mentors are mostly coming from the big corporations but they are also top executives, former executives, entrepreneurs, investors and business angels. In order to transform them into mentors, PoliHub trains and tests them on the field. Implementation model of the mentorship program in PoliHub is also similar what ITU Cekirdek is doing for their mentors. Likewise, when Cekirdek was established, there was no knowledge, culture and network of mentorship in Turkey. ITU Cekirdek created a mentor organization from zero in past 6 years. Today, ITU Cekirdek has more than 250 mentors and for those mentors, mentor application guidelines have prepared in order to provide guidance.

Another important partnership of Cekirdek which is about increasing national entrepreneurial culture is 'Anatolia Partnership'. This program has started with Cekirdeks' 6 years of know-how and aiming to reach the university incubators or techno-parks in disadvantaged regions which don't have their own capacity. Within the scope of the program, partner incubator can send an employee to the ITU Cekirdek to aim gaining experience with the management of Cekirdek, its ecosystem, mentors, biggest start-up competition in Turkey (BigBang), to meet angel investors and risk capital companies. Cekirdeks' aim is to create a mass mobilization and to bring entrepreneurs and investors together from all regions of Turkey. ITU Cekirdek has started to move their offline training to the online platform in order to share training programs with all the partners all over Turkey. At the same time, partner incubators have a chance to send

their entrepreneurs directly to the semi-final of BigBang Start-up contest. This significant program is extremely important for the diffusion of the entrepreneurial culture nationally.

As a part of diffusion of national entrepreneurial culture, official number of both incubators should be mention. PoliHub has incubated 113 projects by the end of the year 2017 (in 17 years) whereas Cekirdek has 555 projects from 2012 to 2017 (in 6 years). While PoliHub has received over than 1.200 applications in 17 years, Cekirdek has received 11.369 applications in 6 years. Official numbers prove that Cekirdek has a way high level of diffusion effect nationally.

Another main criterion of comparison is 'Internationalization'. Which can define as addressing the incubators according to their degree of structured international activities, expansion abroad and part of international networks and activities and attraction level of a foreign investment.

In the light of comparison of two incubators, it can say that PoliHub is lagging behind Cekirdek on internationalization. This difference stem from the management structure of both incubators and entrepreneurial model of the country belong.

Internationalization activities are not structured or commercial offer in PoliHub, there is no dedicated person for it and partnerships are occurring upon the occasions. International activities are not as frequent as PoliHubs' local and national activities. PoliHub would like to able to boost the support, dedicate offer to its' startups in the future and maximize the effectiveness of the collaboration framework with all current& future partners. Another reason for this lagging is predominating foreign investment perception in Italy. According to this perception, foreign investors are expecting Italian startups first to be funded domestically before going international. Foreign investors are willing to invest in Italian startups after they are able to get funding from Italy. Due to this reason, the priority of PoliHub is not internationalization actions which consequently affects the level of foreign investors.

In respect to current international university business incubators portfolio, PoliHub organizes scouting activities or calls for ideas from local industrial partners which can reach to an international entrepreneurial network. Moreover, PoliHub is a part of a huge international network even if it doesn't have a direct relationship. Such in the example of a recent agreement with incubator 'TUS Star' of Tsinghua University from Beijing which is realized by Polytechnic University of Milan. According to that agreement, Polytechnic University of Milan and Tsinghua University will run a joint campus for design skills development, in Milan next to PoliHub office. Owing to this university incubator network, ITU Cekirdek and PoliHub have a partnership agreement. All the international partners in this network consist of the incubators which are managed or affiliated by the universities. The main goal of this partnership is obtaining an international network for start-ups all over the world. In respect to this partnership,

