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DO THE INCUBATORS FOSTER EXCELLENT PERFORMANCE? THE DEVELOPMENT OF POST-INCUBATION GAZELLES OF AALTO START-UP CENTER

Abstract

This paper focuses on the development of post-incubation firms. The research questions of this study are: What kind of financial performance the post-incubation firms have? What is the share of gazelles among post-incubation firms? How have the post-incubation firms developed compared with the total population of SMEs? What is the contribution of post incubation firms in job creation? The data consists of 203 firms incubated in Aalto Start-up Center incubator where from 175 firms were still active (survival rate 86 %). Four year financial statement data was available from 112 firms (55 %) and 19 of these firms were identified as gazelle companies but only 6 of them fulfilled all the conditions. Post-incubation firms grew substantially faster than the whole business population in Finland. Gazelles performed better than the other post-incubation businesses. The share of profitable post-incubation firms had increased in 2010 which proposes that more post-incubation firms will be capable to sustainable development. Some of the firms (e.g. Rovio Entertainment Oy) which have not been identified as gazelles have grown and increased their personnel substantially in 2011 and 2012. Thus the estimate of job creation in post incubation firms is about 1200 jobs in 2012. With this paper I would like to raise the following questions: Should incubator activity be supported by public funding or should it be totally private effort? Should public policy support be allocated to start-ups or to the existing companies which have already passed the death valley stage? Do the incubators belong to the university context?

Keywords: incubators, post-incubation, performance, gazelles
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INTRODUCTION

Current practices in venture programs typically provide for infrastructure such as incubators which offer an array of different resources and services. These services include for example assistance in business planning, networking; intellectual property rights issues and training in entrepreneurship and management (e.g. Malecki 1997, Virtanen & Laukkanen, 2002). Quite a lot attention has been devoted to the description of incubator facilities but focus on the incubatees, the innovations they seek to diffuse, and especially the outcome incubators have generated, has played a smaller role in these studies (Hacket and Dilts, 2004).

Incubators have been established especially in the context of universities. The impact of incubators in this kind of context has been controversial. There seems to be a tension between the practicality searched by introducing incubator activities and high quality science demanded by the universities. For example in Finland, the Ministry of Education and Culture has considered incubators to be ….

Generally the results and outcome of incubator activities propose higher survival rates when the tenants are compared with non-incubator firms. However, Amezcua (2010) examined 19,000 incubated companies in the US and suggested that they failed at almost the same rate as companies that were not supported by incubators. Similarly Hansen et. al. (2000) asked whether incubators truly are a valuable and enduring way to foster new venture process. They found out that many incubators offer little more than a place to set up a shop and nothing else.

On the other hand Abetti (2004) concluded that the proactive approach taken by the government represents a viable method for accelerating economic growth and entrepreneurship in a region. However, he raises the question whether identical models can be transposable and applicable to different cultural contexts.

These partly conflicting results do not deny the importance of the more detailed analysis of the outcome of business incubators, since in many countries incubators are an essential part of strategy for economic development in communities, which foster innovations, entrepreneurship and job creation. However, the measurement of outcome of incubators has mainly been based on the short term analysis of survival or failure of incubated companies. Based on our more rich research base in high growth businesses it could be asked do the survival and failure rates really describe the success of the incubation process? The literature of gazelle companies suggests that it is only a small proportion of the total business population which contributes most in the job creation in the society (Birch, 1981; Acs et. al., 2008; Autio, 2009).

This paper focuses on the development of post-incubation firms. The development of gazelle companies will be differentiated and compared with the development of other businesses. We will answer the following research questions: What kind of financial performance the incubated firms have after their incubation process? What is the share of gazelles among post-incubation firms? What kind of financial performance the gazelles will have compared with the other incubated companies and with the total population of businesses? How do the post incubation firms contribute to job creation?

The paper is organized so that after defining the context of Aalto Start-Up Center we will give a review of the former research in field of incubation and the outcomes of incubation process. The literature review will include also the contributions to the high growth entrepreneurship i.e. to the analysis of the definitions and development of gazelle companies. In the third chapter we will describe the data and methodology of the study. In the fourth chapter we will introduce the results of the study. In the last section the conclusions, limitation and

propositions for future research orientation in the outcome of incubation process and the role of gazelle companies will be discussed.

Aalto Start-Up Center (ASUC)

Aalto University School of Economics Small Business Center runs Aalto Start-up Center (ASUC) which is an incubator concentrating currently on information technology, knowledge intensive businesses and creative industries. ASUC is currently one of Europe's largest incubators and a significant global actor. The incubator was established in 1997 (former names Caduceus, New Business Center, Start Up Center). In 2010 when Helsinki School of Economics (HSE), Helsinki University of Technology (HUT) and University of Industrial Arts and Design (UIAH) in Helsinki were combined to form Aalto University the incubator of UIAH called Arabus was merged to Aalto Start-up Center.

ASUC premises located in Helsinki include 1500 m2 of facilities in a modern cluster of growth. Altogether 80 start-ups are operating in the ASUC incubator and 25 of the incubatees are from creative fields. The total personnel employed by the incubatees are around 250. Annually 30-40 new well-founded tenants (teams) (2/3 with Aalto background) will be selected. An incubator contract is always made for one year at a time, the maximum incubation time for a company being three years. ASUC is a project financed partly by The Centres for Economic Development, Transport and the Environment and City of Helsinki. Currently the annual budget of the incubator is about 0,5M€.The personnel of the project include Project Manager Marika Paakkala and 5 persons in counselling and marketing activities. The project is controlled by the Steering Group and the Advisory Board will help the incubator in planning the future activities.

The Aalto Start-Up Center offers high-quality management consultancy, versatile expert networks and furnished premises for the chosen companies. Along with business planning and

financing guidance the coaching concentrates specifically on the sales process of the company. The services are provided for different stages of the venture development including pre-incubation, incubation and post-incubation stages. Different stages include training in study programs, coaching and mentoring services.

In order to be eligible, the company must be Finnish, possess a business ID and be less than 3 years old. The type of company does not matter, but it is recommended to establish a limited company. The selection criteria of ASUC are growth motivation and orientation, innovativeness and passion for success and scalability of the business. Preference is given to knowledge intensive, technology-based businesses ideas and start-ups in creative fields.

