Performance of Business incubators: the stakeholders perspective

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Abstract
Business incubators are focused on covering the needs of the new emerging companies. Additionally, business incubators have become into a useful tool in order to help these new companies to develop. Thereby, these companies can transform their concepts into profitable services or products.
This study examines the performance of the incubators. Based on the theories of organizational and corporate performance, this study identifies the strength of the linkages between variables related to the incubator and to their performance. Additionally, it was studied the perspective of two of the principal stakeholders of the incubator: the managers of the incubator and the tenant companies. More in detail, two surveys were elaborated, one for managers of incubators and one for managers of tenant companies from Portugal and Spain. Finally it was obtained 57 responses from tenant companies and 21 from incubators managers. In order to pretest the surveys and obtain preliminary information, three interviews were realized, two to managers of tenant companies from Lisbon and Barcelona and one to a manager of an incubator from Barcelona. The empirical results present the strength of the linkages between the incubators main characteristics such as the services offered, their affiliations, their market focus, their sponsors, the financial model applied by the incubator and their performance.
Keywords: Business incubators, performance, tenant companies, correlation.

1. Introduction

Nowadays the current changing economies, highs degrees of adaptability and of innovation are essential to promote the creation of new jobs. Hence, is widely accepted that the establishment of new companies managed by entrepreneurs has been increasing since 2013. (OECD 2016 and Fairlie, Morelix and Russell, n.d.) Researchers emphasize the strong linkage between entrepreneurs and innovation. Furthermore, these businesses have been considered as the vehicle of economic and social development. (Audretsch y Thurik 2004, Schumpeter 1911) However, these newly created companies are related to high rates of failure in their early stages of development.

In conclusion what may be one source of economic development and job creation is also related to high risks of investment. Usually the reasons of high investment risks and high failure rates are associated to undercapitalization and to the lack of skills in business management area. Even if the entrepreneurs have experience in the business field, they often lack of the necessary resources to manage the business. In order to mitigate these problems, this is where business incubators have a key role to play.

Incubators are a typology of business or organization focused on covering the needs of the new emerging companies by offering a wide range of services. More in detail, incubators offer to entrepreneurs a combination of infrastructure services, management advice services and network services. In general terms, infrastructure services provide access to office space, management advice services are focused on covering the lack of business expertise mentioned above and network services provide the necessary net of business contacts to the companies involved with the incubator. Thus, incubators help these new companies to transform and improve their concepts into profitable services or products.

Notwithstanding the fact that incubators have proven to be effective tools for promoting economic growth, there is also an open disagreement on corroborating evidences of their success. To take a case in point, researchers differ on which measures of performance should be taking into account in order to define incubators performance and in addition, incubator phenomenon is a variable concept which is constantly evolving.

Then the main objective of this thesis is to determine the linkages between all the variables related to the incubators and their performance.

2. Literature review

The purpose of this section is to achieve a better understanding of the main topic of the thesis and discussing the factors involving incubators performance.

2.1. Business incubator definition

The definition of what is an incubator has been studied by a large number of researchers (such an academics and organisations). They have confronted the need to define the incubators framework. (Bergek and Norrman 2008) In the literature researchers have contributed to add highlights to this concept with different perspectives of a business incubator. Some of them were more focused on the meaning of an incubator by defining for example the typology of services offered

or the key activities and other researchers for example were more focused on the impact on the tenant companies. (Hacket and Dillts 2004)

Additionally, in literature it can be found ambiguous descriptions and it is important to notice the difference between incubation and incubator. These two concepts are strongly related and in order to define the concept of incubation it has to be clarified (in the first place) the incubator concept. Thereby, the incubator is the firm, with all that entails, and the incubation is the system or program to which are subject the tenant companies. (Hacket and Dillts, 2004)

There is not prototypical incubator, but as discussed earlier, it is fairly accepted that an incubator is a firm which focus is to help to develop new companies by offering them the possibility of being enrolled to incubation programs during a certain period of time. These programs are based on providing some services such as infrastructure, network or management advice. (Bruneel 2011, Bergek and Norrman 2008, Bollingtoft and Ulhoi 2005, Aerts 2007, Chan and Lau 2005, Hacket and Dillts 2004, Ratinho 2011)

- **Services offered**

As mentioned, the main groups of services offered by the incubator are: infrastructure services, management advice services, financial access services and network services.

