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Publicly Funded Support of Technology-Based Ventures

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SUMMARY

This thesis is about publicly funded support of technology-based ventures. These ventures are regarded as solutions to create growth and societal development. They are commonly originated from universities, institutes or other firms and their products or techniques are commonly new or at least different from the ordinary. They are therefore considered as being of higher risk than generic new firms, but if successful they may also give higher returns. Hence, a range of efforts has been undertaken to support them. However, concerning the issue of public support, gaps of research have been exposed.

This thesis aims to give some answers on the question of what characterizes the public support given to technology-based ventures in Sweden. It elucidates two types of public support, the "configuration-type" and the "process-type" The first is studied by using statistical databases built upon the conditional loans and the innovation subsidies that were offered by Sweden Innovation Centre during the years 1994-2003. The second type concerns incubator support, and investigates how best practise incubators can be evaluated. Among the results, it can be mentioned that different support actors use different selection criteria depending on their goals, however the credibility of the applying venture is crucial for approval. Furthermore, a framework for best practice evaluation is developed.

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/Charlotte

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1. INTRODUCTION AND PURPOSE

"Our vision is that Sweden will be the most competitive, dynamic and knowledge-based economy within Europe, which implies being one of the most attractive investment countries in the world, for large and small knowledge-based companies." (Ds, 2004:36, p 4, Leif Pagrotsky, minister of trade and industry and Thomas Östros, minister of education and research)[1]

The solution suggested to reach this vision contains of two main parts. The first is the knowledge-base for innovation per se. This includes e.g. entrepreneurship education on different levels within the school system. The second is to stimulate innovation within the industry (supporting new and existing firms). One important tool for fulfilling the vision is to use an innovation system[2] approach (Vinnova, 2005).

There is an emergent focus on the technology-based venture (TBVs[3]) sectors (cf. Storey and Tether, 1998b; Klofsten and Lindholm-Dahlstrand, 2000; Lindholm-Dahlstrand and Cetindamar, 2000; Lindelöf and Löfsten, 2004). TBVs are often originated (spun off) from universities, institutes or other firms (cf. Lindholm-Dahlstrand, 2004). These ventures are, an important complement to larger firms, but have also special characteristics that make them different to other smaller firms in an innovation system (cf. Storey, 1994). TBVs are often stated to have the potential to "fundamentally transform the ways in which societies and markets operate" (cf. Storey and Tether, 1998b, p 1057). They are seen upon as solutions to create growth and societal development (cf. Storey and Tether, 1998b, 1998a; Klofsten and Lindholm-Dahlstrand, 2000; Lindholm-Dahlstrand and Cetindamar, 2000; Lindelöf and Löfsten, 2004; Ds, 2004:36).

To create more innovation, political systems, firms and institutions need to cooperate. The role for the government is then to facilitate such cooperation between actors (Lindholm-Dahlstrand and Cetindamar, 2000; North et al., 2001; Harding, 2002; Oakey, 2003; Etzkowitz, 2005). There are arguments today, that the old Swedish support system for enhancing entrepreneurship and innovation has been inefficient. There is an immediate need for a new system with greater entirety than the old, which to large extent has been winded up during the last years (de Neergaard, 2004).

[1] The quotation has been translated from Swedish.
[2] Innovation systems (IS) can be regionally limited, such as National IS and Regional IS. They can also be limited to certain techniques or sectors; we then talk about Sectoral IS or Technological IS (Carlsson, 2004; Edquist, 2004).
[3] See section 1.2 for definition.

The policy declarations, and the on-going debate, both in Sweden and on the international arena, points out that it is important for various actors, such as policymakers, financiers and incubator[4] managers, to understand and be aware of the special characteristics of TBVs, and to take these characteristics into consideration when acting in order to benefit them (Storey and Tether, 1998b). Successfully implemented, this entails a better fit between demand (various types of firms) and supply side (various types support actors) of public TBV support, and therefore a more efficient innovation system.

Therefore, increased understanding of publicly funded support towards early stages TBVs is needed. However, to obtain this we need detailed empirical studies, using different rich data samples and various methods for description and analyses. Hence, an initial step is to present basic characteristics of different types of publicly financed support. Furthermore, it is crucial to develop models to evaluate performance of different support initiatives. With respect to this, the aim for this thesis is to find out the specific characterises of public support for TBVs and methods for evaluating performance.

1.1. STRUCTURE OF THE THESIS

This thesis starts with an introduction where a short picture of the present status along with its aim is given. The following sections define TBVs, their surrounding system and the present types of support that are used. This is followed by a presentation of the empirics. After this the model for analysis is given, followed by the research questions.

The frame of reference starts with some general characteristics of TBVs and continues with facts and arguments concerning their finance. After that the literature of public finance is reviewed. The frame of reference is ended with a review of incubator support.

The method starts with a discussion about knowledge, how to utilise practically based knowledge and how to relate to previous experience. The section is continued with the method of this thesis, and the methods used for each paper.

Summaries of each paper are given and the thesis ends with conclusions and some ideas for the upcoming research.

[4] For definition of incubator, see section 1.5.2

1.2. TECHNOLOGY-BASED VENTURES

TBV is a key concept for this thesis, and therefore it has to be discussed and defined. When going through the literature about new technology-based firms (NTBFs), knowledge-based firms, high technology small firms and innovative firms, ventures, projects and ideas in general, it is soon confirmed that the confusion is large over what is considered as being what (Storey and Tether, 1998a; Rickne and Jacobsson, 1999; Lindholm-Dahlstrand, 2004). There is a range of more or less differentiated meanings concerning both definitions and denominations.

'New' in this study aims at ideas, ventures, projects, and firms that are young, in means of being in their earliest phases of development[5]. Therefore, the denomination 'venture' will be used from here on. Early development or early stage/phase is in this study defined as beginning "with the realisation of the idea whereby one or more founders take concrete action to set up a commercial enterprise. The process is said to be concluded when a business platform has been established" (Klofsten, 1997, p 149) [6].

'Technology-based' embrace everything from science-based in means of high-technology spin-offs from universities and research institutes to more basic apprehensions of technology in general, but still with the focus of the technology of the product or service. 'Knowledge-based' is referred to as focusing on the human capital, e.g. products or services from skilled individuals such as art directors, architects etc (Lindholm-Dahlstrand, 2004).

In this research the target group studied is denominated technology-based ventures (TBVs), following the definition given by Klofsten (1992), where the competence of the personnel within the venture is in focus. He defines a technology-based venture as "one whose strength and competitive edge derives from the engineering know-how of people who are integral to the firm, and upon the subsequent transformation of this know-how into products or services for a market", (p 16).

The level of technological height or innovation can also be discussed, since it is not included within the above definition. However, to be able to discuss this issue, the concept of innovation needs to be declared. The word innovation comes according to dictionaries from the Latin's "innovatio" or "innovo", which means renew, or to make something new. When choosing a suitable definition, it must be taken into consideration that TBVs are in their earliest phases of development, which implies

5 New may also be coupled to technique, in means of new technology.
6. Since venture development is an individual process, this period of early stage is both complicated and blurred to estimate in terms of years and months. It will therefore be measured in terms of maturity of the idea, see figure 2. Previous studies (Klofsten, 1992), shows that needs and actions of ventures are to larger extent correlated to maturity rather than to time.

wideness rather than narrowness. This thesis therefore follows the Schumpeterian[7] definition, where innovation is regarded as synonym to entrepreneurship, and is defined as the carrying out of new combinations, which can concern new goods, new ways of production, new markets, new raw materials and new organizations (Swedberg, 2000).

There are ventures, both within the studied financial support system and within several of the incubators, which cannot be defined either as high technology or 'rocket science'. Nor are all of them originated by engineers. However, most of them can, according to the requirements stated of both novelty and innovativeness (both by the SIC scheme and by most incubators) still be considered as engaged with new and innovative *products* or *services*, in terms of new to the market or in some cases new to the world. Furthermore, other research may use stricter definitions, where technology-based is a synonym to research-based. Hence, it must be underlined that the choice of definition for this thesis may entail that what is regarded as specific characteristics and obstacles for the technology-based ventures addressed in some of the referred sources, to a less extent holds for all of the ventures studied in this thesis.

1.3. INNOVATION SYSTEMS

It is demonstrated "that new technologies are seldom if ever developed by a single firm alone in the vacuum of an institutional environment" (Van de Ven, 1993, p 214). Instead, they must be regarded as part of a larger context. This surrounding system, or infrastructure for entrepreneurship, as it has been put by Van de Ven (1993), will in this thesis be referred to as the surrounding innovation system (IS).

In literature there are several types of IS mentioned, each of them suitable for different contexts and purposes. There are two main principles for categorisation, geographically based and based on industrial sector/technology. Geographically based systems are divided into national IS, which are limited by national borders and regional IS, limited to certain geographical regions (Asheim and Gertler, 2004; Edquist, 2004). IS following the industrial sector are called sectoral IS. These systems are build upon shared knowledge and technology of the actors and networks within the sector (Malerba, 2005). If the system concerns "a particular technology or set of technologies" (Carlsson, 2004, p 6) the denomination is technological IS. Additionally to the above ways of limitation, Edquist (2004) mentions the *activities* of the system as a third way. However, he admits that such limitations often are complicated to conduct.

[7] This definition originates from the second edition of J. A. Schumpeter "The theory of economic development" from 1934.

Due to the fact that there are various types of TBVs, a relevant IS can be difficult to point out; a wide definition of the concept of IS is therefore needed. Such a wide definition is made by Edqvist (2004, p 182), where he defines the IS as "the determinants of innovation process = all important economic, social, political, organisational, institutional, and other factors that influence development, diffusion, and use of innovations". Furthermore, IS are constituted by its components (organisations and institutions) and the relations among them.

Finally, the IS approach is put forward to be used as "a conceptual framework in specific empirical analyses of concrete conditions" (Edquist, 2004, p 202). In this thesis it will be used as a tool to describe and limit the surrounding context of the ventures in focus.

1.4. SUPPORT

The focus of this study is publicly funded support directed towards TBVs. This support can be divided into two types, "configuration-type" and "process-type" (Autio and Klofsten, 1998, p 33), The former refers to support in terms of infrastructure, such as proximity to universities, research institutes and manufacturing industries, competent managed science parks/incubators, supply of venture capital and other sources of funding. In this study the focus, however, is put on public finance and the other kinds will therefore be left or only shallowly treated. The latter, "process-type", refers to more "soft type" of support, such as support programs directed directly to the venture and its daily needs, e.g. different kinds of business advice and coaching activities. These two types of support will be discussed in the following two sections; a general picture of the present national state will be given along with some of the arguments of the debate. Some important research gaps will also be revealed.