The selection process starts with application where after the personnel will evaluate the venture and decide about the next stage. In the final part the business plan of the applicant will be evaluated and discussed it in detail. After acquiring all the necessary material the business advisor will form a selection report, which will be handled in weekly staff meeting together with selection reports of other applicants. The final decision will be made within 1-2 weeks of acquiring all the relevant material.

ASUC is a project financed partly by public funds and thus it is a not for profit incubator. Non-profit incubators could be seen as social enterprises which create value added for the society by fostering entrepreneurship and through entrepreneurship contribute to economic growth and job creation. Hacket and Dilts (2004) suggest that non-profit incubators represent politically rational model for allocating community resources and demonstrating the community's long-term commitment to facilitating economic development through entrepreneurship

FORMER STUDIES AND DEFINITIONS

Usually the purpose of business incubators is to foster innovations and new venture development. Large share of incubators are established to serve as successive development environments of higher education institutions (Virtanen and Laukkanen, 2002). Business incubation has also been a target of scientific research since early 1980's (Hacket and Dilts, 20004). The role of incubators as well as research of incubators has faced several challenges including first of all the definition and measurement of concepts and the outcome of the process. In this study we ignore the incubator and incubation process and focus on the firms, which have been incubated, after their exit from the incubator. However, it is important to build a framework of the context that may and should have had some impact on the development of these ventures.

Hacket and Dilts (2004) reviewed systematically business incubation research where they discovered five primary research orientations:

1) incubator development studies
2) incubator configuration studies
3) incubatee development studies
4) incubator-incubation impact studies
5) theoretical studies about incubators – incubation

Our study could be categorized to contribute mainly to the point 4 since the research questions posed in those studies are similar. Two similar research questions are: 1) How can business incubation outcomes be evaluated? and 2) Have business incubators impacted new venture survival rates, job creation and industrial innovation rates? (Hacked and Dilts, 2004).

Impact studies have often concentrated on finding out are the failure rates in incubation lower than without incubation process (e.g. Amezcua, 2010). Amezcua (2010) posed two

research questions: 1) Do incubated firms outperform their unincubated peers? and 2) Does the economic performance of incubated firms vary according to design characteristics of incubators and attributes of the entrepreneur? His idea was that, if incubation adds value that enhances the survival and performance of new ventures, after the incubation the firms should survive and demonstrate higher overall performance than their unincubated counter-parts. This would mean that incubated firms have developed a set of routines, competencies, and structures that allow them to win in the competition for limited resources. As the measures of performance Amezcua (21010) uses survival and sales and employment growth. His study answers also to the question do the incubators speed up the growth process? He concludes that business incubation has a positive impact on sales and employment growth but it lowers the expected life span of incubated businesses. What is the reason for negative correlation between high growth and survival? The explanation could be that high growth means higher risks and higher risks increase the probability of failure. Thus in studying post incubation performance we should also pay attention to not only growth but also to profitability of the venture.

Rothaermel and Thursby (2005) studied the impact of university – incubator knowledge flows on incubator firm performance. Their 79 firm sample was taken from Advanced Technology Development Center, which is a technology incubator sponsored by the Georgia Institute of Technology. The researchers followed each firm for a minimum of 4 years to assess the performance of incubator firms. Through the annual survey instrument longitudinal data was collected from the years 1998 – 2003 (Rothaermel and Thursby, 2005). One essential question in this context is that how do we measure the outcome of incubators? Rothaermel and Thursby (2005) considered acquisitions as part of successful graduation based on qualitative assessments of the incubator managers. However, their study was not direct performance study but an

analysis of knowledge flows from university to incubator firms. They found some evidence of these knowledge flows but more evidence of the firm's absorptive capacity. Absorptive capacity means a venture's ability to recognize the new information and to absorb and apply this information in its development process.

This idea leads us to the responsiveness of the incubator tenants which is dependent on their capabilities. On the other hand, the selection process of incubators affects the quality of the tenants. Colombo and Delmastro (2002) concluded that Italian science parks managed to attract entrepreneurs with better human capital, as measured by educational attainments and prior working experience. Thus it could be argued that analysis of the performance of post incubation firms includes the selection bias since the "due diligence" process of incubators strives to select high potential ventures which are probable to grow and perform well in the future if they succeed well in their development process.

Gazelles and their definitions

From the early works of Birch (1981, 1987) the research on gazelles has expanded significantly and gazelles are often used as a synonym for all types of high-growth companies. Delmar et al. (2003) suggested five categories for appraisal of gazelles. These categories are:

1) measurement period
2) growth indicator
3) measurement of growth
4) growth process
5) firm demographics.

The most often used measurement period in the analysis of high growth businesses has been 3 – 5 years (Heimonen and Virtanen, 2012). In the former literature it has been concluded that sales/turnover measures growth well, and has even been nominated the most preferable of all

growth indicators (e.g. Delmar 2003; Ardichvili et al. 1998). Usually the definitions of gazelles have used relative measures of growth (c.f. Davidsson and Wiklund, 2000). In some cases the process has also been described outside the high growth period (Acs et. al., 2008, Virtanen and Heimonen, 2011). In this paper firm demographics is easy to describe since before incubation period all the businesses have to fulfil the criteria of Aalto Start-up Center.

The main reason why society is so interested in gazelle companies is their huge impact in the process of job creation. Birch (1981) found out that two thirds of the jobs created over the study period by firms with firms which have less than 20 employees. Acs et. al. (2008) suggest that businesses with less than 20 employees responded on one third of the job growth and firms with 20 – 499 employees generated 24.1 % of job growth. But opposite to Birch's results companies employing more than 500 persons created 42.4 % of the total job growth during the study period

Birch et. al. (1995) considered companies as gazelles if they reached a 20 % yearly growth in sales for four years and started out with a base-year revenue of $100 000 at the start of the observation period. This growth rate means the doubling of the sales within four year period.

Utilizing sales as the only growth variable is not without merit as it also simplifies the research process. On the downside, sales are affected by inflation and exchange rates, and it may be inappropriate for certain industries where assets and employment grow before sales. Acs et. al. (2008) proposes that in addition to turnover, attention should be paid to employment when assessing gazelles. They call rapidly growing firms as "high-impact firms" (HIF) since they have a disproportionately large impact on growth in employment, revenue and productivity (Acs et. al., 2008). They define HIF as the firm whose sales have at least doubled over the most recent four-year period and which has an employment growth quantifier (EGQ: absolute and

percentage change in employment) of two or greater over the same period. The use of the EGQ is justified, as it mitigates the unfavourable impact of solely measuring employment in either percentage or absolute terms – i.e. biases towards small or large firms.