Infrastructure is one of the most common services offered by incubators involving space to work, furniture, internet access, conference rooms, and shared services as telephone, printers or secretary. (Wiggins 2003, Aerts 2007)

Management services are composed training, coaching and business plan (Ratinho 2011).Then, for the tenant companies learn how to acquire the necessary skills is an important part of the development of their company so they can take fast and better decisions.

Network services consist on establish a net between all the necessary intermediaries in the process of the company growing. (Schwartz and Hornych 2010)

Financial access services are related to all the activities helping to overcome the lack of financial access to capital or the lack of skills in the area of financial management. (Lewis 2011)

Additionally it has to be taken into account that, in order to cover the necessities of the tenant companies, some incubators may offer in some cases three stages in the incubation programs. (1)Pre-incubation, (2) Incubation and (3) Post- incubation (Al-Mubaraki and Bustler, 2012). These programs differ in the typology of services offered. Usually, each one of these programs is focused on different stages of the companies life cycle. The pre-incubation is more focused on the company creation phase when high risk of investment are associated to the new companies, incubation programs are related with the early stages of the company development and the post-incubation programs are associated with the expansion phase of the company when the risk of investment associated with the company have decreased. (AlMubaraki and Bustler, 2012)

Hypothesis 1: The offer of different services are positively related to the indicators of performance of incubators

- **Entry criteria and graduation policies**

Incubators count with certain policies in order to establish which business from the applicant pool may be accepted for enrollment in the incubator (selection criteria) and in order to decide when the tenant companies have to leave the programs (graduation policies). (EC 2002)

Thus, Selection criteria or entry criteria refer to all the reasons involving the decision of choosing which companies from the pool of candidates are going to be involved with the incubator (Hacket and Dillts 2004) and Graduation policies are referring to all the policies established by the incubator in order to define the moment and circumstances of exit of the incubated firms. (Bergek and Norrman 2008) Anyway, each incubator is applying their own criteria to assess the situation of each incubate. (Bergek and Norrman 2008)

Hypothesis 2: The entry criteria applied by the incubator are strongly associated with their indicators of performance

Hypothesis 3: Graduation policies applied by the incubator and their indicators of performance are negatively correlated

Hypothesis 4: A determinate market focus is related to incubators indicators of performance

- **Stakeholders**

Incubator counts with a large number of different stakeholders ranking since the tenant companies to the sponsors and furthermore each one of them has different interest and goals. (Hytty and Agnette, 2011) Even though, incubator

stakeholders can be divided in four main categories: tenant companies, incubator staff, (Drappier and Chaffer 2009) incubator affiliations and financial actors. (Gerlach and Bren 2015)

Hypothesis 5: The affiliations are positively associated with the incubators indicators of performance

Hypothesis 6: The typology of sponsors is positively related to the incubator financial performance

- **Typology of business incubators**

Once all the characteristics of the incubator have been defined, the types of typology can be studied. The typology of incubators can be evaluated under different criteria. Usually one of the most common kinds of differentiation is defining the incubator under the criteria of non-profit, for profit or hybrids. (Amezcua 2010) Even though, it is common to find different typologies of business incubators based on the specialization of the incubator. This typology can rank according the market focus of the incubator, that means if the incubator is focus in a determinate sector of companies or not. (McKinnon and Hayhow 1998)

2.2. Incubators performance

Performance measurement theories come from organizational performance. (Dess and Robinson 1984) These theories are based on:

- The **goal theory approach** focused on the measurement of goals achievement (Dess and Robinson 1984)
- The **systems approach** which consist on taking in consideration of multiple factors as internals as well as externals (Dess and Robinson 1984)
- The **Multiple constituency approach** measuring which stakeholders influence on the business performance. (Dess and Robinson 1984)

Business performance measurement has not to be only limited by organizational performance, it has to be added the measurement of corporate performance which is based on financial performance. That is considered as a key indicator of measurement as well. (Ramanujam, Venkatraman, and Camillus, 1986)

- ***Goal approach performance***

The goal approach performance is based on the capacity of goals achievement of a business. (Ramanujam, Venkatraman, and Camillus, 1986) Then, the measurement of goals achievement can be considered as an indicator of performance. Even though, the goals of incubators are hard to identify. So, in order to evaluate the achievement of goals, it has to be analyzed if each goal of the incubator is related to the general measurement goal achievement.