every startup can move freely up to 2 weeks for each incubator within the international incubator network. Thanks to this partnership, startups can meet with the different markets, understand the competencies there and attend incubation programs of other incubators for free. If we now turn to ITU Cekirdek internationalization activities, we can see that there is a dedicated person for increasing the effectiveness of current links and creating new connections. Internationalization activities are structured and being offered to the tenants commercially. INNOGATE is ITU ARI Teknokents' born-global/go-global start-ups international acceleration program, has three offices abroad. Those offices are in Chicago, New York and San Francisco. Thanks to that abroad subsidiaries Cekirdek also has become a part of an international network and be able to provide to its' tenants long-term growth plans. Consequently, Cekirdek is able to attract more foreign investments to its' entrepreneurs and be a part of diverse international networks rather than only international university business incubator network. Further, depending on its structured international actions Cekirdek is planning to position BigBang as a stage of entrepreneurs of Turkey and such as Balkan, European and Mena countries. In terms of internationalization Cekirdek is ahead of PoliHub.

Fifth comparing criterion is 'University-Industry Relationship' which can be explained as the contribution level to create a strong relationship between university and industry. PoliHubs' linkage with the university is allied with ITU Cekirdek. In virtue of being a part of well-known, long-established reliable universities, both incubators benefit from the resources and human capital of universities they belong and cultivate this heritage with industrial bonds. In terms of benefiting the resources of the university, PoliHub precedes Cekirdek as we discussed the second criterion 'Local Embeddedness'. Additional to this, it can be say that, PoliHub benefits from university sources more often. Such as recent accretion made on 1st October 2018 as a fund of 60 Million Euro from Polytechnic University of Milan to PoliHub.

Nonetheless, the manner of the relationship with industrial partners show both similarities and differences in two incubators. In both incubators, industrial partners can devote mentorship, sponsorship in the contest and plus can become the customer of the Start-ups for their new innovative ideas. On the other side, when we look at the differences, scouting, joint research projects and corporate social responsibility (CSR) activities are operated in PoliHub. In spite of that, Cekirdek endeavors longer relationship with them by defining long-term KPIs, Venture Capital investments and enable cooperation with Start-up groups on the purpose of open-innovation. In ITU Cekirdek, Industrial partners have a chance to meet with the entrepreneurs at the early stages by the opportunity to be in the jury, become a mentor or attend to demo days and have one-to-one meetings with the entrepreneurs, these opportunities avail to the industrial

partners to cooperate and walk together with the entrepreneur. This cooperation conduces toward an influence on the start-up projects by the industrial partners and creates an environment for the good of open-innovation. By contrast, this relationship is not accurate for PoliHub. In the PoliHub industrial partners are mainly involving in the evaluation process to bring their own perspective in terms of market or their Start-ups become the suppliers of the industrial partners rather than long term cooperation.

In addition to these actualizing activities above in terms of ‘University-Industry Relationship’, national and local events and innovation contests increase intermediate contact between university and industry by virtue of the university incubators.

Following comparing criterion is ‘Specialization Index’ which means the degree of depending on the specialization of the tenants' operating sectors. Considering the divisions of the operating sectors, the dependency level of the incubators can be interpreted. The two incubators have same 8 divergent major sectors which their tenants are operating. These sectors are:

- Communication & Transportation
- Materials & Manufacturing
- Health & Biotech - Fitness
- Creative & Cultural
- Finance & Accounting
- Education & Governance
- Green Energy
- Retail & E-Commerce

The diversity of the sectors might be related to the diversification of the industrial partners. The more range of the partners would cause more divergence of the sectors. Moreover, another reason for this range could be the result of the market opportunities in the country the incubator belongs. From those sectors above mentioned, ‘Communication & Transportation’ is the only common sector which has a higher percentage in both incubators. While in PoliHub ‘Health’ sector is gathered with ‘Biotech’, on the other hand; ‘Fitness’ is the sector which gathers with ‘Health’ sector in ITU Cekirdek. This fact can show the differences in terms of the market of two countries. Another example of the market discrepancy is ‘Materials & Manufacturing’ and ‘Green Energy’ sectors have more projects in PoliHub, on the other hand in Cekirdek ‘Education & Governance’ and ‘Retail & E-commerce’ have more projects. Both incubators have the same specialization index in terms of diversity but the operating sectors are versatile.