1.4.1. "CONFIGURATION-TYPE" OF SUPPORT

The problem of finding finance is often put forward by individuals that have got an innovative idea that they are willing to realize within a new venture (cf. Westhead and Storey, 1997). If studying the venture capital literature it is easy to get the impression that the lack of capital is most severe during the expansion phases of the venture (cf. Harding, 2000; North et al., 2001; McGlue, 2002). However, there is evidence (Klofsten et al., 1999) that also small amounts directed to the very earliest stages are of high importance.

According to de Neergaard (2004) the demand for new venture finance in Sweden is now strong. He states that the old system of support was fragmented, and since it has during the later years at least partly been mounted down, the present opportunities to

find finance beside own capital and so called "bootstrap capital"[8] has decreased. Furthermore, it is shown that the venture capital investments towards early phases have decreased steadily in the recent years (SVCA, 2000, 2002, 2003). There are however, some regional funding available, especially if the venture is able to claim that it is situated at the countryside in a less dense region that can invoke regional support from the EU. In principle, the Swedish support system dedicated to new venture ideas today is limited to the funds of ALMI/NUTEK[9] and the Innovation Link. Most is available as different kinds of loans or against equity shares. There are also possibilities to get smaller sums in the form of subsidies[10], but regional policies and solutions are differing. Furthermore, the present financial support efforts are not exclusively directed to the earliest phases.[11]

The issue of public support of TBVs has also generated discussions among researchers. Demand for thoughtfulness is emphasized along with the need for more research on the issue. Storey and Tether (1998b) as an example, argues that no development of the European support schemes has been undertaken, and for this reason they suggest that evaluation of the effectiveness of governmentally financed support schemes in Europe is needed. There are studies that point out the advantages of, and need for publicly funded support directed to new ventures (cf. Klofsten et al., 1999; Lindholm-Dahlstrand and Cetindamar, 2000; North et al., 2001; Lawton, 2002; Oakey, 2003). Studies stating the opposite, or at least rising warnings about governmental support activities and accusing them for being inefficient and for "throwing money" at the problem instead of solving them (Cressy and Olofsson, 1997b, page 192 ; Bergström, 2000). Klofsten et al. (1999) recognized a research gap concerning public finance of early stages ventures in 1999, when they surveyed subsidies and loans available during the early nineties. According to my own studies this research gap still seems to be open (Norrman et al., 2004a).

[8] Bootstrap capital (such as loans from friends and family, credit cards, home equity loans (Auken and Neeley, 1996)) is a term used to comprehensively describe the sources of finance that not are to be described as traditional (such as loans from banks, venture capital investments and public financial schemes) (c.f. Auken and Neeley, 1996; Winborg, 2003).

[9] ALMI is a publicly financed and owned support organisation that aims at supporting new and established firms with funding and advice. It consists of a parent company, ALMI Företagspartner AB, with 21 regional daughters. ALMI gives advice and provides capital, mostly in case of different types of loans (http://www.almi.se). NUTEK is a publicly owned central support agency translated as "The Swedish Agency for Economic and Regional Growth". The aim of NUTEK is to create an increasing number of (1) new companies, (2) growing companies, and (3) strong regions (http://www.nutek.se). The Innovation Link is a publicly owned and regionally operating foundation. It aims at supporting the commercialisation of research and innovations (http://www.innovationsbron.se).

[10] Information from ALMI Östergötland.

[11] The information about the Innovation Link is given by its officials in Stockholm.

1.4.2. "PROCESS-TYPE" OF SUPPORT

Although 'money makes the world go round', it is not all that matters! To gain success on the market there is a need for support in terms of what is mentioned above as "process-type". This type of support includes hands-on advice to the entrepreneurs and originators of TBVs, e.g. of what to do and what to avoid, how to structure the business, find and convince customers, how to build an efficient organisation. Bright ideas and advanced inventions are as mentioned, important, but what is their value if no one has heard of them, or worse, don't want to purchase them? There are several studies giving evidence that inventions, no matter how brilliant they are, guarantee commercial success, and it is the commercial success that secures jobs and incomes (Heydebreck et al., 2000). As an example the video standards VHS and Betamax can be mentioned. Betamax was first on scene and more technically advanced, but it was the second mover VHS that through strategic movement finally won the race (Cusumano et al., 1992).

As previously shown, few innovations are born and developed in closed and locked basements. To reach, for example, customers, partners and financiers, relations with the surrounding environment are needed. The support actors, such as business advisors and incubator coaches, therefore have an important mission of being mediators between TBVs and the actors that's surround them.

Governmental efforts are made also concerning the "process-type" of business support. Beside nation-covering organisations such as ALMI, that serve both established and new firms, there is the Swedish Agency for Innovation Systems, Vinnova that supports the environment of TBVs (e.g. the Vinnkubator-programme). However, when taking a closer look at incubators, both in Sweden and abroad, it appears that incubators do not constitute a homogeneous group (paper three). Therefore, when supporting incubators it is important to be able to measure their effectiveness. For example, a Swedish study (Lindholm-Dahlstrand and Klofsten, 2002) gives evidence that the support given by Swedish incubators and science parks does not match the demand of the tenants. The lack of research on how to evaluate their performance was recognized almost ten years ago (Mian, 1997), but this gap has not yet been fulfilled (see paper three). This holds especially for the Swedish incubator system, where a research-gap is addressed by Lindelöf and Löfsten (2004) who emphasize that more knowledge on the issue is needed.

1.5. ABOUT THE EMPIRICS

This thesis is to a large extent based on empirical analysis. To put these empirics into a context that is easier to approach, a map over the main public support actors has been constructed (see Figure 1). The map shows primarily the financial resource providers[12] within the Swedish system of support actors during the resent 10 years (1994 – 2003)[13].

The map is arranged as follows: The bottom row indicates the development stage of the venture. It is divided between pre-commercialisation stage and commercialisation stages, which both are concepts adapted from Klofsten (2005).[14] The following five rows (see figure 1) represent publicly funded actors and the top rows represent private actors. The intensity of grey colour indicates the stage of firm development in focus of each type of actor or actor.

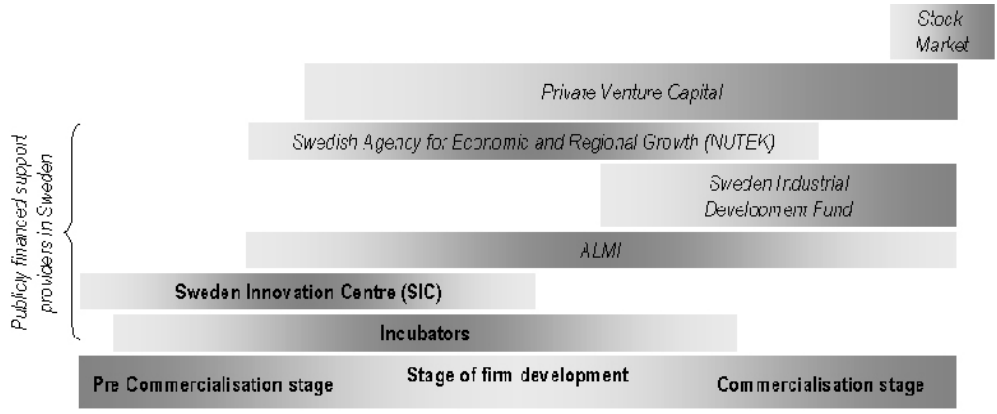


Figure 1, Support actors in Sweden

Starting from the top, the first row, 'stock market', represents the stock exchanges available for TBVs that are in position to make public offerings of their stocks. 'Private venture capitalists' represent all kinds of private investors[15]. NUTEK and ALMI have

[12] Although financial support may be the first task that comes to mind concerning the organisations in the figure, most of them emphasise the combination of financial support and advice.
[13] This map is today changed. SIC has been winded up and there are new actors, like the innovation link, that have entered the stage.
[14] In the first stage, the venture strives to reach a "launching platform", where the idea is a foundation for starting a new venture and there is an actor which is prepared to invest resources in the future development of the idea (p 116-117). In the latter stage the idea has been successful enough to commercialise, and the venture strives to reach a "business platform". See also Figure 2, where the whole process is given (Klofsten, 2005).
[15] For information of Swedish venture capital investors see SVCA, the Swedish Private Equity & Venture Capital Association (http://www.svca.se).

both been described above (note 9). The Sweden Industrial Development Fund is a publicly owned and financed venture capital fund that offers growth capital for Swedish small and medium sized companies in most sectors. Their investments consist of both loans and equity capital in the range of k€ 225 and M€ 5.5, and optimal investments are of approximately M€ 1.1. The fund is co-owner of a number of regional private venture capital companies (SVCA, 2005)[16]. SIC was a scheme for innovation finance that aimed at supporting innovative ideas. Finally, the incubators has been put in to this map, since most of them, at least partly, are financed with governmental disposes and since their support, which mainly is of "process-type", aims at early stages ventures.

As stated above, support has been divided into two main types: "configuration-type" and "process-type". In order to get a picture of the public support that is as complete as possible, it is important to study both these types. As shown by figure 1, both SIC and the incubators have in common that they are supporting TBVs in their earliest phases, therefore they both fit well as research objects for this study. The innovation finance scheme of SIC represents the "configuration-type" and the Swedish incubators represent the "process-type" of support.

Although these support actors represent different types of support, there are several denominators common for both of them. Both actors are:

- Aiming at early phases of business development by dealing with support directed towards TBVs[17].
- Aiming at creating environments – or innovation systems - that nurtures the emergence and development of TBVs.
- Totally or partly financed by governmental disposals.
- Instruments or tools that are expected to provide the society with an increasing inflow of technology-based firms, which is regarded as a key factor for the society to achieve and develop economic growth.

The following sections will give a more detailed presentation of these support actors, starting with the SIC.