- ***Systems approach performance***

The system approach performance is based on the internal or external factors involving to the incubator. (Dess and Robinson 1984) More in detail, this approach takes a look into the inputs over the outputs generated by the company. (Glunk and Wilderom 1996) In conclusion this approach allows evaluating the internal processes of the incubator and the internal or external factors involved on the generation of outputs. (Dess and Robinson 1984, Glunk and Wilderom 1996) In the case of incubators, that implies the study of incubator practices and to determine which ones are associated to their performance and additionally, which factors are related to these practices. (Marimuthu and Lakha 2015)

- **Multiple constituency approach**

This approach is based on the achievement of the satisfaction of all the actors involving the company. (Dess and Robinson 1984) This approach allows an extended point of view about how are the incubators practices (Glunk and Wilderom 1996). Then the measurement of the degree of satisfaction of any of the stakeholders can be an indicator of the measurement of business performance. (Glunk and Wilderom 1996)

- ***Financial performance***

Financial performance is based on the corporate performance approach which consists on defining the financial activities of a company. Usually the most common indicators for measuring financial performance are how the company generates earnings, analyzing the return of equity or assets, how a business increases the incomes and the general financial situation. (Zsidó and Fenyves 2015) In order to evaluate the financial performance of an incubator, it has to be understood how the incubator is managing revenue streams and how the incubator can be able to cover all the operating costs. (EC 2002)

Hypothesis 7: The financial model followed by the incubator is positively correlated to their financial performance

Hypothesis 8: The location of the incubator and their performance are indirectly related

Hypothesis 9: The typology of the incubator and their performance are indirectly related

3. Methodology and data collection

The research question stated in this thesis was: **Which variables are related to the incubators performance?.** The objective of this question to identify the strength of linkages between each one of the principal variables related to the incubators and their performance.

To find an answer to the research question and the hypothesis stated, two surveys were conducted. One of the surveys was focused on the managers of the incubator and the other one was focused on the managers of the tenant companies from Portugal and Spain.

In order to elaborate the surveys, it was extracted from the literature review the main concepts related to incubators. Also, these surveys were also based on surveys already used in other studies (see EC 2002). Additionally, in the exploratory phase, these surveys were pre-tested and validated in three preliminary interviews to two managers of tenant companies and to one incubator manager. Finally in addition to the responses obtained in the interviews, it was obtained 57 responses of managers of tenant companies and 21 of managers of incubator.

4. Data analysis

In the case of this thesis the data obtained from both surveys was tested and it was determinate that the variables of the study were not following a normal distribution. This condition restricted the use of parametric methods which are based on the assumption of normally distribution. On the other hand the non-parametric tests are less restrictive and assumptions of normally distribution are not necessary. (McCrum-Gardner 2008)

Then, in order to analyze the data from the surveys, it was decided to use the following non-parametric tests:

- The Kruskal-Wallis one-way ANOVA test in order to compare categorical variables.
- Cramer's V and Phi coefficient in order to analyze the correlation between nominal variables.
- Spearman correlation test in order to identify the correlation between ordinal variables.

Additionally in order to evaluate the internal consistency of the data, Cronbrach's alfa test was applied.

4.1. Tenant companies data analysis

Finally 57 e-mail survey responses from managers of tenant companies were received through the Google forms collector, all of the responses were considered useable. Out of the 57 tenant companies surveyed, 61% of tenant companies have been enrolled with incubators from Portugal and 39% from Spain. Additionally, according to the responses obtained 42% of the incubators are non-profit while 33% are hybrids and 25% for profit. On the other hand according to the specialization 58% of the incubators are mixed use while 42% are specialized.

The analysis was divided in two steps. The first step consisted on examining which variables (involving the incubator practices and policies) were related to the incubator performance while the second step, evaluated the significant variables (variables related to the performance extracted from the previous analysis) in relation to their location and typology. All the constructs of the variables presented in the figure 1 were analyzed according to the internal consistency. All the results presented $\alpha>0,7$. Figure 1 presents a schematic about the analysis mentioned.