OECD and Eurostat define gazelles as enterprises with 20% annual growth in employees or turnover over a three-year period, and with ten or more employees at the beginning of the observation period. Although this definition may at first seem like a safe middle ground, it has been validated by experts from national statistics offices around the world, and a comprehensive sensitivity analysis by Petersen and Ahmad (2007). The employee-based size threshold is set at a level that strives to achieve a high sample size without over-representing small businesses. However, this definition may be criticized because the shorter time span of the analysis. Doubling of the sales during four year period (three growth figures) would demand for 30 % annual growth (Heimonen and Virtanen, 2012).

Definition of gazelles in Aalto Start-up Center

Aalto Start-Up Center (ASUC) has adopted its gazelle definition from the Danish financial magazine Børsen. This definition includes four different criteria.

1. turnover of the venture should be larger than 135 000 € every year during the four year period
2. growth of turnover and gross profit should be positive every year (three observations)
3. cumulative net profit should be positive during the period of analysis
4. turnover and gross profit should be doubled during the research period

In other words, the chosen growth indicators are turnover, profitability and threshold size, and the measurement period is 4 years. The first criterion refers to the size and the third one to profitability of the firm. Conditions 2 and 4 measure the growth of the venture.

It should be noted that all sample companies reside in a business incubator, and are thus not entirely comparable to average start-ups. The clear distinction of this definition is the inclusion of profitability as a growth indictor. Supplementary growth variables are recommendable when attainable, and profits have the clear advantage of taking also company costs into consideration. A monetary size threshold is logical for ASUC, as many incubator companies function with only a handful of employees – if an employee size threshold were to be used, it would have to be set very low, which in turn could result in a bias towards the smallest companies.

We defined four categories of gazelles depending on their size, growth and profitability. If all the terms (size, growth, profitability) were fulfilled the firm is called as a *gazelle*. *Fawns of gazelles* are such businesses which achieve substantial growth and profitability but not the demanded size of the business. *Prodigal gazelles* are large enough and grow substantially but are not profitable. In the group of *premature infant gazelles* only the growth aspect will be fulfilled.

- Categorisation in 4 groups (see Table 2 below):
  - Gazelles (all the conditions fulfilled)
  - Fawns of the Gazelles (growth and profitability fulfilled)
  - Prodigal Gazelles (growth and size fulfilled)
  - Premature Infant Gazelles (Growth fulfilled)

METHODOLOGY AND DATA

Methodology

The approach in this study is pragmatic and the nature of the analysis is descriptive and normative. We have not tried to build theoretical framework but have followed the financial performance of the incubated companies. Thus we follow Bygrave's (2006) thoughts about importance of descriptive field studies and Siegel et al. (1993) who stated that: "*A longitudinal study that follows companies through defined stages of growth and focuses on the characteristics that set companies apart at different stages in their life cycle would greatly contribute to our ability to predict winners and losers at their inception.*".

The studied businesses have been incubated in Aalto Start-up Center or its predecessors and exited by the end of the year 2011. Information from the development since 2007 was available from about one third of post-incubation firms. Financial data of the study was gathered from the Voitto + Data base including four year periods 2006 – 2009 and 2007 - 2010. The unit of analysis in this study will be a venture which has been incubated and exited the incubator. Every single firm was checked and the gathered data included growth, profitability and size figures of the venture. The financial development of the businesses was analysed by studying the development paths of the ventures and the distributions of financial ratios.

Data

In Table 1 we have presented the distributions of post incubation firms. Altogether the amount of post incubation firms at the end of the year 2010 was 276 firms. However, 73 of them have been established after the year 2007 and thus they cannot have four year accounting history which was required to be included in the sample of this study. In the population of this study we have included all those companies which have been established earlier than the year 2008.

Table 1: Post-incubation firms with four year financial data

Established	Group 1.1 (4 year data)	Group 1.2 (1- 3 year	Group 1.3 (no Voitto+ data)	Group 1 Total	Group 2 (not active)	Post-firms Total
-1999	29	2	8	39	5	44
2000	9	4	1	14	3	17
2001	7	3	3	13	5	18
2002	8	4	4	16	2	18
2003	12	1	3	16	6	22
2004	13	1	5	19	4	23
2005	9	3	6	18	1	19
2006	13	6	3	22	1	23
2007	12	4	2	18	1	19
Total	112	28	35	175	28	203
	55 %	14 %	17 %	86 %	14 %	100 %

From the Table 1 we may derive the survival rate of the firms. The follow up data of ASUC reveals that 86 % of the companies, which have been incubated, survive more than three years. The failure rate of those 34 businesses entered the incubator in the years 2005 – 2007 is really low being less than 9 %. Thus 9 out of ten companies incubated in those years in ASUC will survive longer than 4 years. Taking into account the incubation period which is two years all the survived businesses have survived outside the incubator longer than one accounting period. This implies that they are not only dependent on the low cost facilities and support of

incubator but have developed their skills and capabilities in order to survive outside the walls of incubator.

In the analysis of gazelle companies we included 112 (55 %) firms where from financial data from four year period 2007 – 2010 was available (Table 2.). From 28 firms (14 %) financial data was available from three year period only and 35 firms (17 %) did not have any financial data available in Voitto + database.

In analysing the loss of the data we should take into account that in order to be eligible to be a tenant of ASUC incubator the company should have been established less than three years before the application process. The maximum length of the incubation period is three years and certain form of the business has not been required but limited company form has been recommended. One reason for the lack of financial data from Voitto + database could be the form of business. According the Finnish norms limited companies have been responsible for delivering their financial statements to Patent and Registration Office (PRH) whereas small and medium sized partnerships have not been obligated to the delivery. It could be expected that in the future there will be less missing data since the Tax Authorities have been delivering financial statements of limited companies to PRH since the year 2009.