1.5.1. SWEDEN INNOVATION CENTRE

"Sweden Innovation Centre, SIC, supports innovators in their absolutely earliest phases of development – with financial capital, advice and networks. One of the

[16] See also http://www.industrifonden.se
[17] See Figure 1, Support actors in Sweden and figure 2.

objectives of SIC's work is to create a better innovation climate in Sweden – a climate where people's attitudes to innovators is positive." (SIC, 2002, p 24)

SIC[18] was founded in 1994 by a governmental decision and was then supplied with a foundation of approximately 60 M€, originated from the public foundations of employees. The purpose of SIC was to give economic support to early stage innovations that were able to commercialise. SIC was also, as a lead in the renewal of the Swedish trade and industry, supposed to support innovation-promoting activities in purpose to enhance the interest and understanding of the importance of innovations as a factor behind economic growth (SIC, 2004).

Due to the initial governmental decision, the activities of SIC was limited into a 10-year project period and its funding was expected to be consumed during this period. Today SIC has been winded up, the official date was in September 2003, where the remaining funds were transferred to ALMI, that were the inheritor of the SIC project.

During the SIC project there were four kinds of support activities managed by SIC. These were:

- 'Innovation subsidies', a financial grant without obligations of payback. The maximal supported amount was of approximately 3300 €, but generally lower.
- 'Conditional loans', a soft type of loan, with the security put in the applying project. If the project gained commercial success the applicant had to pay it back and if the project failed the loan was written of. The maximal loan amount was of approximately 44 k€.
- 'Scholarships' have been characterized by varying size and varying purpose and only accessible periodically.
- 'Innovation-promoting activities' have been support activities directed towards other supporting actors and activities, typically different kinds of networks, special activities and efforts, such as participation in trade fairs lead by ALMI and other organisations that promotes trade and industry.

Subsidies, loans and the scholarships were available for applications from private persons as well as new firms, although firms were limited to not being older than three years. The innovation subsidies were locally administrated by the 'innovation centres' (normally by the local ALMI companies, but there were a few exceptions) in each of

[18] Where no other source is given, the facts about SIC is taken from the pamphlets "Sweden Innovation Centre" (2002), "10 years with Sweden Innovation Centre" (SIC, 2004) and the application form (SIC) "Nurture for good ideas". Some facts are also taken from interviews with the staff of SIC, Per Laurell, managing director and Roger Yttergren.

Sweden's 21 counties. The other facilities were administrated centrally by SIC in Stockholm. To handle the applications SIC used authorized consultants with knowledge of specific industries. These consultants were spread all over the country.

The rules for application were explicit: To get support a project or an idea had to be (1) new, (2) able to commercialise and, (3) technically or intellectually advanced. The instructions within the application form and its checklists were clear and indicated explicitly which activities were supported and which were not.

1.5.2. INCUBATORS

Historically, incubators can be seen as a quite new phenomenon (Mian, 1997). They are often located or connected to Science parks[19] and in most cases they also have got close bounds to universities (Siegel et al., 2003). The first American incubator was started in Batavia, New York, in 1959 (Hackett and Dilts, 2004b).

The history of the science park/incubator phenomenon is said to be started by the birth of Stanford Industrial Park in the early fifties. Frederick Terman is commonly believed as its inventor and the Stanford Industrial Park was the first stone in what became the area that today is known as the Silicon Valley, situated between the universities of Stanford and Berkeley in Santa Clara (Huffman and Quigley, 2002). Silicon Valley has been the role model for science parks all over the world and the phenomenon is growing (Westhead et al., 2000). The first parks in Sweden, Mjärdevi Science Park in Linköping and Ideon in Lund was established in the early eighties and today the number of parks has considerably increased.

In the literature concerning incubators and science parks, the concepts are often mixed (Falkeström and Larsson, 2000) and science parks and incubators are treated as more or less the same (cf. Westhead et al., 2000; Löfsten and Lindelöf, 2003; Phan et al., 2004). The definitions of science parks and incubators, given by their own

[19] The denomination Science Park is here used as a synonym to Technology Park, Research Park, Business Park and other similar concepts (Löfsten and Lindelöf, 2003). Since this thesis does not deal with parks, the difference if any will not be discussed.
The following definition for science parks is decided by the International Association of Science Parks: "A Science Park is an organisation managed by specialised professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a Science Park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities. (IASP International Board, 6 February 2002). The expression "Science Park" may be replaced in this definition by the expressions "Technology Park", "Technopole" or "Research Park""(Source: http://www.iasp.ws).

organizations are also close to each others[20]. Business incubation can according to these definitions (see note 19 and note 20) be regarded as a part of the science park agenda.

This thesis concerns incubators. There are plenty of definitions suggested for the concept *incubator* as shown in paper three. Rather than choosing one, our study (paper three) maintains that incubators can be viewed as "…a support environment for start-up and fledging companies" (Peters et al., 2004, p 83), although with the following conditions:[21]

(1.) Shared office space, which is rented under more or less favourable conditions

(2.) A pool of shared support services to reduce overhead costs

(3.) Professional business support or advice (coaching)

(4.) Access to networks

Furthermore, incubators are in this research identified to be concerned with ventures whose ideas are approaching the "launching platform", but have not yet reached a fully established "business platform"[22]. This is here referred to as incubator stage (see figure 2).

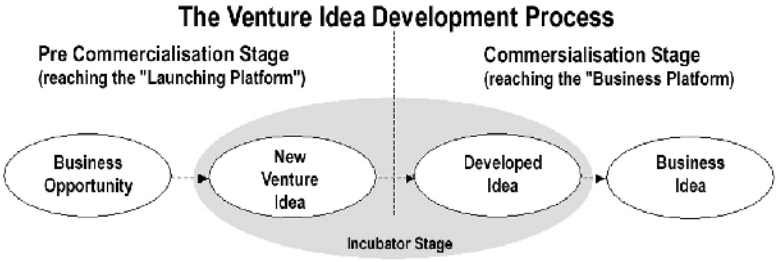


Figure 2, The incubator stage (Adapted from Klofsten, 2005)

No recent comprehensive catalogue of Swedish incubators have been found except the one presented by Falkeström and Larsson (2000), where they in November 1999 listed 33 Swedish incubators. The Swedish Association of Incubators and Science Parks SISP (http://www.sisp.se) organizes today almost 40 members. These consist of

[20] Hackett and Dilts (2004b) gives a comprehensive list of definitions of incubators. On the web page of National Business Incubator Association, NBIA, business incubation is defined as "a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services."
(Source:http://www.nbia.org/resource_center/what_is/index.php)

[21] These conditions are agreed upon by a large number of studies. See paper three.

[22] The business platform is defined as "a state whereby an enterprise has an input of business resources and is able to use these to promote corporate survival and growth in reasonably normal business circumstances" (Klofsten, 1997, p 148).

both parks, parks with incubators and incubators. According to the applications[23] for the Vinnkubator programme of Vinnova there are 42 organisations that claim that they are incubators.

The sources of finance for the incubator activities studied are mainly provided by governmental disposals. However, the sources are often more differentiated in terms of public actors than it is for the previously presented SIC. Swedish incubators are owned and financed by actors such as the Innovation Link, ALMI, universities, regional/local municipalities. There may also be private financiers and owners such as companies and private funds.

1.6. A MODEL FOR ANALYSIS

To be able to deal with the initially stated governmental vision, the following conditions concerning TBVs must be emphasised. Firstly, TBVs are associated with certain characteristics. This is indicated in previous sections and will also be shown in the following frame of reference. Secondly, if TBVs are to be developed into the flourishing enterprises that can serve to fulfil the introductory vision of the government, they need to get in hold of certain crucial resources, such as scientific or technological research or know-how, financing, market access, network, human resources (cf. Van de Ven, 1993; Rickne, 2000). These resources can be obtained by linking to - and becoming active part of - the surrounding innovation system, in which the resources, or the holders thereof, subsists (Edquist, 2004). Thirdly, credibility plays a key role to gain resources and can be gained through certain strategic actions (Zimmerman and Zeitz, 2002). The support organisations may play an important role as provider of information of such suitable actions and may thereby enhance the linking process. It can be concluded that TBVs can benefit from different kinds of public support activities in their efforts to link with the surrounding structures.

Generally, both TBVs and actual support actors are perceived as being part of the innovation system (Van de Ven, 1993; Edquist, 2004). In figure 3, the public support is regarded as a tool to link TBVs to their relevant innovation system. Therefore, they have been put in separate boxes. Other reasons for this division are that TBVs can be assumed to not having fully merged with their relevant innovation system(s). Furthermore, their technology may also be too new and different to yet having been established in a relevant system (see paper three). The relation between TBVs, the support and the environment to which they strive to link themselves is showed in the figure 3.

[23] Vinnova received 42 applications for the Vinnkubator program in November 2004.

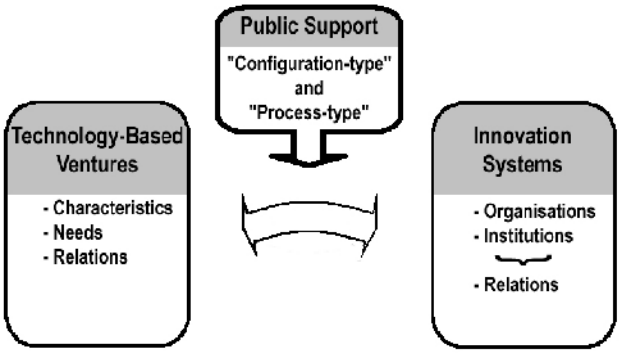


Figure 3, Model of analysis

The left box represents the TBVs. It includes their individual characteristics and their needs of resources required in their processes of development into mature firms. It also includes constrains faced on their way to reach their goals. Furthermore, their relations and interactions with actors such as financers, customers and partners are included, as well as their actions. The right box represents the relevant IS and includes the relations between its organisations, e.g. "formal structures that are consciously created and have an explicit purpose"…"the actors of the game" (Edquist, 2004, p 182), and its institutions, e.g. the "sets of common habits, norms, routines, established practises, rules or laws that regulate the relations and interactions between individuals, groups and organisations"…"the rules of the game" (Edquist, 2004, p 182).

The middle box represents the public support efforts that are made in order to bridge between TBVs and their relevant IS. Depending on the individual circumstances and context for each TBV, the connections between the venture and its IS are more or less tight and more or less easy to obtain. This is because different types of TBVs may be in the need of different types and quantities of support.