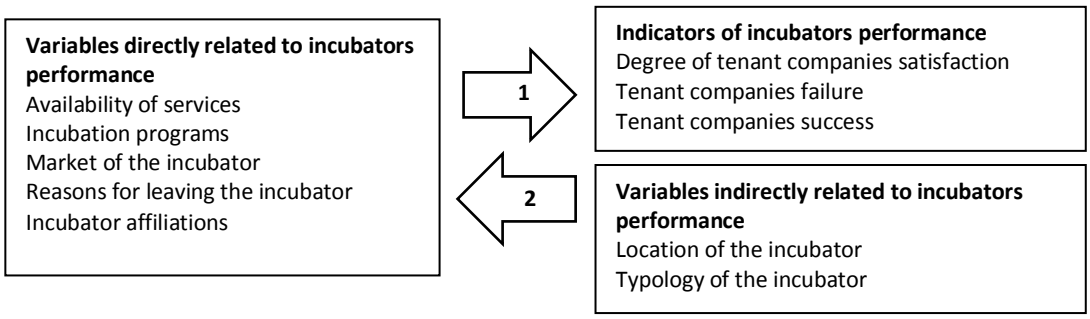

Figure 1. Variables used in the analysis of tenant companies data

- **Services**

The services offer proposed in the surveys were divided in five main groups: infrastructure services, financial access services, H.R. and law services, network services and management advice services. Additionally the variables reflects the availability of the proposed services on a nominal variable (1=available, 2=not available). Table 2 presents the significant variables detected in the Kruskal-Wallis test and the respective correlation value obtained.

Table 2.Results of the analysis of tenant companies data (Kruskal-wallis and Cramer's V test)

	Variables	Indicator of performance: Degree of tenant companies satisfaction with	Sig.	Corr.
Services	Cafeteria/catering	Infrastructure services	0,005	0,436
	Access to venture capital	Financial access services	0,026	0,443
	Access to loans		0,012	0,480
	Access to seed capital		0,034	0,422
	Access to royalty financing		0,000	0,771
	Interaction with financial actors	Incubator as a bridge to find investors	0,012	0,425
	Assistance in providing taxes	H.R. services	0,027	0,413
	Employing assistance		0,012	0,511

- **Market focus of the incubator**

In the case of the study the market focus has been divided in three main typologies: the start-up category, the size and the sector specialization. The variables related to the market of the incubator are ordinal variables measured in four ranks (very important, moderate important, little important and not important). The results obtained in the Spearman test are presented in table 3.

- **Graduation policies**

In order to evaluate the degree of association between the variables related to incubators performance and the graduation policies, it was applied the Spearman' correlation test. The correlated variables are presented in table 3.

- **Incubator affiliations**

Incubator affiliations are referring to all the associations with external actors. More in detail in this point the affiliations are divided into 5 categories: Universities, community, volunteers, research centers and outsourcing providers. These variables are ordinal variables measured in four ranks (very important, moderate important, little important and not important). The results obtained in the Spearman test are presented in table 3.

Table 3. results from the analysis of tenant companies data (Spearman test)

	Variables	Indicator of performance: Degree of tenant companies satisfaction with	Corr.
Market sector	Firms must be start-ups	Incubator team	-0,414*
		Other tenant companies	-0,393*
	Firms must have a determinate size	Incubator team	0,274*
	Firms must belong to a determinate sector	Incubator charges	-0,323*
		Incubator team	-0,368**
	Graduation policies	Incubator managers	-0,414**
		Incubator team	-0,397**
Incubator affiliations	University	Incubator manager	-0,463**
		Incubator team	-0,352**
	Community	Incubator team	0,318*
		Other tenant companies	0,578**
	Volunteers	Network services	0,393**
		Incubator team	0,723**
		Other tenant companies	0,637**
	Outsourcing providers	Other tenant companies	0,599**

* Correlation statistically significant at the 0.01 level (using Spearman test)
** Correlation statistically significant at the 0.05 level (using Spearman test)

- **Typology and location**

As previously mentioned, it was developed a second analysis in order to establish if the typology of the incubator and its location might be indirectly related to the indicators of incubators performance. More in detail, it has been analysed if typology and location were associated with the variables related to the indicators of performance. Table 4 presents the results obtained in the Phi and Cramer's V test.

Table 4.Location and typology analysis results

Variables directly related to incubators performance (data obtained from tenant surveys)		Correlation values obtained		
		Location	Typology (financial structure)	Typology (specialization)
Services	Cafeteria/catering	0,301		0,404
	Access to venture capital	-0,416	0,424	
	Access to loans	-0,419		
	Access to seed capital	-0,481		
	Access to royalty financing	-0,371	0,501	
	Interaction with financial actors		0,499	
Market sector	Firms must belong to a determinate sector		0,548	0,965
Incubator affiliations	University	0,570	0,520	
	Community	0,500		0,431

4.2. Incubator managers data analysis

Finally 21 e-mail survey responses from managers of incubators were received through the Google forms collector, all of the responses were considered useable. Out of the 21 incubator manager surveyed, 61% of incubators were located in Portugal and 39% in Spain. Additionally, according to the responses obtained 42% of the incubators were non-profit while 33% are hybrids and 25% for profit. On the other hand according to the specialization 58% of the incubators were mixed use while 42% were specialized.