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RESULTS OF THE STUDY

Characteristics of post incubation companies

The amount of post-incubation gazelles

In Figure 1 and Table 2 we have described the characteristics of post-incubation companies in 2006 – 2009 (n= 78) and 2007 – 2010 (n= 112). In this figure the firms are categorised according to their growth, profitability and size. When all the conditions are fulfilled the venture

is classified as a gazelle company. The amount and share of gazelles has decreased from the previous study from the years 2006 – 2009 (Figure 1, Table 2). In the former study the share of gazelles was 13 % whereas in this analysis the share of the gazelles has decreased to 5 % of the sample. The share of prodigal and premature infant gazelles has remained stable but the share of fawns of gazelles has increased. The overall share of gazelles has decreased from 27 % to 22 %. This decrease is probably a consequence of recession and European financial crisis.

However, the positive sign of the development of post incubation firms is the increase in the amount of profitable companies. In 2006 – 2009 the overall share of profitable companies was 18 % and it has grown by 6 percentage points to 24 % in 2007 – 2010. Comparing to the results of Amezcua (2010) referred above it could be concluded that in order to achieve sustainable growth a venture should strive for profitability first.

Table 2: Post-incubation businesses in 2006 – 2009 and 2007 - 2010

Post-incubation businesses in 2006 - 2009 and 2007 - 2010				
	2006 - 2009		2007 - 2010	
	Number	%		%
Gazelles	10	13	6	5
Fawns of gazelles	5	6	10	9
Prodigal gazelles	3	4	3	3
Premature infant gazelles	3	4	6	5
Total gazelles	**21**	**27**	**25**	**22**
Profitability	14	18	27	24
Profitability + size	17	22	27	24
Size	8	10	7	6
None of the conditions	18	23	26	23
Total	**78**	**100**	**112**	**99**

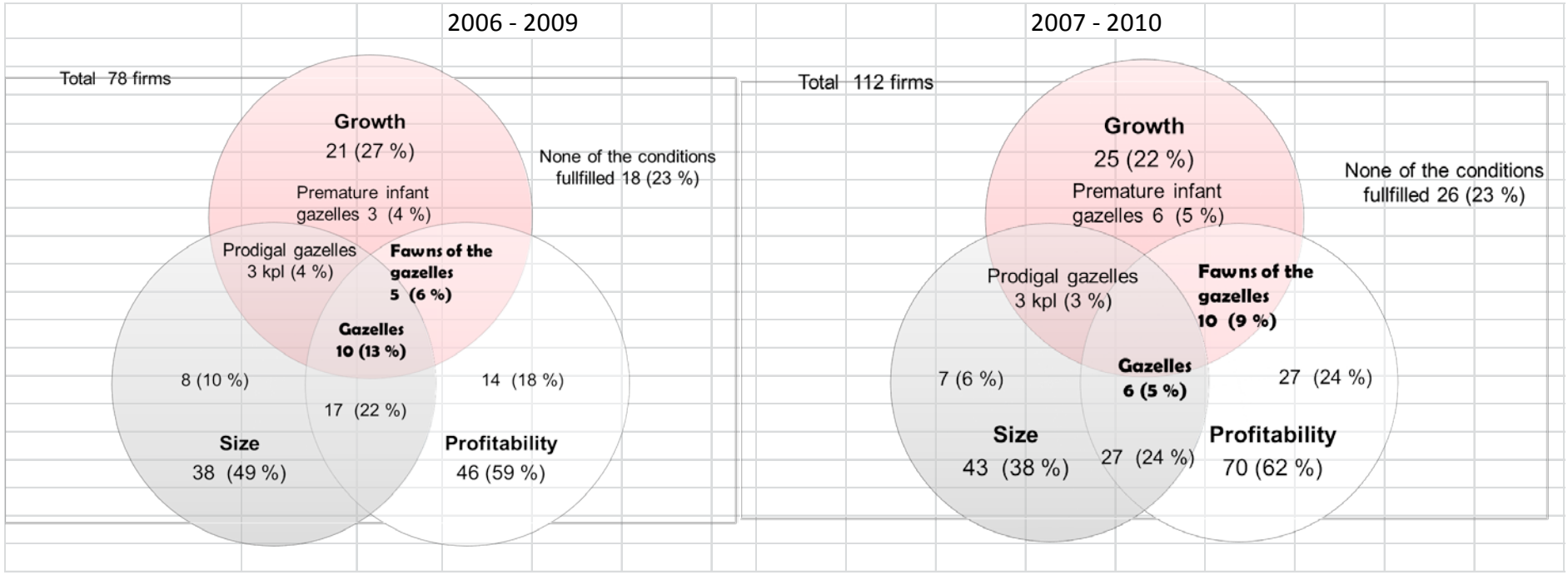

Figure 1: Characteristics of post-incubation companies in 2006 – 2009 and 2007 - 2010

Development of turnover in post-incubation firms

The total turnover of the post incubation firms was about 85 million euros in 2010 (Figure 2). Thus the average turnover is about 0.75 million euros. Almost one third of this turnover is generated by gazelle companies and about 6 % by fawns of the gazelles. Both gazelles and fawns of the gazelles have increased their share substantially from the year 2007 when the share of gazelles was 18 % and the share of fawns of gazelles less than one percentage. The average turnover of the gazelle companies was 4.7 million euros and fawns of gazelles 0.5 million euros in 2010.

However, compared to the last year of the previous period 2006 – 2009 the share of gazelles has decreased. In 2009 the share of gazelles from the total turnover of post incubation firms was 42 %. This shows the sensitivity of the data as well as the importance of the time span when evalauting the performance of ventures.