Finally, the last comparison criterion is ‘Government support’. Both incubators are examined with regards to government support and its’ sustainability model in the country they belong. As such in it has been unfolded during the examination of both incubators in previous sections, ITU Cekirdek is well ahead in the sense of government supports and its’ depth. For PoliHub, government support is weak, there is no sustainability model provided by the government to support the incubator. This fact causes a self-sustainability model creation in PoliHub. Furthermore, it can say that the funding system in Italy is frail and interlocutory in compare to Turkey. More frequent support is provided by European Union towards PoliHub. Government support which Cekirdek is benefiting is way stronger. Moreover, for Cekirdek, there is a huge advantage of being in the technology development zone. Apart from the many different grants which are supporting incubators, there are also different policies in terms of taxation for incubators and start-up companies which are located in Technology development zones such as ‘zero tax’ policy that we mentioned in section 3.5.

CONCLUSIONS AND FUTURE IMPLICATIONS

The thesis focused on the role of incubators and the importance of networking activities in enhancing their performance. The main advantage in forming networks is the possibility to share expertise and to increase the coordination of regional activities (OECD, 1999). This thesis explores the pivotal role of networks through a comparative case study analysis, which provides insights useful to derive practical and theoretical implications about the topic. As mentioned at the beginning of Chapter 3, several researches on networking activities of university business incubators has been done. A large and growing body of literature has investigated on networking activities of university business incubators and outputs of networked incubators. The networked incubator incorporates and promotes mechanisms that foster partnerships between the incubator firms and other external parties thus, facilitating the transfer of knowledge and expertise between small start-ups, thereby laying the foundation for fruitful relationships (Hansen, 2000)

The reader should bear in mind that, the first two chapters of this thesis, which are focused on bibliometric analysis of the literature, are unable to encompass the entire citation database of today. Analyzed data is extracted only from one database which is Web of Science. Other databases such as Scopus, InCites, Google Scholar are not in consideration of this thesis work. Broader citation analysis can be made by using all of the databases. Another topic to be mention is that two main criticisms of citation analysis. For many scientists, citations measure popularity rather than quality, consequently many good papers remain undiscovered meanwhile few popular ones keep being cited. On the other hand, the number of citations in the database is appearing without any distinction between negative or positive reference or self-citation.

Other limitations are related to the empirical case study. Accessing the right people in both university business incubators was not easy. Even though the interviewees are experts in their field and working in their incubators for a long period of time, some questions were answered unsafely and confirmed in later period.

Level of subjectivity of the interviewees should always taking into consideration when they are providing qualitative data to the analysis. Another limitation is related to differences in partner perception in two sample countries. Structure of shareholder/ stakeholder/ founder is not equivalent in Italy and Turkey as we will see from the following chapters in Chart 1 and Chart 4 – Shareholder structure of both university business incubators. Last limitation lies in the fact

that there is a lack of prior research studies on the topic. Turkish entrepreneurial ecosystem is still undiscovered and there are few studies which are working on the impact of networking activities. Further studies need to be carried out in order to validate the findings of this thesis.

At the end of the Chapter 2, we indicated the most popular studies on the topic of university business incubator by means of a systematic literature review based on the WoS database. The proposed summary table highlights how current studies have emphasized the importance of tenant networking activities. No previous study has investigated the networking activities of university business incubators and explored the geographical distribution of the network. By this work, we are able to examine all the available information which is gathered about on the networking activities of university business incubators in different geographical scopes of our sample model. This study has determined the relationship between all the partners of a university business incubator and incubator itself. In consideration of previous academic studies about the topic and contributions of this thesis work, now we can gain a better understanding of cause-effect relation of partnership choices and activities in diversified geographical scopes of a university business incubator.

There is no doubt in that, breadth and depth of the relationships have a huge impact on the success of the incubators. According to one of the most significant findings emerged from this study is that some specific networking activities result in more success in a shorter time span. In order to analysis these activities and their consequences, all the available data about the sampled university business incubators are compared according to the criteria illustrated in chapter 3.6.