1.7. RESEARCH QUESTIONS

Within the literature several important gaps of research has been pointed out. First, the literature on public support for TBVs is recognized to be scarce (Klofsten et al., 1999; Norrman et al., 2004a). Furthermore, Storey and Tether (1998b) demands more research on the issue of public venture finance. They put forward that evaluation of the effectiveness of governmentally "configuration-type" (e.g. early stages financing) support schemes in Europe is needed. Second, also for the "process-type" (e.g. incubator support), there are research gaps addressed. Mian (1997) desires for enhanced knowledge of how to evaluate incubator performance. This research gap

seems, according to our research, still to be open. It holds especially for the Swedish incubator system, where it is emphasized (Lindelöf and Löfsten, 2004) that more knowledge is needed. Additionally, Storey and Tether (1998b) emphasize the importance of understanding and awareness of TBVs special characteristics, and the importance of considering them within the support actions.

Furthermore, we know from the previous sections that there is an on-going debate of financial support, over its advantages and drawbacks. The demand for a new system in Sweden is stated as being strong (de Neergaard, 2004). Also regarding the incubators, there are efforts made, from the government as well as from a regional level, to create and support effective incubators.

Hence, more knowledge is needed on both of the above-mentioned types of support. The following questions emerge as important: How do we recognize the characteristics and components of a good financial support system, or a best practice incubator? How and what can we learn from passed efforts and experience? Which parts deserve continuation in future systems and which parts are better to be put in archives?

The studied support actors are of two separate types. The innovation finance scheme (SIC) was one limited organisation, and the incubators consist of a group of organisations, which in principle is unlimited. In the databases of SIC answers as well as new questions are buried, but far from all. Therefore, as stated in the beginning of this section, knowledge about the characteristics must be obtained, to be able to generate meaningful hypothesis that points out the most important questions. This is true also for the incubators, to be able to find good incubator practice we first need to know how it is evaluated.

To summarize, the aim for this thesis is to find out the specific characterises of public support for TBVs and methods for evaluating performance. In order to find answers and solutions on this aim, two main research questions have been formulated:

RQ 1: What ventures get public financial support?

RQ 2: What problems are inherent in evaluation and comparison of incubator performance and how can best practice be identified?

2. FRAME OF REFERENCE

TBVs, as defined in this thesis[24], and the innovativeness and prospects of technological development and growth, to which they are associated, is regarded as important for the development and growth in society (cf. Storey and Tether, 1998b; Klofsten and Lindholm-Dahlstrand, 2000; Lindholm-Dahlstrand and Cetindamar, 2000; Ds, 2004:36).

TBVs are associated with a range of characteristics that distinguish them from new ventures in general. At first it must be made clear that TBVs as group are not uniform. This is important both to understand and to take into consideration (Heydebreck et al., 2000). Despite this statement of variety, there are also several characteristics that unite them and make them special compared to other firms. To start, they differ not only from large firms, but also from other kinds of small firms (Storey and Tether, 1998b, 1998a). The differences between large and small firms are a problem in it self, without adding the dimension of technology-based or not. This was shown already in the end of the fifties by Penrose (1959), who puts forward a range of competitive disadvantages for the small firm compared to larger firms. Moreover, TBVs offer, when successful, high returns, but the way to obtain these returns are surrounded by high risks (Klofsten and Lindholm-Dahlstrand, 2000).

Furthermore, the following additional characteristics of TBVs commonly seem to be of particular significance: (1) well educated owners/founders (Westhead and Storey, 1997; Storey and Tether, 1998b; Oakey, 2003). (2) owners/founders lack of marketing abilities and/or managerial skills (Westhead and Storey, 1997; Storey and Tether, 1998b, 1998a; Lindström and Olofsson, 2001; Mason and Harrison, 2001; Oakey, 2003) (3) technology focused and associated with advanced technology (Westhead and Storey, 1997; Storey and Tether, 1998b; Lindholm-Dahlstrand and Cetindamar, 2000; Lindström and Olofsson, 2001; Oakey, 2003) (4) concentration on one product (Oakey, 2003). (5) act on new markets, which are hard to access (Lindström and Olofsson, 2001; Oakey, 2003). (6) limited internal resources (North et al., 2001). (7) difficulties to influence or shape their external environment compared to larger firms (Storey, 1994; North et al., 2001). (8) associated with great uncertainty, since they are concerned with new products/services, which implies double uncertainty if their case comprise both new product/service and new market (Westhead and Storey, 1997; Lindström and Olofsson, 2001; Oakey, 2003) (9) affected by "liability of newness" (Stinchcombe, 1965, p 148), which includes lack of legitimacy or credibility (Birley et

[24] See section 1.2

al., 1985; Van de Ven, 1993; Zimmerman and Zeitz, 2002)(10) recognized to have short windows of opportunity (Westhead and Storey, 1997; Storey and Tether, 1998b).

According to Westhead and Storey (1997) the firms with the most sophisticated technology are those who have got the largest potential of getting high returns, but they are also associated with the highest risk. However, despite that TBVs are considered as risky, there are European evidence present that "tends to show that, on balance, technology-based firms are a lower risk" (Storey and Tether, 1998a, p 936). They are, compared with other start-ups, showing faster growth rates (Storey and Tether, 1998a), but the authors admit that the growth in case of employment amongst the youngest firms is modest.

2.1. TECHNOLOGY-BASED VENTURES AND THEIR FINANCING

"New, small, and unknown firms do not have the same facilities for raising capital as do established, large and known firms" (Penrose, 1959, p 37).

Finance is regarded as a crucial question for most TBVs and it is now and then reported that entrepreneurs feel that their presumptive growth are constrained by lack of external finance (Storey and Tether, 1998a). Launching a new product or service on the market is risky and costly (Westhead and Storey, 1997; Lindholm-Dahlstrand and Cetindamar, 2000; Oakey, 2003) and it often takes long time until any returns of the investments is seen (Drucker, 1985; Storey and Tether, 1998b; Lindström and Olofsson, 2001; Oakey, 2003). Klofsten and Lindholm-Dahlstrand (2000) mentions two occasions were the need for capital is crucial, during the start-up phase and during the latter expansion phase. They also show that the ventures often are self-financed in the beginning, but from the research of North, Smallbone et al. (2001) we know that their assets are limited. Before a market success it has, therefore, often been several rounds of external finance (Klofsten and Lindholm-Dahlstrand, 2000). The question is what happens if the venture is not able to obtain the funding that they need to make it to the market.

The list of characteristics in the previous section explains why TBVs are considered as "special" and as more risky than new ventures in general. Their characteristics enhance their risk to meet with financial obstacles, not least due to conditions, such as: (1) advanced technology is difficult to evaluate (Storey and Tether, 1998b; Lindholm-Dahlstrand and Cetindamar, 2000), (2) unknown markets are difficult to evaluate (Westhead and Storey, 1997), (3) lack of intangible assets (Lindholm-Dahlstrand and Cetindamar, 2000), and (4) lack of credibility on the market or to financiers (Birley et al., 1985; Van de Ven, 1993; Storey and Tether, 1998a; Klofsten and Lindholm-Dahlstrand, 2000; Zimmerman and Zeitz, 2002).

When studying the finance of early stages ventures, demand and supply of resources often emerges as unbalanced (Norrman and Klofsten, 2005). This is hardly something new and it is often referred to as financial obstacles termed as financial gaps. The debate over these gap-issues has been ongoing since the early thirties, where the Macmillan report (1931) was presented in the English parliament. These gaps can occur in different forms and stages. Mason and Harrison (2003) and Cressy (2002) suggests that a funding gap can be defined either as a disequilibrium between demand and supply of loans (funds) or as a market failure. Harding (2002) states that there is a funding gap for high growth business. To her the gap is synonymous with inefficiency in the market and imbalance between demand and supply for finance on certain levels. "The concept of a funding gap is by no means straightforward" (Cressy, 2002, p F1) and most researchers today refer to these gaps as different kinds of market failures (Storey, 1994; Storey and Tether, 1998a; Martin and Scott, 2000; Carpenter and Petersen, 2002; Harding, 2002; Lerner, 2002). Furthermore most of the research contributions over this issue concerns equity based venture capital investments (North et al., 2001; Harding, 2002; McGlue, 2002; Mason and Harrison, 2003).

Irrespective of what term is used, financial gap or market failure, the phenomenon is a barrier that is commonly faced by early stages TBVs. The phenomenon seems to be caused by a range of factors. Information asymmetries between investors and entrepreneurs (Berggren et al., 2000; Carpenter and Petersen, 2002; Cressy, 2002; de Meza, 2002; Harding, 2002; Lerner, 2002; Shane and Cable, 2002) is one of the most common explanations. It is also put forward that entrepreneurs often are averse to external ownership and carefully watch over their independence (Cressy and Olofsson, 1997b; Berggren et al., 2000; Lindström and Olofsson, 2001; North et al., 2001; Harding, 2002), which prevents them to take on external venture capital. From the investors perspective there are complaint over the lack of high quality investment cases (Mason and Harrison, 2002). Furthermore, high-technology as such are emphasized to be severe to evaluate (Carpenter and Petersen, 2002) which might also make investors averse. From the demand perspective the view is the opposite; the investors are risk averse (Lindholm-Dahlstrand and Cetindamar, 2000; Carpenter and Petersen, 2002) and therefore tend to invest close to the market launch (Mason and Harrison, 1997; Oakey, 2003), which leaves early phases un-funded.

According to Lindholm-Dahlstrand and Cetindamar (2000) early stages financing requires lower investments than latter stages. Despite this, Mason and Harrison (2002; 2003) underline the problem with lack of small investments. This problem is further enhanced by high costs for evaluations of the cases (Harding, 2002), which makes small investments more expensive[25] than large ones. Investors are also accused of

[25] More expensive by means of evaluation cost per Euro invested.

making short term investments without long term commitment (Oakey, 2003), which is in contradiction to how innovations develop (Drucker, 1985). Other obstacles that are pointed out are the entrepreneur's lack of "investment readiness" (cf. Lindström and Olofsson, 2001) and that high-technology has got limited collateral value (Carpenter and Petersen, 2002).

As exposed above it is clear that financial constrains, despite of origin, is an issue worth discussing. Carpenter and Petersen argues that "if financing constrains are widespread in the high-tech sector they could potentially inhibit economic growth" (2002, p F55). There is a range of solutions suggested to overcome or restrict these obstacles. Berggren et al. (2000) argues that overcoming information asymmetry must be the basic goal.