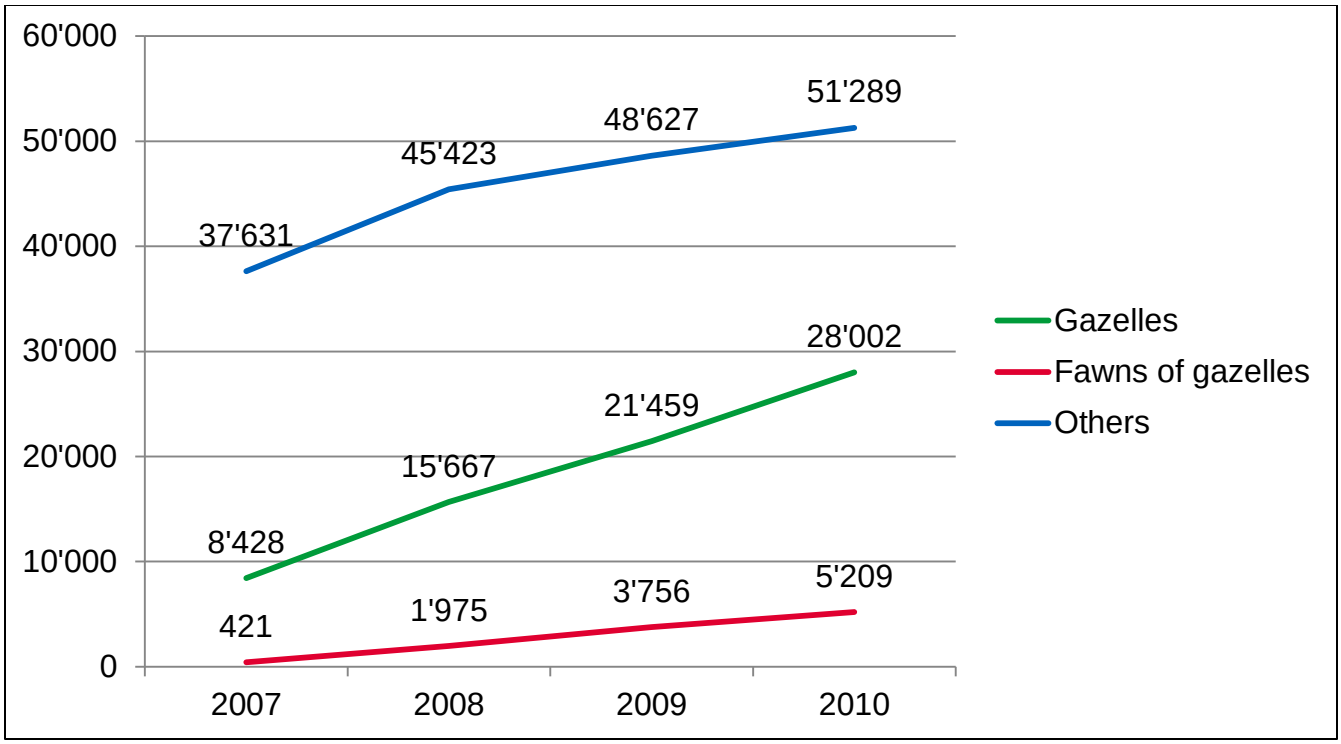

Figure 2: Development of turnover in post-incubation firms in 2007 – 2010

The development of turnover compared with the total business population

In spite of the recession the turnover of post-incubator tenants grew 17 % in 2009 and 14 % in 2010 when simultaneously the turnover of all the firms decreased by 15 % in 2009 and increased by 7 % in 2010 (Figure 3). In small businesses the decrease of turnover was 10 % in 2009 and increase 7 % in 2010. Compared to the total business population we can conclude that on the average post-incubation firms perform better, and all in all small businesses perform better during the recession than the whole business population. Naturally gazelles outperform the other groups in sales growth because according to the definition they will have on the average more than 20 % annual growth.

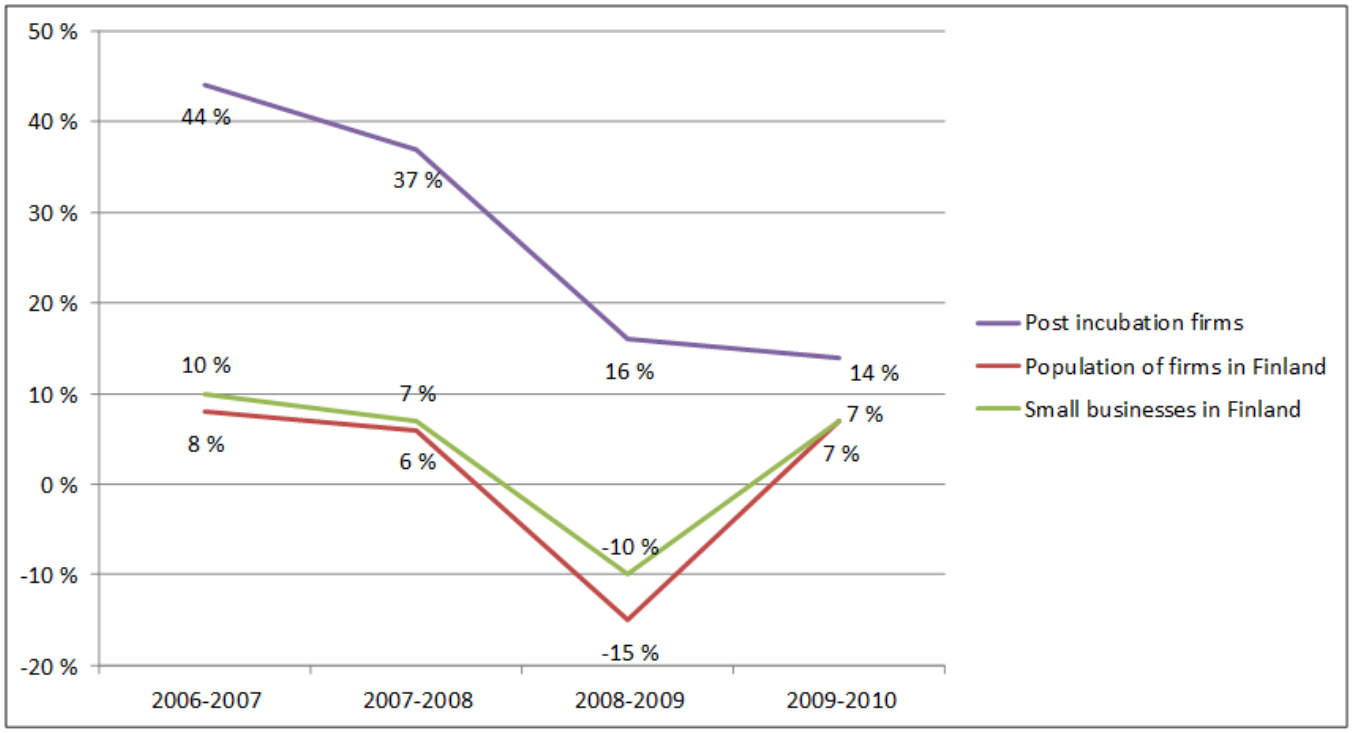

Figure 3: Growth of turnover in post incubation businesses compared with the total business population 2006 - 2010

Profitability of post-incubation firms

When we have a look at the distribution of the companies according different characteristics it is noteworthy that altogether 62 % of the sample in 2007 – 2010 can be categorized to be continuously profitable (Figure 1). The total amount of profitable gazelles which includes also the so called fawns of gazelles was 16 companies (14 %). Figure 4 shows that gazelles and fawns of gazelles have been clearly more profitable compared with other companies. The average level of the net profit percentage of profitable gazelles varies between 10 – 15 %. It should be noticed that in 2009 the profitability of other firms has increased but the

profitability of gazelles and fawns of gazelles have decreased. This could be a sign of counter cyclical nature of the development of gazelles.