Table 22 shows a comparison of the two university business incubators, reporting some essential facts.

Table 22: **Official Data comparison**

Official Data	PoliHub (2000-2017)	ITU Cekirdek (2012-2017)
Incubated Start-ups	113	555
Cumulative Turnover	30 Million Euro	12 Million Dollar
Application Received	+1.200	11.396
Total Investment	12 Million Euro	21.756.000 Dollar
Another Highlight	8 Major Acquisition	1268 Jobs created

Source: **Authors' Elaboration**

Based upon this evidence, we can observe how the performance of ITU Cekirdek, obtained in a shorter time span, exactly 12 years, are more relevant than those reached by PoliHub. Geography influences the entry of new network members and how new connections are sought (Gluckler 2007). The density of the different scopes of our sample university business incubators is the evidence of the Gluckler. The number of partners of the incubators is decreasing with their distance from the incubator. Geographic proximity seems to be crucial for establishing growing networks (Bøllingtoft and Ulhøi 2005; McAdam and McAdam 2008). In other words, local partners are the ones which the incubators are collaborating with at the highest frequency. International partners are the least active. These findings provide support for previous works which emphasized that the density of the relationship is highly linked to the geographical proximity between partners.

The management team of a business incubator constructs and frames the network and makes it available to the incubating firms (Hughes, 2007). The management of the university business incubators of this thesis further supports the idea of Hughes. Moreover, avowed contributions of the management of the Cekirdek on investor relations, international incubation & internationalization, long-term relationship establishment with industrial partners, incremental mentorship network and embeddedness of local & national entrepreneurial culture with continuous effort, brought Cekirdek today in the third ranking in UBI Global a shorter time span compare to PoliHub which is also in the same ranking. The official number of received applications and the degree of specialization of incubated companies could be connected to the degree of local embeddedness, the degree of diffusion of national entrepreneurial culture, and the availability of government support. The different governance of local embeddedness activities and activities in order to increase the diffusion of national entrepreneurial culture, such as ‘Anatolia Partnership’ brought Cekirdek fore. As indicated in previous part 3.6., ‘Comparison’, government support is much higher in Turkey than in Italy; this results in a higher number of startups and a higher level of turnover (according to Cekirdeks’ lifespan). Being a part of ‘Technology Development Zone’ and benefiting from the special taxation regulations stimulates the Incubated Startups for ITU Cekirdek. Science Park effect has a non-negligible effect on ITU Cekirdek in terms of expediting the development of the incubator.

This thesis examined the relationship between University and Industry and how the decisions affect the performance of the incubator in terms of being a linkage between university and industry. The manner of Industrial partnership agreements is affecting the length of the agreements and its’ depth. For industrial partners, becoming venture capitalist to the startups and being a customer is increasing the length and depth the relationship. On the other hand,

working together with startups from the beginning, creates an open-innovation environment. Having a wide range of industrial partners provides an opportunity to not be depending on only one sector and having more balance of specialization index such as diverse tenants profile of both university incubators. Thanks to the breadth of the industrial partners of both the incubators here analysed, incubated startups don't have to specialize in one or few specific sectors. Consequently, all the ideas can get support, survive and be successful. On the other hand, Cekirdek is able to get more investment to its' tenants (Table 22) due to its' strategies such as defining long-term KPIs, Venture Capital investments and enable cooperation with Start-up groups. Additional to this, Cekirdek is able to attract international investors through its' own international incubation subsidiaries in USA. In spite of that, PoliHub has a deeper relationship with the university which it belongs to. Consequently, PoliHub is able to benefit more from the university sources such as physical facilities, laboratories and intellectual property of the university. Hence, grants and funding programs of the university give countenance to PoliHub; for instance, recently on the 1st October 2018 it received funding from Polytechnic University of Milan for 60 Million Euro.