Information asymmetry is explained (Shane and Cable, 2002) as an obstacle that emerge when two parts, in this case the entrepreneur and the investor, has got separated knowledge or information about each others conditions and potentials. There are several reasons that explain why information asymmetry ensues, for example the entrepreneur might be reluctant to display too many details since he/she fears that it might benefit the competitors. The entrepreneur can, on the other hand, from the investors point of view, be regarded as over-optimistic over the idea, since the investor are not aware of its fully potential (Shane and Cable, 2002).

The phenomenon with entrepreneurs as over-optimistic is also recognized by for example Åstebro (2003) and de Meza (2002). The investors have got reasons to be sceptic about to optimistic sagas from burning entrepreneurs. Åstebro shows that "the average probability that an independent inventor succeeds in commercialising his/her invention is estimated to about 0,07" compared to 0,27 for R&D in established firms (2003, p 227). Lerner (2002) shows that despite of careful selection and due-diligence procedures the most common result on invested venture funding is failure or in best cases survival with low returns. He also shows that the return on venture capital investments originates from a low number of success cases. Neither society nor the entrepreneur benefits from too much optimism if it leads to pursuing inventions and ideas that lack of quality (Åstebro, 2003). To prevent this he suggests increased patent fees and more efforts put on exploring the commercial abilities of the idea. According to Shane and Cable (2002) however, the two sides often seems to find ways to, at least partly, overcome this kind of obstacle.

Mason and Harrisson (2001) stated that the demand side contributes to the early growth stages equity-gap. Since the barriers for investments, according to Mason and Harrison (2002), lies in lack of proper business opportunities and problems in negotiating with the entrepreneurs, it is suggested that entrepreneurs should be educated in understanding the advantage of taking on external equity based capital.

They emphasize TBVs to get "investment ready" before presenting their prospects to the investors. They have named this skill "investment readiness". "Investment readiness" incorporates three dimensions: (1) the entrepreneur's attitude to equity-based finance, (2) the entrepreneur's way of presenting the offer, both through written documents such as business plans and through oral presentation, and (3) the match between the entrepreneur's offer and the requirements of the investor. "…at its heart, becoming 'investment ready' is therefore about business development" (Mason and Harrison, 2001, p 664). Mason and Harrison also emphasize the "need to reach entrepreneurs at an early stage to enable them to incorporate equity funding in their planning process" (2001, p 666).

2.2. PUBLIC FINANCE

From the previous sections it is shown that TBVs are associated with special characteristics and obstacles. They are also associated with expectations, not least from a societal point of view, as shown in the introduction section. It is therefore logical that this type of ventures has attracted interest from the public sector. TBVs are shown to have difficulties in obtaining finance, due to one or several reasons exposed above. The governmental role might therefore be to bridge this financial gap by providing "configuration-type" of business support (Oakey, 2003). Lindholm-Dahlstrand and Cetindamar (2000) argues that the public sector can lower the risks and thereby encourage private investors, both by providing resources and by encouraging private investments.

There are efforts made from governments worldwide, in order to support the emergence of TBVs. Story and Tether (Storey and Tether, 1998b) has reviewed the support for TBVs in Europe in order to give policy implications for the European policy makers. On direct financial support, their findings shows that support schemes exclusively designed for what they define as new technology-based firms, are rare. In Sweden they refer to the seed finance system of NUTEK as the only present[26]. Their general findings claim that the efforts made, both the general and the exclusive, are important, but they are not eliminating the financial gaps. However, they conclude that most schemes despite this are to be regarded as rather effective.

Going trough the debate of public support in general and public financial support in particular leaves a large range of arguments both saying that society should get involved and that it should not. There are suggestions of how this public involvement should be carried out and what efforts that ought to be avoided in order to be as efficient as possible. To start, North et al. (2001) distinguish between expressed needs

[26] This system is to day winded up (Bager-Sjögren, 2004).

and latent needs of the firm. They suggest that it is better that the available public resources are put on "the needs of the economy" (p 305), than on the expressed needs of the entrepreneur. They prefer a strategic innovation policy rather than meeting sole needs.

Lawton (2002) argues that public sector can promote growth and employment by facilitating access to venture capital. The role of the public sector concerning support of especially the earliest phases is emphasized (Lindholm-Dahlstrand and Cetindamar, 2000). This argument is grounded on the fact that private investors tend to invest in stages where they can see good prospects of getting return of their investments (Bygrave and Timmons, 1992). Early stages are therefore often left unfunded (Oakey, 2003). A number of studies shows that public support of early stages decreases the risks for latter stages investments (Klofsten et al., 1999; Klofsten and Lindholm-Dahlstrand, 2000; Lindholm-Dahlstrand and Cetindamar, 2000; Lawton, 2002; Oakey, 2003). Cooperation between public and private capital is therefore suggested (Lindholm-Dahlstrand and Cetindamar, 2000; North et al., 2001; Harding, 2002; Oakey, 2003; de Neergaard, 2004).

It is also shown that the lack of credibility, which is a common obstacle faced by many new ventures, can be repaired by publicly funded grants (Klofsten et al., 1999; Lerner, 2002). Public support in order to motivate the struggle of entrepreneurs is also suggested (Klofsten et al., 1999; paper one).

When private investors are unwilling to invest, the public sector can facilitate necessary resources (Klofsten et al., 1999; Oakey, 2003). Maigart and Struyf (1997) argue in the same direction, concerning governmental support for high technology start-ups and mean that subsidies and R&D funding plays an important role. They also noted that entrepreneurs lacked awareness of the opportunities for present publicly funded finance.

According to Martin and Scott (2000) "strict reliance on a market system will result in underinvestment in innovation, relative to the socially desired level" (p 438). This is because innovation in some cases can be generic by means that an innovation can be used in many industries. Under such circumstances, there is a role for public support, e.g. funding for both SMEs and start-ups that can prevent R&D investments from suffering. Lerner (2002) argues that public financial efforts also create technological spill-over.

Mason and Harrisson (2001) put forward lack of "investment readiness" as an explanation to why financial gaps come to existence. If this holds, it is of importance, as they also suggest, to work with attitudes also among the entrepreneurs. North et al. (2001) argue in the same direction and states that "one of the tasks of innovation

support should be to encourage attitudinal change on the part of owner-managers with respect to external finance" (p 309).

There are also several researches that are more or less sceptic to public support of new ventures. Bergström (2000) argues that subsidisation may occur technical inefficiencies and it can be questioned if it is good or bad for long-term growth. Bergström has surveyed only selective subsidies, e.g. regional policy subsidies towards the northern parts of Sweden. He shows that subsidies are positively correlated to growth during the first year, and then the correlation decreases. He (Bergström, 2000) argues that subsidisation can make firms less efficient, because there is a risk that the subsidies is allocated to less productive firms, which implies that these firms only survive a little bit longer than they would have done elsewhere, and then gets winded up anyway. Storey (1994) claims that "…as a whole, public sector financial intervention to support small firms cannot be viewed as successful" (p 231). Also Cressy and Olofsson (1997a) are sceptic about governmental finance. They claim that equity gaps are originated from constrains on both the demand- and the supply side. To them "a governmental policy of simply throwing money at the problem" (p 192) like public schemes, especially those aiming at small firms, offering easy money, but no hands on advice, will not solve the problem (Cressy and Olofsson, 1997b). Also Lindholm-Dahlstrand and Cetindamar (2000) emphasize the importance of what they call competent capital (capital in combination with advice).

2.3. INCUBATOR SUPPORT

From the above sections we know that the owners/founders of TBVs often lacks of marketing abilities and/or managerial skills, that they are technology focused, acts on new markets that are hard to access, has got limited internal resources, lacks of credibility and enhances difficulties to influence or shape their external environment compared to larger firms. Lack of "investment readiness" increases their difficulties to rise funding, which complicates the situation further. From this brief summary of TBV characteristics it is obvious that there is "job-openings" for organisations that are specialized on the "process-type" of support, i.e. the incubators.

The aim of most incubators is to create an environment for start-up and fledging companies.[27] They also, commonly, provide facilities such as shared office space, shared support services, professional business support or advice (coaching) and access to networks. Most incubators are also publicly funded. (Hackett and Dilts, 2004b)

[27] Hackett and Dilts (2004b) give in their appendix a list consisting of 24 different incubator definitions that they have identified. A majority of the listed definitions corresponds with the here given aim.

When going through the literature about incubators it is shown that incubators are different from each others, just like the firms that they are nurturing (cf. Allen and McCluskey, 1990). There are several reasons to start-out an incubator, besides the ones of making profits for profit-driven incubators and renting out office space for the real-estate based ones (cf. Allen and McCluskey, 1990). Incubators are seen as tools to enhance innovativeness and to support entrepreneurship (cf. Hsu et al., 2003; Lyons and Li, 2003), commercialise new technology (cf. Phillips, 2002; Lindelöf and Löfsten, 2004), and create societal growth (cf. Mian, 1997; Phan et al., 2004). They are also regarded as arenas where universities meet industry and merge and transfer their knowledge with each others by creation of new ventures (cf. Mian, 1997; Phillips, 2002; Hsu et al., 2003; Rothschild and Darr, 2005).

Since the reasons for starting incubators differ, also the goals and priorities of the incubators and their stakeholders differ (cf. Mian, 1997; Bhabra-Remedios and Cornelius, 2003; Bollingtoft and Ulhoi, 2004). The selection of incubatees is seen as important (Colombo and Delmastro, 2002; Peters et al., 2004) and the criteria for how this selection is made varies between incubators (Lumpkin and Ireland, 1988).

The agreement of the kind of support given by incubators seems to be quite large. The types of advice and service commonly referred to is accounting, legal matters, entrepreneurial training and business development services (cf. Mian, 1996; Lalkalka, 2003; Lyons and Li, 2003; Bollingtoft and Ulhoi, 2004; Chan and Lau, 2004; Lindholm-Dahlstrand, 2004). However, it seems to be differences in how this business support is given in terms of e.g. intensity, initiative, and quality (Rice, 2002; Bhabra-Remedios and Cornelius, 2003; Hackett and Dilts, 2004a).

Incubators are commonly associated with networking in one way or another. The importance of incubator network, both between incubatees (Brooks, 1986; Aernoudt, 2004) and between incubatees and other actors, are emphasized (Phillips, 2002; Clarysse et al., 2004; Peters et al., 2004; Rothschild and Darr, 2005). According to von Zedwitz "incubators have often served as catalysts and even accelerators of entrepreneurial clusters formation and growth" (p 95). According to Vinnova, incubators are seen as tools to create and strengthen the environments for TBVs (Vinnova, 2005). Incubators are also referred to as an important type of activity within an innovation system (Edquist, 2004).