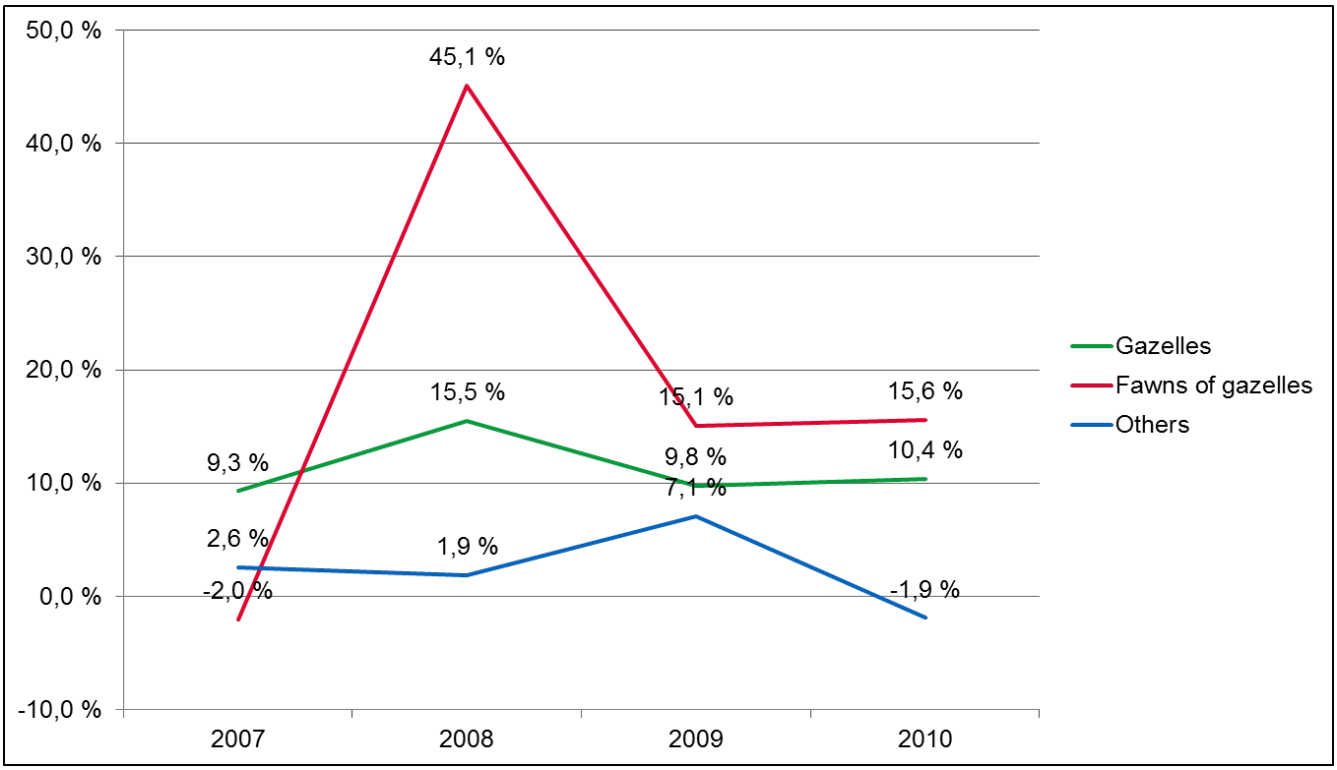

Figure 4: Net profit of post incubation gazelles (%) in 2007-2010

Compared to the previous study we notice that in the sample from the years 2006 – 2009 fawns of gazelles were profitable both in 2006 and 2007. In the sample from the years 2007 – 2010 the net profit of the fawns of gazelles was negative in the first year of the period whereas in the previous sample net profit of this category was about 6 % in the year 2007. But in that sample, the profit of this category had decreased by 2.7 % from the year 2006. This inconsistency is caused by the fact that because of the definition the companies may be classified in different categories in different samples.

Comparison with previous growth and post incubation studies

From the perspective of recent studies in growth entrepreneurship the outcome of the performance of post-incubation businesses is encouraging. For example Davidsson et. al. (2009), Steffens et. al. (2009) and Kiviluoto (2011) emphasize the importance of profitability in creation of sustainable growth. Kiviluoto (2011) argues that growth and especially high-growth has replaced profitability as the main focus of entrepreneurship research. Both Davidsson et. al. (2009) and Steffens et. al. (2009) propose that profitability precedes sustainable growth. Virtanen and Heimonen (2011) discovered also that family businesses strive for profitability first and growth will be considered thereafter. Thus it seems that those profitable firms which do not belong to the category of gazelles yet have a lot of potential to become gazelles in the future. Even if they would not be striving for high growth the survival of these companies will be more probable as the ones which do not possess good profitability. Heimonen and Virtanen (2012) concluded that growth and financial success are inversely related because high growth demands a lot of financial resources and this may decrease the profitability of growing businesses.

Job creation of post-incubation firms

From the data bases it is not possible to get complete information about the jobs created by post incubation firms. Since no exact figures are available we used careful estimate deciding that if the figure will not be announced and we do not have reliable figure available from secondary sources the number of jobs will be estimated to be 1. Following this principle we discovered that 6 gazelles had created altogether 226 jobs. Gazelles had increased their jobs from 82 in 2008 to 226 in 2010.