Figure 2 presents a schematic about the analysis.

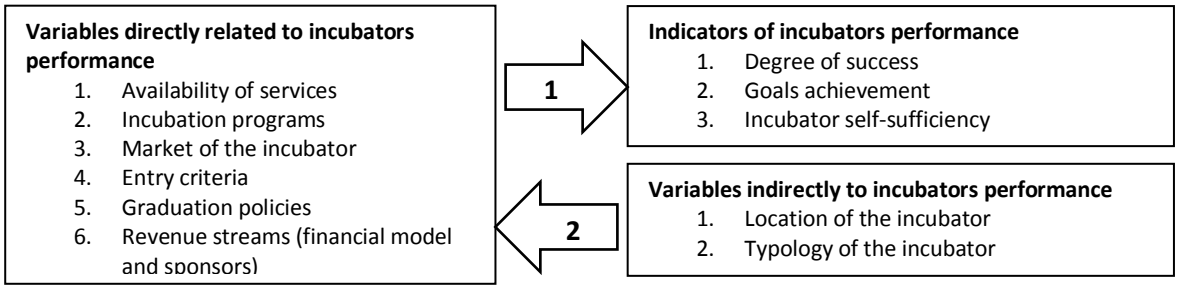

Figure 2. Variables used in the analysis of the data of managers of incubators

As the figure 2 presents, the first step consisted on examining which variables (involving the incubator practices and policies) were related to the indicators of incubator performance while the second step, evaluated the significant variables (variables related to the indicators performance extracted from the previous analysis) in relation to their location and typology.

All the constructs of the variables presented in the figure 2 were analyzed according to the internal consistency. All the results presented $\alpha>0,6$ except in the case of entry criteria where the coefficient obtained was $\alpha=0,599$. Anyway even if the general limit accepted of the coefficient has to be upon 0,70, this coefficient can decrease to 0,60. (Hair et al. 2014)

4.2.1. Data analysis

This part of the analysis of de data obtained from managers of incubators is divided in four categories: services offer, market focus of the incubator, reasons for leaving the incubator, entry criteria and revenue streams of the incubator. As it was explained the dependent variables were: degree of success, goals achievement and incubator self-sufficiency.

- **Services offered**

This section of the survey was common in both analyses. So, as it was previously explained, the services offered were divided in five main groups: infrastructure services, financial access services, H.R. and law services, network services and management advice services. Additionally the variables reflects the availability of the proposed services on a nominal

variable (1=available, 2=not available). In order to develop this analysis it was applied the Kruscal-Wallis test in order to determine the significant variables and Cramer's V test in order to determine the correlation between the variables. More in detail, table 5 presents the significant variables detected in the Kruskal-Wallis test and the respective correlation value obtained between the indicators of performance and the variables related to services offer. Additionally it has to be mentioned that all the network services proposed were available in the 21 surveyed incubators.

Table 5. Results of the analysis of the data of managers of incubators (Kruskal-Wallis and Cramer's V)

	Variables	Indicator of performance	Sig.	Corr.
Services	Furniture/equipment	Degree of success	0,022	0,619
	Secretary/receptionist		0,047	0,541
	Access to loans		0,005	0,726
	Financial assistance		0,022	0,619
	Assistance in providing taxes		0,044	0,559
	Help with licenses		0,046	0,554

- **Market focus of the incubator**

This section of the survey was common in both analyses. So, as it was previously explained, the study the market focus has been divided in three main typologies: the start-up category, the size and the sector specialization. The variables related to the market of the incubator are ordinal variables measured in four ranks (very important, moderate important, little important and not important). In order to evaluate the degree of association between the variables related to incubators performance and the market focus of the incubator, it was applied the Spearman' correlation test. Anyway in the test it was not found significant correlation.

- **Entry criteria**

In the case of the survey released to the managers of the incubators the question related to the entry criteria were divided in 6 possible criteria. These criteria selected were: 1. Based on the characteristics of entrepreneurs, 2. Based on well-defined market and customers projected growth potential, 3.Based on proprietary of advanced technology concept, 4.Based on the ability to pay rent and services, 4. Based on the potential attractiveness to investors and 6. Based on the business idea. These variables related to the entry criteria are ordinal variables measured in four ranks (very important, moderate important, little important and not important). In order to evaluate the degree of association between the variables related to incubators performance and the entry criteria of the incubator, it was applied the Spearman' correlation test. Anyway in the test it was not found significant correlations.