3. METHOD

This section discusses the method for this thesis. It starts with a general discussion about knowledge and its sources, where the practically based knowledge is focused. After this, the process and method of this thesis follows, following the order of the research process.

3.1. ABOUT KNOWLEDGE AND BACKPACKS

"New ideas emerge from the interaction between different kinds of knowledge and sources of knowledge"(Paavola and Hakkarainen, 2005, p 250).

In the work with this thesis the following main sources of input have been used: (1) information based on suitable analysis of statistical data, (2) information based on relevant theory, and (3) information based on earlier working experience. Number one and two in the above list is among the most common ways of collecting information and maybe also the most important sources for this research. But, when utilising the first and second sources the researcher can be affected by - or benefit from the third source.

This implies that among these sources it is, in the first hand, the third source that can be regarded as controversial and may thereby also cause a methodological discussion. In the following section the question of how to treat practically based knowledge in an academic field therefore will be discussed. Own reflections of how the own backpack of experience have been treated will also be given, since this backpack is, at least partly, directly related to the objects of research.

Some ideas for discussion can be found by studying the theories of Charles Sanders Pierce. He advocated an abductive way of proceeding to reach the highest possible level of insight in the studied issue. The theory of Pierce (1990) is complex or, as described 1907 by William James, filled of "flashes of brilliant light relived against Cimmerian darkness" (p. 19)[28]. Pierce named his theory as pragmaticism[29]. The thrilling thing with his theory is the discussion of which the gist can be understood as utilisation of practically based knowledge. E.g. if the researcher both owns theoretically based and practically based knowledge or understanding of the research issue, the possibility to get closer to the truth is larger than if the knowledge is only theoretically

[28] This citation is taken from the foreword to Pierce (1990) written by Margareta Bertilsson and Peder Voetmann Christiansen in 1989 and was delivered by James as a description of a lecture given by Pierce

[29] The term was chosen since its ugliness was supposed to secure it from getting kid-napped (Peirce, 1990)

based. Pierce stressed that the researcher, when initiating the investigation, must start-out with the state of mind and the knowledge that he/she owns at that time, since this experience is impossible to get rid of. Pierce was also critical to the concept of absolute truth, since truth according to him is coupled to trust. He therefore, instead of seeking the truth, advocated search for a reasonable explanation, or a kind of preliminary hypothesis, e.g. a kind of good enough and useful explanation. The matter of usefulness is an important ingredient in the Piersian theory. Pierce is by no means opposite to the positivistic apprehension that hypothesis must be put up and tried, but from this pragmaticistic point of view, the experience is important both when generating hypothesis and finding weaknesses within them.

Social sciences cannot fully take on a pure natural science or positivistic way of research (Gustavsson, 2004). Their complexity implies understanding or as Droysen (Andersson, 1979) put it "verstehen". They can be measured, but the measurements need to be interpreted and explained before it can be transformed into usable knowledge. If the researcher owns an understanding of the issue that is studied in terms of practically based experience it is possible to use the abductive approach that Pierce argued for. This approach is described as a "conscious interaction between theory and practise that often takes its way via empery, methods and models" (Wigblad, 2003, p 7)[30]. The abductive researcher then talks about "joining theory with practice, or to develop models and methods that couples theory and practice" (ibid).

This implies that the one that owns such practically based knowledge, or experience of his or hers area of research hopefully is able to ask questions or generate hypothesis that is more precise than those that do not own this kind of knowledge. Furthermore the chances to "see through" messages and "read between the lines" ought to be enhanced.

Being able to utilise practically based knowledge and acting in an abductive way requires thoughtfulness (Wigblad, 2003), but also declaration of the content of this practically based knowledge or experience (Arbnor and Bjerke, 1994). For the work with this thesis knowledge, experience and contacts gained from former occupations have been used. Hiding the sources of this pased would therefore be to keep the reader in the dark.

Before returning to academia I have about nine years of working experience of which most in organisations that often goes under the nickname "the friends of trade and industry". The first part of those years was spent at Mälardalen chamber of commerce, where I had the opportunity to interact with mostly SME-firms from manufacturing industries that were interested in internationalization. There were also lots of contacts with larger firms, which were in need of different kinds of certificates

[30] The citation is translated from Swedish

and documents for shipping and travelling with their goods. The second half was spent as a part of the managerial team of Västerås Technology Park (VTP), where my role was to be the leader of the growth park, which are one out of three legs of the park[31]. My responsibility was to supply the companies with infrastructure, facilities, networks and education seminars. By the time I started to work at VTP, it was nothing more than a start-up itself and when I left in 2003 there were approximately 130 companies with around 1100 employees present, whereof 60% were start-ups originated from the park's incubator. VTP has always been, and still is, an organization created by entrepreneurs in purpose to benefit entrepreneurs. When we started to build the park there were no road maps, no frames and no limits. All we had were good ideas, a prospect, a dynamic manager and a good entrepreneurial team accompanied by the growing network of park companies and other surrounding actors.

During my work at the technology park I was involved in the support system of SIC, that is studied in the first two papers. My involvement was in case of the special actions that were directed towards TBVs in incubators and science parks, which was run in cooperation with the judgement group of Swedepark[32]. My role was to market the support from SIC and to assist the ventures that applied for support with their applications. I also assisted the judgement group with information.

My working experience has affected me as researcher in several ways. It has given me practically based insights of how to build an organization from start, how entrepreneurs think and act when they are creating their organisations, and also how support organisations such as incubators and science parks works, which can be useful when you interact with both entrepreneurs and representatives from other support organisations. I will here underline that my insights concern how I/we acted in our organisation, how our organisation interacted with other organisations, and how the entrepreneurs that shared their stories were thinking, acting and interacting with us and vice versa. I will definitely not claim that I have found the key to the inner essence of entrepreneurship, but I believe that my experience has expanded my perspectives and understanding of the issue a little bit. These experiences allow me as researcher to act in a more abductive way towards my research objects as suggested above.

One important experience, that has benefited me as a researcher, is that I have been in the clothes of the research object myself. I have thereby recognized that the kind of "truth" the researcher is served when interviewing representatives of different kinds of organizations, not always is the "truth, and nothing but the truth" but rather a narrative story that can be described as one kind of the truth but under more or less thick layers

[31] The remaining legs are (1) managing director combined with recruitment of firms and (2) leader of the incubator.
[32] Swedepark was a network organization for Swedish science parks. This organisation now includes incubators and is to be found under the denomination SISP, Swedish Incubators and Science Parks.

of makeup. This does not imply that employees of science parks or other organisations are bad guys that lie on purpose to researchers. Instead I think that it is about marketing, and how the organisation has decided or learned to expose itself. After a range of repetitions, the personnel have adopted their story. This source of error can also be feared to appear when documents, such as applications for funding, are used as sources. From what I have seen[33], there is always a risk that the given picture is a "marketing" picture, which serves to give the purchasing actor the picture the providing actor expect the purchasing actor to want to have.

If the researcher in such cases has got experience of the branches or the type of organization, and if the research object also knows about this, the chances of a dialogue on a collegial level are enhanced (Wigblad, 2003) and thereby also the possibilities to go behind this makeup. I have experienced this phenomenon my self, most lately when I conducted interviews for this thesis. This kind of experience can help the researcher to recognize situations that can be correlated to special kinds of problems, choices or activities. According to the interpretation of the thoughts of Pierce made by Paavola and Hakkarainen (2005) this can be described as a sort of guessing instinct or intuition based on experience. This guessing instinct or intuition is put forward as useful, especially in situations where the research is explorative. Paavola and Hakkarainen also put forward that before one really getting a new idea, a lot of its ingredients are there, which to them implies abduction.

The negative side of owning practically based knowledge is that it can entail difficulties to distance from the research object. There is also a risk that the researcher gets biased and neglects new angels and brainwaves, by relying on the confidence in the own for real or believed knowledge. The researcher's interaction with the research object is also of importance. Is there a risk that a researcher owning large practically based knowledge is to fast in the interpretation of the results and thereby also assimilates his or hers own knowledge in the information that is collected from the research object? Is there a risk that the researcher like Johannisson (2005) in his "Amorphous project" is staging the results, but without being aware thereof, in difference to the carefully prepared Johannisson, who used this staging approach as a method of research? Although these risks can be seen as problematic they ought to be, at least partly, reduced by combining practical knowledge with a good theoretical base and an open curious sense. Utilising a sound criticism of the information sources is also important.

The above discussion couples to the question of handling "objectivity" against the research object. Dealing with this question implies that the means of objectivity must

[33] The latest time this phenomenon occurred was when we read all applications for the Vinkubator program (paper three).

be handled. Can a researcher be truly objective? Both Holme and Solvang (1991) and Arbnor and Bjerke (1994) notice in agreement with Gunnar Myrdal that social science never can be either objective or neutral. This is explained by the fact that social scientists are exposed to a number of situations were they are forced to make choices of how to continue, and these choices are subjective. A similar view is expressed by Ljung (1993), who states that objectivity "in means of being devoid of value judgements and prosecute unbiased research" is not "possible or not even desirable within social science" (p 26)[34]. However, it is important that researchers are open-minded and base their statements on facts (Holme and Solvang, 1991; Ljung, 1993). As well Holme and Solvang (1991) as Arbnor and Bjerke (1994) refers to a number of bullet points formulated by Gunnar Myrdal, where he puts forward the importance of researchers being explicit with their own values in cases where these values can be feared to affect research and that these values discussing their values in their reports. Finally, the ownership of a backpack of experience ought to be seen as an advantage rather than a drawback as long as it is not hidden or not reflected upon.

3.2. THE PROCESS AND METHOD OF THIS THESIS

The main method, concerning the financial support (paper one and two), has been quantitative, complemented with qualitative elements in the form of interviews. Descriptions of the statistical analyses conducted are given in section 3.2.3, and the details are given in each of the papers.

For paper three, another methodological approach, literature studies[35], has been used since this paper instead aims at conceptual development rather than empirical analysis. These are highly different ways of obtaining knowledge about the issues of research.

In the following section the choices and considerations that were made during the work with the papers of this thesis will be described and discussed, starting with the first two papers and continuing with the third. The following figure, along with the below brief description illustrates the process in main from the start to this thesis. The details follow under the sections where the method for each paper is presented.