Last performance measure is internationalization for our sample university business incubators. In order to investigate the impact of the management decisions on international performance, the distinction of international activities should be identified and an entrepreneurial model of the country belong should be considered. Internationalization activities are not structured or commercially offered in PoliHub, there is no dedicated person for it and partnerships are occurring upon the occasions. Hence, there is no strategic planning for international activities. Moreover, international activities are not as frequent as PoliHubs' local and national activities. International activities are conducted by the Polytechnic University of Milan such as the agreement made with incubator 'TUS Star' from Beijing. On the contrary, there is a dedicated person for increasing the effectiveness of current links and creating new connections in ITU Cekirdek. Internationalization activities are structured and offered to tenant commercially. Due to this reason, Cekirdek is able to position itself better, and have a strategic international goal such as aiming to be the center of Balkan, European and Mena countries. Moreover, Cekirdek was able to create an international acceleration program in USA and become a part of an international network and be able to provide to its' tenants long-term international growth plans. Consequently, Cekirdek is able to attract more foreign investments to its' entrepreneurs and be a part of diverse international networks rather than only international university business incubator network. As a result, tenant start-ups can go global quicker, freely from the bias of Turkish image abroad. On the other hand, Italian startups are lagging due to predominating

foreign investment perception in Italy. According to this perception, foreign investors are expecting Italian startups first to be funded domestically before going international. Foreign investors are willing to invest in Italian startups after they are able to get funding from Italy and PoliHub is not able to break this prejudgment for now.

Needless to say that, achieving the international goals cannot be done without government support. In this respect, the support received from the government and governmental institutions is non-negligible for ITU Cekirdek. Besides, government support is also highly influential to grow in a short time span. Cekirdek reached the same place in 6 years where PoliHub reached in 17 years. Additional to the effect on internationalization, government support is also helpful for the incubator itself in terms of the sustainability model. Cekirdek has been supported by the government with different types of incentives. In spite of that, PoliHub had to find its' own sustainability model. This fact influences negatively to the development of the business incubator.

In compliance with some external factors such as being a part of the European Union, is contributing to PoliHub with regards to funding system but it doesn't have a high level of impact. Besides, it is not influencing any kind of international partnership choices.

The main objectives of networking are access to resources and the acquisition of knowledge (Grant, 2004). In order to get the highest benefit from the networking activities, the manner of the established relationship should be effective. This present study has offered a framework for the exploration of partnership extent and activities according to different geographical scopes. Findings of this thesis provide additional evidence for the impact of different partnership choices on the performance of university business incubators. Existing researches about the topic recognize the critical role played by networking activities of tenants of a business incubator. The current study highlights the importance of future theory development in the field of networking activities of incubator itself to develop a full picture of business incubators. These findings may help others to better understand effects of networking as a success factors of incubators. This new understanding should help to improve predictions of the impact of right partner choice of the university business incubators and consequences of the degree of local embeddedness.

Reviewing all of the work above, ITU Cekirdek could be considered as a better partnership management model than PoliHub. From this point of view, there should be some future recommendations could suggest to PoliHub basing on the model of Cekirdek.

The physical location of a firm affects its level of innovation, but this effect is influenced by the other types of organizational structures in a region, for example, whether they are competitive or more cooperative public research organizations (Whittington et al. 2009). In this respect, Cekirdek has a manner of ‘cooperation’ with all the business incubators and science parks. For Cekirdek, the only competition they could have is competition for success. They call this manner ‘Rekaberlik’ in Turkish. Composed phrase of two opposite words: ‘Rekabet’ (competition) and ‘Beraberlik’ (cooperation). This manner conveys them to be able to create a good design ecosystem which Cekirdek is the not only part which has benefits upon it. Furthermore, PoliHub also has the same understanding in terms of cooperation locally and nationally even so it should be improved to enrich the local embeddedness and diffusion of national entrepreneurial culture. Moreover, PoliHub should create a strategic planning for internationalization aspect as a future suggestion and dedicate a person for international activities. This implication would increase its’ international effectiveness and not only become more internationalized but also would be able to attract foreign investment in Italian entrepreneurs. Future efforts should also include creating a subsidiary abroad, increasing the frequency of international activities.