Fawns of gazelles contributed 30 jobs, prodigal gazelles 103 jobs and premature infant gazelles 23 jobs. Thus all the gazelle categories generated altogether 382 jobs wherefrom almost

60 % were created by six gazelle companies. Other companies which did not belong to any of the gazelle categories created about 380 jobs. Thus the overall job creation of post-incubation gazelles was more than 750 jobs and gazelles produced 30 % of this total job creation among those firms where from we had 4 year financial data available. Thus our result does not directly support the results of Birch (1981), Acs et. al. (2008) and Autio (2009) that the majority of the new jobs are created by a small cohort (gazelles) even if this small cohort contributes a lot to job creation. Later on when we discuss about anomalies in defining gazelles it will be noticed that the employment development of start-ups is really sensitive and depends a lot on the selected time span.

In addition to these 112 firms we received financial information from 67 companies but 10 of them had closed down their operations and we got additional job information or estimate from 52 companies which employed altogether 150 people. Thus the total amount of jobs created by post-incubation firms was about 900 at the end of the year 2010. Taking into account that some of the firms may grow really fast and take quantum leaps also in increasing jobs it could be estimated that the current amount of jobs created by post incubation firms could be about 1200.

Anomalies of the definition of gazelles

The definition we have used in defining different categories of the gazelles presupposes that firm's growth and gross profit should be positive every year in 2007 – 2010. However, it is quite obvious that we should consider those companies as gazelles where the development has been outstanding in 2011 and 2012 even if they do not fulfil all the criteria of gazelles at the end of 2010. Rovio Entertainment Oy (previously Rovio Mobile Oy) which entered the incubator in

2003 with the name Relude is an obvious anomaly of the group of gazelles. The development and growth of its turnover is described in Figure 5.

Angry Birds was the breakthrough game of Rovio Entertainment in 2010. The turnover of Rovio decreased slightly in 2008 and thus it was not includes as a case company in the sample 2007 - 2010. In 2010 the reported 12 months turnover at the end of June was 1.4 M€. Thereafter the accounting period was shortened to 6 months generating about 5 M€ turnover. In the year 2011 the development was outstanding and produced 1400 % growth compared to the end of 2010. The pace of increase in employment is unbelievable since at the end of the year 2011 the company employed about 250 people and in the beginning of June 2012 already 360 people. This is almost the same amount as jobs created by all the gazelle categories together at the end of the year 2010. Thus it can be concluded that gazelle data is very sensitive and the superior performance of one single company may change the outcome of the performance measures drastically.

However, some such companies which were classified as gazelles perform also very well in job creation. Futurice Oy employs currently 150 employees compared with 92 at the end of 2010. It is widely international company with offices in Helsinki, Tampere, Berlin, Düsseldorf and London. The company was selected as Europe’s best workplace in June 2012.

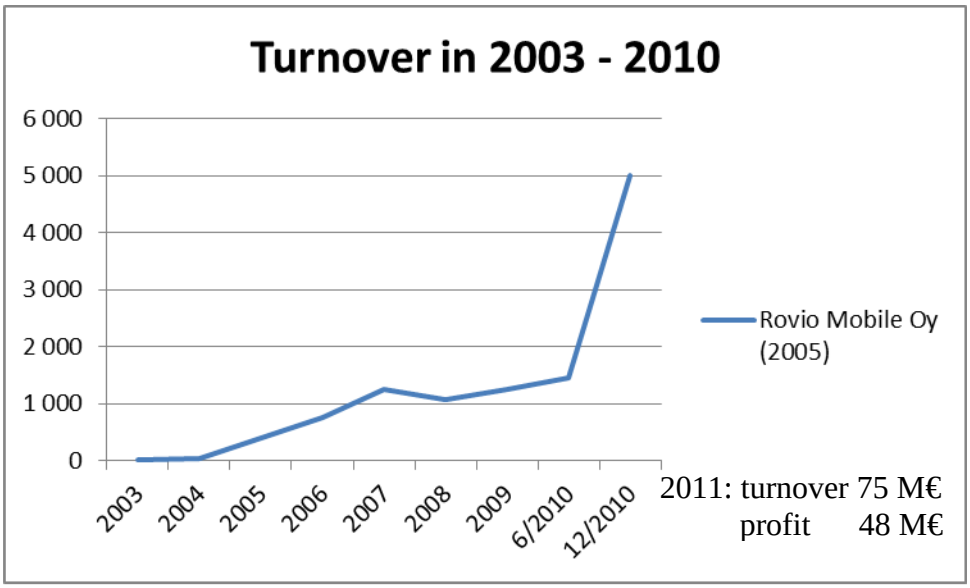

Figure 5: Turnover and its growth in Rovio Entertainment in 2003 – 2010

DISCUSSION AND CONCLUSIONS

The answer to the question what kind of financial performance the firms incubated in ASUC will have after the incubation period is that only very few of them are simultaneously fast growing and profitable. The share of gazelles among post-incubation firms in 2010 was 5 % which is quite near to the previous results compared with the total population of firms (2 – 8 %). However, in 2009 the share of gazelles was more than double compared to the year 2010. The impact of financial crisis could be seen in the development of the businesses in 2009 – 2010 meaning decrease in the turnover and increase in avoidance of risks. This can really be derived from the fact that the share has decreased from 17 % in 2005 – 2008 to 13 % in 2006 - 2009 and further to the latest figure 5 % in 2010. The results of the study suggest that if we use only growth as the criterion for the gazelle company the share of gazelles is clearly larger in the population of incubated firms than in the overall population of businesses. Altogether 27 % of the post-incubation firms grew substantially after their incubation period in 2007 - 2010. The survival rate of post-incubation firms is outstanding being 86 %. Similarly as Rothaermel and Thursby (2005) we considered survival to mean the continuation after incubation as a stand-alone going concern or acquisition of the company.

In the follow-up studies the growth of turnover in post incubation businesses compared with the total business population has been continuously at the higher level than in the control groups. The reason for the superior performance is probably the selection process of incubators where such ventures which have high growth motivation will be selected. Colombo and Delmastro (2002) suggest that incubators have an important positive selection role and thus the tenants have better capabilities than their non-incubated counterparts. When we compare the

total business population we may argue that small businesses have performed better than the whole business population but gazelles perform better than small businesses.