[34] The citation is translated from Swedish
[35] Although coupled to empirical material in type of applications for funding.

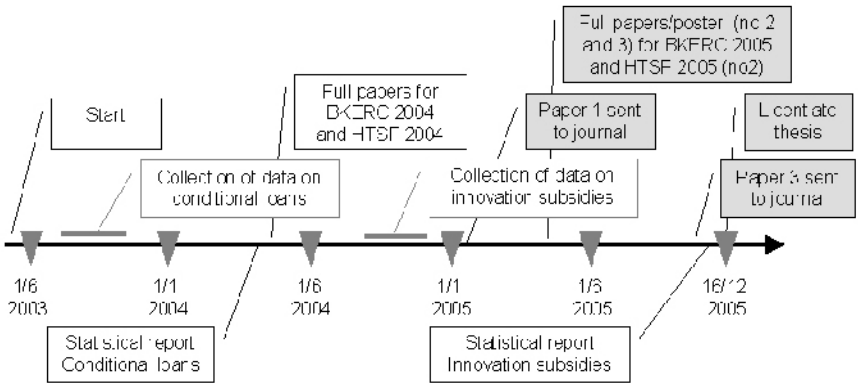


Figure 4, The process

The process was initiated in the spring of 2003. The first part was dedicated at PhD-courses and preparations for the start of the research of SIC. In the autumn of 2003 the data of the conditional loans were collected. Abstracts were prepared and sent in for two conferences, the High Technology Small Firms Conference (HTSF) 2004 and Babson-Kauffman Entrepreneurship Research Conference (BKERC) 2004. Both were accepted for presentation as full papers. During the first half of 2004 the conference papers were prepared, sent in and presented. A statistical report concerning gender aspects of the conditional loans were also prepared. The conference papers were then re-written into paper one of this thesis, which was sent in to a scientific journal in January 2005. During the autumn of 2004 the data for the conditional loans were prepared, along with an abstract for BKERC 2005, which were accepted. Abstracts for the conference paper that resulted in paper three were sent in and accepted as poster for BKERC 2005 and as full paper for HTSF conference 2005. The conference papers were written during the spring. During the autumn of 2005, paper three was written and sent to a scientific journal. Also this thesis has been written during this period. Finally a statistical report concerning the innovation subsidies has been produced. The remaining PhD-courses have been passed in parallel to the work described. The boxes marked grey are included in this thesis.

3.2.1. PAPER ONE

Paper one is written by Charlotte Norrman and Magnus Klofsten. It originates from two earlier conference papers, which have been re-written into one article that now is in review for an entrepreneurship journal. The originally papers were prepared for and presented at BKERC in Glasgow, Scotland 2004 and HTSF conference in Enschede, The Netherlands 2004.

The start of the research for the paper one - and for this thesis - was a commission from NUTEK to analyse public innovation support from SIC from a gender

perspective. The original idea was to go through applications from female applicants within the archive of SIC. This task was taken on and SIC were contacted and asked for permission for access to their files. The question of access was shown to inherit some difficulties and was not the easy task pictured by a hopeful enthusiast at a new office at the university. The fact that the material was quite large was known since initial information about it had been gathered, but there were still a couple of surprises to come. The first one was that the central organisation of SIC was able only to share the files of those that had applied for conditional loans, since the innovation subsidies showed to have been administrated regionally. The second surprise was the largeness of the material. Initially the number of applications was estimated to 7-8000 in the files of SIC centrally and approximately 30000 additional applications for innovation subsidies that were spread over 21 independent regions. Since both the time and the budget were limited, it was decided to focus on the applications for conditional loans, which were in the files of SIC centrally. Next challenge was to get access to these files. The applications included both financial transactions and immaterial property descriptions, and therefore this question required several rounds with the directions of both SIC and ALMI and their lawyers. Signing an agreement of secrecy solved the problem.

After the first interaction with SIC it was obvious that going through an archive containing more than 7000 applications was a very large job, but taking on only a selection was not satisfying either. It appeared that there was a computer-based diary system that could be used to find individual applications. After some additional questions it was made clear that the variables stored within this diary were the basic facts that were needed to conduct the survey.

Since the diary was shown to be stored in a relational database, we realized that it would be convertible it into SPSS, where the needed statistical analysis could me made. The data was transferred to us in the late end of September 2003. It was then refined and recoded and resulted finally in a database containing of 5839 cases of applications for conditional loans. Being able to use SPSS opened the opportunity to take on an explorative[36] method approach. Since this study aims at building a descriptive foundation for future research that allows continuation with explanatory questions,

[36] The means of the term explorative to me can be illustrated by using the old garret that belongs to my grand mother. She lives at the countryside and has got this amazing garret where she during her long life has stored old stuff from the floor and up to the ceiling in a wonderful overwhelming disorder. In this garret it is possible to find enough with artefacts to fill an entire museum of how farmers refined linen and wool into clothing during the latest 200 years. My work with these databases can be described as systematically turn inside out of this old garret and make an alphabetic list of its contents. This content list is then to be used when it is time to find out what all the different thingamajigs has been used for, of whom and during what time-period.

such as why and because of what, this method approach was very suitable. The method is also recommended by Yin (1994) in purpose to dig out as much facts as possible.

During the study of the conditional loans some interviews with the staff at SIC and with the "judgement group of Swedepark"[37] were made. These interviews were made because of two main reasons. The first one was to verify that the results corresponded with the perception of SIC. The second was to be able to explain the results of the analysis. During this process the outline of the SIC system was mapped, which created extreme curiosity over the innovation subsidies that were placed before the conditional loan in the support chain of SIC. [38]

Besides the paper, the following activities were conducted: Abstracts were during the autumn prepared and sent in for two conferences, 2004 BKERC and 2004 HTSF conference. Both abstracts were accepted and full papers were sent in and presented. Also a statistical report was written containing data on the conditional loans from a gender perspective.

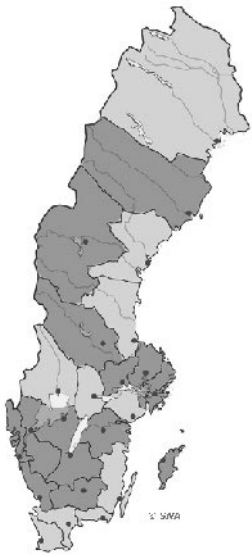


Figure 5, Distribution of innovation subsidies

3.2.2. PAPER TWO

Paper two is written by Charlotte Norrman, Magnus Klofsten and Anna Bergek. It was presented at BKERC in Boston, USA, June 2005.

The curiosity over the innovation subsidies that was awaken during the work with the conditional loan lead us to take the next step of this research, to survey the innovation subsidies. The task to extend the SIC-project and to gather finance was undertaken during the spring of 2004 and the problem was solved after the following summer.

The work to convince all 21 regional innovation centres of SIC that they should provide access to their databases was initiated during the autumn of 2004. This task was not easy due to several reasons. The first one was technical, the regions were

[37] The judgement group of Swedepark was an effort made by SIC to reach academic start-ups within the technology parks of Sweden and their incubators.
[38] The analysis of the conditional loans resulted in two conference papers presented 2004 at the BKERC-conference in Glasgow, Scotland and at the HTSF-conference in Twente, the Netherlands. These papers have been re-written into paper one in this thesis. I also produced a descriptive analysis for NUTEK with a gender perspective.

independent and there were no uniform and compatible diary system used by all administrators present. Fortunately, most of the regions, but far from all, used diary systems, which was relatively uniform and closely related to the system used by SIC. The second reason was of more emotional character, not all regions were positive to share their data and have it merged with the information from other regions. They were also sceptic due to security reasons. After intensive contacts and backup from SIC centrally data from 12 of the regions that had SPSS-compatible data were collected (see figure 5). In the beginning of 2005, the work finally resulted in a second database containing of 17722 cases of applications for innovation subsidies. The included counties are marked dark grey. Besides paper two, a statistical report on the innovation subsidies is under preparation.

3.2.3. COMMENTS ABOUT THE SIC-DATA

The two SIC databases have got a large set of descriptive variables such as industry, legal form of firm, gender of applicant, address, and supported sums. This has been very useful, but also constraining, since the databases are created from given variables. On the positive account can be put that using a diary system gives access to lots of variables and that the data material is very large in terms of both number of cases and longitudinal extension. On the negative account can be put that there were no possibility to choose variables after own preferences. Furthermore the quality of the data within the system has been impossible to influence, which more than once occurred frustration, mistrust and extra working hours. Technically regarded, it must be mentioned that transforming a data structure with variables created for one certain purpose (in this case diary systems) into a structure for a highly different purpose (statistical research databases) is a 'little bit tricky'. For example the supported amounts within the subsidy database were parted, since the SIC funding was boosted by other sources. To further complicate the situation the additional sources differed over time and between the counties. Hence, we had to sort out the SIC funding in one column and merge all other funding in another. Doing this operation for 12 databases with in total 17722 cases required skilled SQL-programming exercises. Also the task of merging a number of different databases into one is problematic, even if the structure of the merged databases was close to similar.

The population studied for the conditional loans (paper one) was limited and known. It includes all applications for conditional loans received by SIC centrally. Hence it was advantageous to strive to grasp over- and map as much of this population as possible. Since the data fortunately turned out to be compatible to the structure of SPSS, the most efficient and workable way therefore was to conduct descriptive statistical analysis, in combination with an explorative attitude. For paper two the same strategy was used and the reasons for this where; firstly, to be able to compare the

variables between the databases, and secondly, because of the same reasons as shown for the conditional loans.

The data was, for both paper one and paper two, analysed, in first hand from defined issues (see the papers). Each of the analysed variables has been run against other variables in order to detect similarities or differences that can be regarded as interesting. There have also, from a more unbiased view, been exploitations of different variables and combinations thereof in order to find other correlations that not were pre-hypothesised, but still could be suspected as important. The reason for this "experimentation" was to avoid that "non obvious" combinations to bee foreseen, since it is not unusual that something that in a first analysis seems to be truly correlated to a certain variable, instead turns out to be explained by a foreseen third variable.

The statistical analysis run for the first two papers has technically been delimitated to frequencies, cross-tabs and means. To detect significances chi-square tests, ANOVA and ANOVA with Bonferroni tests have been used. In paper two also cluster analysis, K-means, have been used. The different tools for analyse and how they have been used in each case is in detail described in the papers respectively. The analyses might be regarded as simple, and the reason why more advanced analyse instruments, such as regressions, not have been used is the descriptive structure of the data, which does not permit these kinds of analysis, since there are no scales or attitudes within the material.