Secondly, being part of the Technology Development Zone has undeniable benefits globally. PoliHub should also put an effort to improve the current ‘innovation district’ into its’ own Science park by adding more physical and social capital into its’ campus.

Thirdly, extending the interaction time of the industrial partner would contribute on the increase of the number of application received, incubated startups and amount of turnover. Implicitly, it would increase the local embeddedness and diffusion of national entrepreneurial culture, Industry – University relationship. The longer interaction time would also create an open innovation environment.

None of the above implications can be realized easily without the support of the government. Accordingly, policymakers should provide convenience to business incubators for the sake of the entrepreneurial environment of Italy. New taxation regulations, some grant support should be accommodated.

Lastly, a general recommendation for both university business incubators could be improving the scope of the international partnership agreement among all university incubators which PoliHub and ITU Cekirdek are also involved. The mobility among the university business incubators shouldn’t be limited by only the tenants but also should comprise the management team. Thus, the know-how/best practices of any university business incubator would flow

among the other UBIs and would increase the entrepreneurial knowledge worldwide.

Taken together, apart from the above discussed for partnership consequences of the business incubators the findings of this thesis also suggest that, actions towards internationalization may not only increase the profitability and sustainability of the tenants but also decrease the cultural bias of the foreign investors. It is also illustrated that, venture capital or any other long-term relationship with industrial partners may increase the realizability of open innovation. The present study also contributes to the evaluation of the impact of government support on university business incubators. We believe that these findings are relevant to both practitioners and policy-makers.

APPENDIX A: QUESTIONNAIRE OF POLIHUB

SECTION 1- GENERAL INFORMATION ABOUT UBIs

1. *PoliHub* is in the third ranking of “UBI GLOBAL 17/18 World Ranking Report”, to understand how you reach this point can you please briefly describe the milestones of *PoliHub*?

2. Can you please mention current status of your UBI with numbers? (number of tenants and their field (high-tech, software, pharma etc.), number of incubation proposals, number of incubator’s employees, data about the amount of investments for the tenants)

SECTION 2 – NETWORKING ACTIVITIES

3. Could you please fill the table below with your main partners like in the example.

Example:

<i>MAIN PARTNERS</i>	<i>NAMES/ ATTIBUTES</i>	<i>TYPE OF THE RELATIONS</i>	<i>ACTIVITIES / SERVICES</i>	<i>AIM OF RELATION</i>
<i>International</i>	<i>University of Latvia student business incubator</i>	<i>Partnership</i>	<i>Shared training programs, Space providing etc..</i>	<i>Providing European environment for tenants of PoliHub</i>

4. What is the frequency of activities that you are conducting with your partners?

Frequency	Always	Very often	Sometimes	Rarely	Never
Local Partners					
National Partners					
International Partners					

5. How easy was the creating networking activities with following partners?

Convenience	Very easy	Easy	Moderate	Hard	Very hard
Local Partners					
National Partners					
International Partners					

6. How did you establish a relationship with current partners that you have? Is there any difference in terms of your networking strategies of different scopes?

Locally...

Nationally...

Internationally...

7. What kind of support does the government provide for networking? Are there any special policies which are run by local, national or international governance?

8. Who are the future partners that you are planning to collaborate with? Why? And will it be in the same context that you already established with the current ones?

9. Are there any partners that you are running internal activities of PoliHub together? Or are you outsourcing any services? Like seminars, training sessions, mentorship activities...

10. I would like to ask about operations with ComoNext, CoBox about providing more locations to your tenants. What is the scope of the partnership with them? Were there any intermediate third parties or policies to facilitate it?

11. Last question is about your worldwide partners, are there any intermediate third parties or policies to facilitate it? And moreover, what kind of differences you have when you are creating a network with an incubator which is not in EU?

SECTION 3– INVESTOR RELATIONS

12. Who are your industrial partners? Are they mainly local, national or international? What is the scope of your partnership with them? If they are your main funders do they have an influence on the incubation process or selection of the projects?