Post-incubation companies have contributed substantially to job creation. Former tenants of ASUC have created more than 1000 jobs. The role of incubator in future job creation of its tenants is probably modest but it could be suggested that incubator has been capable in selecting a bunch of such tenants which strive for sustainable development and growth. Even if large amount of post-incubation companies seem to be self-employed businesses the results of this follow-up study suggest that ASUC has created a wide ecosystem of incubated companies which contributes substantially to the society.

The results of this research strengthen the perception that incubators contribute to the performance of their tenants or at least they could be capable to select businesses which have potential for survival and growth. Potential incubator tenants may benefit from these results by seeking such incubators which have good results in producing post-incubation gazelles. Incubators may use these results in promoting their activities and selecting their tenants. The results propose that public policy should promote such incubators which are capable to introduce selective process and pick up tenants that have good potential. Aalto University Start-up Center has developed a model which includes pre-incubation, incubation and post-incubation activities. This model together with rather strict criteria for selection as a tenant of the incubator has produced very good results (c.f. Colombo and Delmastro, 2002).

Because the study describes the development of post-incubation gazelles it will of course include several limitations. The starting point is inclusion of all the post-incubation firms in the population where from those which have delivered sufficient information to be included in Voitto + data base were selected. This kind of approach will cause bias in the data since it is

probable that those businesses which do not succeed very well are most probably those who abandon their announcement responsibility. The time period in the follow-up studies has been four years. As Rovio Entertainment's Angry Birds example shows we should take into account all the available data and follow-up single firms in order to identify the anomalies in the population of incubated businesses.

At this setting we may identify three kinds of tensions 1) public vs. private, 2) start-up vs. existing ventures, and 3) university context vs. other context. Should incubator activity be supported by public funding or should it be totally private effort? Some authors have suggested that fostering start-ups may be a bad public policy (Shane 2009). Should public policy support be allocated to the existing companies which have already passed the death valley stage? Do incubators belong to the university context?

We suggest that the future research on incubators and incubation process could be more clearly staged and focused according to the stage where the entrepreneurs and businesses enter and exit the process. This means differentiating pre-incubation, incubation and post-incubation stages. The goals and objectives of the process are different in different stages. In pre-incubation stage the major objective is to prepare entrepreneurs and entrepreneurial teams to establish an "incubator ready" venture where the entrepreneurial team understands how to attract external resources during their role as incubator tenant. As an incubator tenant the venture will widen the external resource base through actions in incubator community. In the post-incubation stage ventures apply the learning in the incubation process within their current context. This means mobilizing of the external resources widely in their daily operations. More research would be needed also in the demand for incubator position since it is very scarcely studied area.

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REFERENCES

Abetti, P. A. (2004), Government-Supported Incubators in the Helsinki Region, Finland: Infrastructure, Results, and Best Practices. *The Journal of Technology Transfer*, Volume 29, Number 1, 19-40.

Acs, Z.J., Parsons, W. and Tracy, S. (2008), High-Impact Firms: Gazelles revisited. Washington, USA: SBA, Office of Advocacy.

Amezcua, Alejandro S. (2010). Boon or Boondoggle? Business Incubation as Entrepreneurship Policy. Syracuse University Dissertation.

Autio, E. (2009). The Finnish paradox: The curious absence of high-growth entrepreneurship in Finland, Helsinki: ETLA, The Research Institute of the Finnish Economy, Discussion papers, No. 1197.

Birch, David L. (1981). Who Creates Jobs? *The Public Interest* 65, 3-14.

Birch, D. (1987). Job Creation in America. New York : Free Press.

Birley, S. and P. Weasthead (1990), "Growth and performance contrasts between types of small firms," *Strategic Management Journal*, Vol. 11, pp. 535-557.

Bygrave, William D. (2006), " The entrepreneurship paradigm (I) revisited", pp. 17 - 48 in Neergaard, Helle & Ulhøi, John Parm eds. Handbook of qualitative research methods in entrepreneurship. Cheltenham: Elgar

Davidsson, P., & Wiklund, J. (2000). Conceptual and empirical challenges in the study of firm growth, In Blackwell Handbook of Entrepreneurship, In Sexton, D. L. and Landström, H. (eds.) Oxford, Blackwell Publishers Ltd, pp. 26-44

Delmar, F., Davidsson, P. and Gartner, W. B. (2003), "Arriving at the high-growth firm", Journal of Business Venturing, Vol. 18, No. 2, pp. 189-216.

Gabrielsson, J., Politis, D. and Galan, N. (2011), "Rapid growth… and after? A study of growth patterns among ex-gazelles in Sweden," Paper presented in XXV RENT Conference, November 16 – 18, 2011, Bodø, Norway.

Hackett, S. M & Dilts, D. M (2004), A Systematic Review of Business Incubation Research. *The Journal of Technology Transfer*, Volume 29, Number 1, 55-82.

Heimonen, Tomi and Virtanen, Markku (2012), Characteristics of successful gazelles – problems in approaches and methods of analysing the data. Forthcoming in *International Journal of Business and Globalisation*.

Kiviluoto, Niklas (2011), Rediscovering profitability in entrepreneurship: evidence from Finnish high-technology start-ups. Åbo Akademi University Press, 2011.

Malecki, E.J. (1997): *Technology and Economic Development: The Dynamics of Local, Regional and National Competitiveness*. Second Edition. (Longman)

OECD (1997). Small businesses, job creation and growth: Facts, obstacles and best practices. 22nd of June, 1997: http://www.oecd.org/dataoecd/10/59/2090740.pdf

OECD (2003). High-growth SMEs and employment. 6th February 2003: http://www.oecd.org/dataoecd/18/28/2493092.pdf

Shane, Scott (2009), “Why encouraging more people to become entrepreneurs is bad public policy, Small Business Economics 33:141–149

Steffens, P., Davidsson, P. and Fitzsimmons, J. (2009), ‘Performance configurations over time: Implications for growth- and profit-oriented strategies’, *Entrepreneurship Theory and Practice*, pp. 125-148.

Virtanen, M. & Laukkanen M. (2002): Towards HEI-based New Venture Generating Tool: The "Business Lab" of The University of Kuopio, Finland. *Industry and Higher Education*, Vol. 16, No 3, June 2002.

Virtanen, M. and Heimonen, T. (2011),”The development of high growth and highly successful SMEs: cases from Eastern Finland”, *Int. J. Technology Transfer and Commercialisation*, Vol. 10, Nos ¾, pp. 411-432.