- **Graduation policies**

This section was common in both surveys. In order to evaluate the degree of association between the variables related to incubators performance and graduation policies, it was applied the Spearman' correlation test. Anyway the test was nit presenting significant correlation

- **Revenue streams**

Revenue streams refer to the incoming capital sources. It was divided in two groups: sponsors and financial models applied by the incubators.

Table 6. Results of the analysis of the data of managers of incubators (Spearman test)

	Variables	Indicator of performance	Sig.	Corr.
Revenue streams	Public entities (sponsors)	Incubator self-sufficiency	0,018	0,612
	Rent model (financial model)		0,003	0,702

- **Typology and location of the incubator**

Once the significant variables in relation to incubators performance were detected, a second analysis it was developed in order to analyze if the variables related to the location and typology of the incubator were indirectly associated with the performance of the incubator. The respective correlation tests were not presenting enough degrees of association between the location and typology of the incubator and the variables selected from the first analysis.

4.3. Hypothesis tested

After the presentation of the analyses of the data obtained from tenant companies and from incubator manager, in order to present the differences found in the evaluation of performance of incubators, the next table presents the evaluation of

the hypotheses mentioned in relation to the main variables associated to the respective indicators of incubators performance.

Table 7. Results obtained

H	Variables related to the indicators of incubators performance		Tenant companies	Incubator manager
H1	Services	Cafeteria/catering	✓	
		Furniture and equipment		✓
		Secretary/receptionist		✓
		Access to venture capital	✓	
		Access to loans	✓	✓
		Access to seed capital	✓	
		Access to royalty financing	✓	
		Financial assistance		✓
		Interaction with financial actors	✓	
		Assistance in providing taxes	✓	✓
		Help with licenses		✓
		Employing assistance	✓	
H2	Criteria selection		N.A.	
H3	Graduation policies		✓	
H4	Market sector	Firms must be start-ups	✓	
		Firms must have a determinate size	✓	
		Firms must belong to a determinate sector	✓	
H5	Incubator affiliations	University	✓	N.A.
		Community	✓	N.A.
		Volunteers	✓	N.A.
		Outsourcing providers	✓	N.A.
H6	Financial structure	Public entities	N.A.	✓
H7		Rent model	N.A.	✓
	Variables indirectly related to the indicators of incubators performance		**Tenant companies**	**Incubator manager**
H8	Location		✓	
H9	Typology		✓	

5. Summary and Conclusions

The study was set up to explore which variables could be related to the performance of business incubators. Additionally, it stated to examine how the location or the typology of a business incubator could be indirectly associated to their performance.

This topic covers a very wide research domain. Furthermore, it has been already treated by some researchers. Despite that, it has been presented that the concept of business incubators is still evolving. Additionally, it was stated the business incubator are a useful tool to help newly created companies. These suggest the necessity of a deeply research on the studies already published and that there is a need for studies and analysis of this business incubators area.

Business incubators are a multifaceted concept. Thus, the analysis was focused on two of the main stakeholders: the tenant companies and the managers of the incubators.

Business incubators multiple variables possibly related to their performance. Thus, diverse variables related to various concepts were selected from the literature review: incubator services, market focus of the incubator, entry criteria followed by the incubator, reasons for tenant companies to leave the incubator, revenue streams and affiliations of the incubator.

The literature review also yielded that variables such as the typology or the location of the incubator could be related to the evaluation of the practices and policies of the incubator and consequently to incubator performance. Therefore, it was added a second analysis in order to corroborate this association.

Once the variables were selected, another consideration is that the development of the surveys and the selection and collect the data of the surveys were hard tasks to overcome. That might be reflected in the analysis as far as both samples obtained were limited. Finally, after the interviews (which allowed to validate the surveys) and the data collection from the surveys, some conclusions could be extracted from analysis:

From both analyses it was obtained that services related to the groups of infrastructure services, financial services and law and H.R services were associated to the degree of satisfaction of the tenant companies and to the perception of success (see table 7). The results presents that there is a positive relationship between the offer of services and the performance of the incubators. These results were expected because according on the conceptual bases, if the incubator is offering more services, the tenant companies are receiving more help and attention in diverse areas of their business development than the incubators which are offering less variety of services.