13. What kind of funders you have? Can you explain with percentage, please?

14. How do you do find a financial support? Do you get any extra funding from EU or other benefits?

Locally...

Nationally...

Internationally...

15. Does government have some kind of intermediary role on foreign investments? If there is, which are the government measurements?

16. How do Italian Incubators attract foreign investors? What kind of difficulties do Italy have to find foreign investors? What is the impact of those investments in the incubators? Like minority or majority of the investments. And do your international programs having any impact on foreign investment?

17. Does the government sustain special exit strategies for the tenants which are acquired by the large international corporations at the end of the incubation process? What is the role of the incubator and what is the role of the government in exit strategies?

APPENDIX B: QUESTIONNAIRE OF CEKIRDEK

SECTION 1- GENERAL INFORMATION ABOUT UBIs

1. *ITU Cekirdek* is in the third ranking of “UBI GLOBAL 17/18 World Ranking Report”, to understand how you reach this point can you please briefly describe the milestones of *ITU Cekirdek*?

2. Can you please mention the current status of your UBI with numbers? (number of tenants and their field (high-tech, software, pharma etc.), number of incubation proposals, number of incubator’s employees, data about the amount of investments for the tenants)

SECTION 2 – NETWORKING ACTIVITIES

3. Could you please fill the table below with your main partners like in the example.

Example:

<i>MAIN PARTNERS</i>	<i>NAMES/ ATTRIBUTES</i>	<i>TYPE OF THE RELATIONS</i>	<i>ACTIVITIES / SERVICES</i>	<i>AIM OF RELATION</i>
<i>Local</i>	<i>Istanbul Kalkinma Ajansi</i>	<i>Sponsorship</i>	<i>Funding INNOGATE, Shared training programs, Space providing etc..</i>	<i>Providing American entrepreneur environment for tenants of ITU</i>

4. What is the frequency of activities that you are conducting with your partners?

Frequency	Always	Very often	Sometimes	Rarely	Never
Local Partners					
National Partners					
International Partners					

5. How easy was creating networking activities with following partners?

Convenience	Very easy	Easy	Moderate	Hard	Very hard
Local Partners					
National Partners					
International Partners					

6. How did you establish a relationship with current partners that you have? Is there any difference in terms of your networking strategies of different scopes?

Locally...

Nationally...

Internationally...

7. What kind of support does the government provide for networking? Are there any special policies which are run by local, national or international governance?

8. Who are the future partners that you are planning to collaborate with? Why? And will it be in the same context that you already established with the current ones?

9. Are there any partners that you run internal activities of ITU Cekirdek together? Or are you outsourcing any services? Like seminars, training sessions, mentorship activities...

10. I would like to ask about two special programs that you are running in ITU Cekirdek. First one is; “Freemovement” that you create with other Hubs. What is the scope of the partnership with them? Were there any intermediate third parties or policies to facilitate it?

11. Other question is about INNOGATE, can you please inform us about this program in terms of its’ aim and the main actors? Are there any intermediate third parties or policies to facilitate it?

SECTION 3– INVESTOR RELATIONS

12. Who are your industrial partners? Are they mainly local, national or international? What is the scope of your partnership with them? If they are your main funders do they have an influence on the incubation process or selection of the projects?

13. What kind of funders you have? Can you explain with percentage, please?
(Region, Ministry, European Union funds, University, Venture Capital, Angel Investors)

14. How do you do find a financial support?

Locally...

Nationally...

Internationally...

15. Does government have some kind of intermediary role on foreign investments? If there is, which are the government measurements?

16. Do global players invest incubator in Turkey? What is the impact of those investments in the incubators? Like minority or majority of the investments. And does INNOGATE program or other international programs having any impact on foreign investment?

17. Does the government sustain special exit strategies for the tenants which are acquired by the large international corporations at the end of the incubation process? What is the role of the incubator and what is the role of the government in exit strategies?

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