On the other hand, it has to be mentioned that despite the fact that the group of network services was not significant enough in the analysis of incubators performance, but the fact that almost all of the proposed network services were available in most of the cases evidences the importance of the network services. Furthermore, the management advice services proposed were not presenting correlation with the incubators performance. These results were unexpected because management advice services are supposed to be critical for the tenant companies.

In the analysis of the data from tenant companies, it was observed that the variables related to the frequency application of graduation policies or to the importance of a determinate market focus were correlated with the degree of satisfaction of the tenant companies (see table 7). In both cases, these relationships were presenting negative values. Thus, the restricted applications of policies of exit or entry criteria were negatively related to the performance indicated by the satisfaction of the tenant companies with the incubator staff.

On the other hand, from the manager of incubators analysis, it was not found relation between these variables mentioned and the perception of accomplishment of objectives or success.

Additionally, the entry criteria applied by the incubator were not presenting association with the perception of the success or with the achievement of goals (see table 7). These results were unexpected because theoretically, the entry criteria were considered as ones of the most determinant variables in relation to the incubator success. More in detail, the entry criteria followed by the incubator are defining which tenant companies may be enrolled with the incubator and in consequence, these criteria should be determinant in the evaluation of the success of the incubators. In conclusion these analyses should be presenting significant correlation values whereas it was not found evidences of the relation between the entry criteria and the perception of success.

From tenant companies data analysis, it was also evaluated the relation between the possible affiliations of the incubator and their performance. More in detail, the variable related to the affiliation with universities was negatively related to the degree of tenant companies satisfaction whereas the association with volunteers and business community presented positive relationships with the degree of satisfaction (see table 7). These results were not expected because from the literature review it was stated that the linkage with universities was an important resource for the tenant companies in order to exchange knowledge and (in some cases) to access to specialized facilities. Consequently it was expected higher degrees of correlation values.

On the other hand, from the analysis of the data from managers of the incubators, it was obtained positive correlation values between the self-sufficiency of the incubators and the application of rent model and public entities as sponsors (see table 7). As it was stated in the literature review, the rent model is usually, the most common model applied by incubators. Thus, the relation between this variable and self-sufficiency it was expected. On the other hand, in the analysis of sponsors, the results obtained were surprising because it was not expected just find that only the public entities was related to the indicator of financial performance.

In the case of the analysis of the relationship between the typology of the incubator and localization and the variables related to the incubator performance, it was found that only the analysis of the data from tenant companies presented significant correlation between the variables.

More in detail, the typology according to the financial structure presented values of correlation in the cases of the variables related to financial services and to one variable related market focus of the companies (firms must belong to a determinate sector). On the other hand the typology according to the specialization was also related to the variables of firms must belong to a determinate sector, to the availability of cafeteria and catering and to community as affiliation. At the same time, the location of the incubator was related to the availability of the services of cafeteria and to the availability of financial services mentioned above and to the affiliations of community and universities.

Additionally, it has to be mentioned that it was expected to find correlation values between the variables related to the characteristics of the incubator (services offer, criteria of selection, market focus…) and the perception of goals achievement. Additionally, it was not found either relation between this variable and the types of goals proposed. That it is not understandable because it was stated from the theories of organizational performance that the perception of goals is a measure of business performance. Additionally, this variable and the perception of success variable were strongly correlated. On the other hand it was presented that one the main goals of the incubator is to help tenant companies. Thus it was expected to find higher degrees of association between goals achievement and the others variables.

Finally, this thesis connects the theory explained in the literature review with the analysis presented through the data collection from surveys. Then, in order to increase the comprehension of the field of business incubators, this thesis analyses the strength of the relations between variables related to the characteristics of incubators and their performance. So, in conclusion, this thesis evidences the linkages between the main components of the incubators and their performance.

References

Aerts, K., Matthyssens, P., Vandenbempt, K., 2007. Critical role and screening practices of European business incubators. SSRN Electronic Journal.

Al-Mubaraki, Hanadi y Busler, Michael (2011b). The Incubators Economic Indicators: Mixed Approaches. Journal of Case Research in Business and Economics, 4

Amezcua, Alejandro S. (2010a) Performance analysis of entrepreneurship policy: which business incubators generate the highest levels of economic performance? Frontiers of Entrepreneurship Research 3(18): Article 1.

Audretsch, D. y Thurik, A. (2004) A model of entrepreneurial economy. Group entrepreneurship, growth and public policy. Max planck Institute, Jena

Bergek, Anna, Norrman, Charlotte, (2008) Incubator best practice: a framework Technovation, 28 (1–2) (2008), pp. 20–28

Bruneel, J., Ratinho, T., Clarysse, B., y Groen, A. (2012) he evolution of business incubators: Comparing demand and supply of business incubation services across different incubator generations Technovation, 32 (2) pp. 110–121

Bøllingtoft, Anne y Ulhøi, John (2005) The networked business incubator—leveraging entrepreneurial agency? Journal of Business Venturing, vol. 20, issue 2, pages 265-290

Chan, K. F., Lau, T., 2005 Assessing technology incubator programs in the science park: the good, the bad and the ugly Technovation 25 (2005) 1215–1228

Dess y Robinson (1984) Measuring organizational performance in the Abcense of objective measures Strategic Management Journal Vol. 5, No. 3. pp. 265-273

Drappier, A. y Chaffer, J. (2009) A Tool to Measure Performance and Impact of Business Incubators ISBE RAKE FUND

EC 2002 Benchmarking of Business Incubators, Final Report Brussels Part 2

Fairlie, R., Morelix, A. and Russell, J. (n.d.). Kauffman Index of Startup Activity: National Trends 2016. *SSRN Electronic Journal*.

Gerlach, S y Brem, A. (2015) What determines a successful business incubator? Introduction to an incubator guide Int. J. Entrepreneurial Venturing, Vol. 7, No. 3, 2015

Glunk, U., & Wilderom, C. P. M. (1996). Organizational Effectiveness = Corporate Performance? Why and How Two Research Traditions Need to be Merged. (FEW Research Memorandum; Vol. 715). Tilburg: Organization.

Hackett, S.M., Dilts, D.M., (2004) A systematic review of business incubation literature Journal of Technology Transfer 29 (1), pp. 55–82.

Hair, J., W. Black, B. Babin, and R. Anderson, Multivariate Data Analysis: Pearson New International Edition. 7th ed. New Jersey: Pearson/Prentice Hall, 2014.

OECD (2016), Entrepreneurship at a Glance 2016, OECD Publishing Paris.

Lalkaka, R. (2006). Technology Business Incubation: A Toolkit on Innovation in engineering, science and technology. Published in 2006 by the United Nations Educational, Scientific and Cultural Organization

Lesáková, Ľ. (2012). The role of business incubators in supporting the SME start-up. Acta Polytechnica Hungarica, 9(3).

Lewis,D., Harper-Anderson,E. and Molnar, A. (2011) .Incubating Success. Incubation Best Practices That Lead to Successful New Ventures. 2011 University of Michigan

Marimuthu,M. and Lakha, P. (2015). The importance and effectiveness of assistance programs in a business incubator. Problems and Perspectives in Management, Volume 13, Issue 3, 2015

McCrum-Gardner, E. (2007). Which is the correct statistical test to use?. British Journal of Oral and Maxillofacial Surgery 46 (2008) 38-41

McKinnon, S. and Hayhow, S. (1998). *State of the business incubation industry, 1998*. Athens, Ohio: National Business Incubation Association.

Ramanujam, V., Venkatraman, N. and Camillus, J. (1986). "Objectives-based" evaluation of strategic planning systems. *Omega*, 14(4), pp.299-306.

Ratinho, Tiago (2011). Are They Helping? An Examination of Business Incubators' Impact on Tenant Firms. PHD dissertation. University of twente.

Rubin, T., Helge, T. and Stead, A. (2015). Knowledge flowing Technological Business Incubators: Evidence from Australia and Israel. Technovation41-42(2015)11–24.

Schumpeter, J. A. (1911) The theory of the economic development an inquiry into profits, capital, credit, interest and the business cycle. 1934 Translation. Cambridge, Ma: Harvard University Press.

Schwartz, M. and Hornych, C. (2010). Cooperation patterns of incubator firms and the impact of incubator specialization: Empirical evidence from Germany Technovation 30(9/10): 485-495.

Wiggins J. and Gibson D., 2003.Overview of US incubators and the case of the Austin Technology Incubator. International Journal of Entrepreneurship and Innovation Management, Vol. 3, Nos. 1/2, pp.56–66.

Zsidó, K and Fenyves, V (2015). Application of "traditional" and "new" approach methods in business performance measurement. Cross-Cultural Management Journal Volume CVII, Issue 1 (7)