Statistical analysis has got both advantages and drawbacks. Among the advantages can be mentioned that using statistical analyse enhance the detection of important background variables and how they are distributed over the material and correlated to each other. Knowledge of background variables is essential if the researcher wants to continue with a qualitative approach (Gustavsson, 2004). With an alternative strategy the knowledge about individual applications ought to be enhanced[39], which would have been useful if the mission had been to study how different administrating officials had made their judgements over what applications to turn off and what to support. But to show patterns and significances consideration of a large part of the material still would have been needed. With the model used it is possible to see tendencies, which can be used as background for generating interview questions. Furthermore the option to go through all applications is still available.

When analysing given data the way that it has been done in this study, one can hardly expect to find comprehensive explanations or answers of why a correlation or significance appears to be in one or another direction, but it is possible to find important and interesting correlations, from which it is possible to generate better hypothesis and issues of research to continue with in deeper qualitative investigations.

[39] Since the applications within the paper-archive contain more detailed information (such as education of the applicant, descriptions of the idea etc) than the computer-based diary.

3.2.4. PAPER THREE

Paper three is written, by Anna Bergek and Charlotte Norrman. It has been presented at the annual HTSF conference in Manchester in May 2005 and as a poster for BKERC in Boston, June 2005. Both during the presentation in Manchester and at the BKERC poster session positive interest were received. The present version has been re-written and sent to a scientific journal.

The idea behind the paper is generated through the years at the Västerås Technology Park. It is founded on observations that different incubators, with almost the same financial resources, showed largely differentiated results. This was discussed and there were an interest raised to see if it was possible to find out why. The work was initiated in the summer of 2004, and the original aim of the study was to try to find a best practise incubator model, in terms of performance in relation to the assets invested, and to use this model for undertaking best performance evaluation on a number of Swedish incubators. To deal with this work all literature concerning the issue that was found in electronic sources was collected and briefly read. The applications for the governmentally funded Vinnkubator program of Vinnova, which aims at supporting incubators in Sweden, were also collected and read.

The literature was, as mentioned, examined in first hand to find a model that could be used to take on this evaluation, but after the review it was recognized that there were no such model present. Furthermore, there were complains over the lack of theoretical base for this issue in several articles (Allen and McCluskey, 1990; Mian, 1997; Bhabra-Remedios and Cornelius, 2003; Lindelöf and Löfsten, 2004). We therefore had to move backwards, and ended up in trying to develop a usable framework for this task. In difference to the first two papers, the third therefore is theoretically based with focus on conceptual development, rather than examination of individual incubators.

4. SUMMARIES OF THE PAPERS, CONCLUSIONS AND PRACTICAL RELEVANCE

4.1. PAPER ONE, SEED FUNDING FOR INNOVATIVE VENTURES: A SURVEY OF PUBLIC FINANCE

The aim of the paper is to describe and analyse the mechanisms by which innovative new ventures receive publicly funded financial support. It suggests that 'soft' and informal small-scale financing provided to new ventures and idea owners are important in encouraging entrepreneurs in the start-up process, especially in gaining additional financing for the business. As governments provide public sector funding to assist entrepreneurial activity, it is important to understand and analyse the key factors that have influenced the rationale in supporting new businesses.

The study is descriptive and based on quantitative methods, e.g. statistical analysis, using SPSS. It investigates a unique dataset, provided by the public support scheme SIC, which is covering almost ten years (1994 to 2003) and contains of 5839 applications for public soft loans. The study has been broad in order to map as much as possible in purpose to create a platform of background variables for upcoming research.

The following conclusions have been made:

- The 'legal form of the firm' was the most important factor to gain support.
- The variable 'type of industry' was important.
- Both expressed and tacit selection criteria have affected the process that determines which ideas gain support.
- Some differences due to gender were found. Females applied as sole proprietors in larger extent than males; however, females that applied as limited companies were the most successful in gaining support.

4.2. PAPER TWO, PUBLIC INNOVATION SUPPORT AND INNOVATIVE IDEAS

The aim of the paper is to develop new insights about how public financing works in a market that creates and develops innovative ideas. Of particular interest is how the type of industry has affected to what extent the ideas has gained public support and how these results correspond with theories of innovation and growth.

Societal efforts to develop and achieve sustainable economic growth by focusing on the emergence of new venture ideas that can be transformed into flourishing business have often been by provision of different kinds of seed funding. However, the number of actors and efforts present, both private and public, providing funding directed towards new ideas are few. In this paper our interest has been to investigate the past to learn for the future about the role of publicly provided funding towards early stages.

This study investigates publicly funded financial support in case of innovation subsidies provided by SIC. The data emanates from the unique diaries of 12 out of 21 regional innovation centres and is, for the first time, merged into one database, which consists of 17722 cases of which most are registered during 1999 – 2004. Statistical analyses using SPSS have been made. The number of variables is rich and matches well with the earlier study on conditional loans from the same provider.

The following conclusions have been made:

- There was not one simple and obvious explanation for the differences in the amounts received by different ideas. One possible reason may be that it was impossible to separate effects of different variables from each other.
- Knowledge intensity gives some explanations, but not all.
- The variable legal form was strongly related to amounts received, but the number of limited companies was not that high and there were limited companies within all clusters. This implies that, the legal form in it self is not the only determinant of success. Instead, strong legal forms seem to strengthen strong types of industries. Stronger legal forms also seem to be related to knowledge intensive ideas.
- There is something more to industry than knowledge intensity and legal form.

4.3. PAPER THREE - SORTING OUT THE APPLES, PEARS AND FRUIT SALADS IN TECHNOLOGY INCUBATOR PERFORMANCE EVALUATION

The aim of this paper is to sort out a number of problems inherent in the evaluation and comparison of incubator performance and to develop a framework that can serve as a basis for identifying best practice incubator models. The reason to this aim is that incubators have become a ubiquitous phenomenon in many parts of the world since they are regarded as solutions to increase the birth rates of technology-based enterprises. Considering the great credence for – and the large amounts of money invested in the incubators, the question of evaluating as well return on investments as comparison of different models is important.

The contribution of the paper consists of sorting out some of the key concepts and identifying some of the problems leading to "apple-and-pear" comparisons. Also the proposed framework in it self is to be seen as a contribution. If the framework proves to be generally useful, it will be applied in best practice studies as a diagnostic instrument to evaluate alignment within incubators.

The following conclusions have been made:

- It is showed that most researchers seem to have used an implicit "model" for incubator performance evaluation. This model has two main deficiencies: (1) Failure to take incubator goals into consideration, which implies measurement of outcome rather than performance. (2) Failure to take the issues of how the incubator support is currently provided, i.e. which incubator models that are used into consideration, which implies mixture of apples and pears.
- In order to avoid the above problems, recognition of incubator diversity is recommended. If best practices are to be identified, it is suggested that: (1) classes of incubators are to "fall out" of the data, (2) evaluation of each class is conducted using different performance criteria, and (3) categorisation is made with respect to incubator models. Furthermore, three key incubator model-distinguishing components are suggested – selection strategies, business support strategies and mediation.

With respect to selection, a four-field categorization matrix consisting of the strategies: picking-the-winning-idea, picking-the-winning-entrepreneur, survival-of-the-fittest-idea and survival-of-the-fittest-entrepreneur are put forward. Business support strategies are suggested to be positioned on a scale from a "laissez-faire" strategy to a "baby-sitting" strategy. Finally, it is distinguished between mediation focused on regional innovation systems, technological innovation systems and clusters respectively.

4.4. CONCLUSIONS ON THE RESEARCH QUESTIONS

As previously stated, the reason for public support of TBVs is that such firms are regarded as important for societal development and economic growth. This might explain why they render such large interest, both from researchers and policy makers. The support of TBVs is connected to common characteristics and specific needs of such firms.

This thesis shows that public support towards TBVs in Sweden is a wide concept, and can be undertaken in several ways. In order to bring clearness among the concepts the terminology of "configuration"- and "process-type" of support, launched by Autio

and Klofsten (1998) has been used. This study deals with examples of public support of both these types, where the innovation system approach is used as a contextual framework that regards the public support as a tool to help linking TBVs to their relevant innovation system(s).

The emerging TBVs are in the need of both the "configuration"- and the "process-type" of support to be able to link with the surrounding innovation system, and develop into the flourishing companies that are desired in the introduction section.

In order to be able to deliver answers to the aim stated above, the following research questions have been formulated.

RQ 1: What ventures get public financial support?

RQ 2: What problems are inherent in evaluation and comparison of incubator performance and how can best practice be identified?

The first question corresponds to the "configuration-type" of support, which is studied in the form of the financial support given by SIC. These studies are based on descriptive and explorative statistical analysis. It is made on two unique sets of data, in order to map important background variables that can be used for further investigation. Two kinds of financial provision has been studied, namely innovation subsidies and conditional loans. The subsidies were directed to ventures in their absolute earliest phase and the loans, commonly towards those that were a little bit more developed, but still far from mature.

The second question concerns the "process-type" of support. This is studied in the form of the incubator support given to TBVs in terms of advice and environments. Instead of using statistical data the study is theoretical and based on a literature review.

4.4.1. RQ1: WHAT VENTURES GET PUBLIC FINANCIAL SUPPORT?

The results of the two studies made on the innovation finance correspond well with each other. They concern the same provider, although they are based upon two different databases. From a supply side perspective, they point out what ideas have got public innovation support from SIC. It emerges that specific variables such as 'legal form' and 'industry' are strongly correlated to the decisions of support or rejection of an application. The legal form comes out as an important variable and it is showed that limited companies attract both more grants, and higher sums of money in each grant than sole proprietors. Additionally, some differences concerning legal form were found due to gender concerning the conditional loans.

The correlation between the type of industry and support that is shown for the conditional loans holds also for the innovation subsidies, where it is shown that knowledge intensive industries attracted higher amounts than the industries that were

categorized as less knowledge intensive. Furthermore, it is shown, for the conditional loans that both expressed and tacit selection criteria may have affected the process that determines what ideas gain support. Whether this holds also for the innovation subsidies has not yet been tested. However, it can be concluded that there is something more than type of industry and legal form that has affected the decisions.

In this thesis, the issue of credibility has come out several times. Birely and Norburn (1985) put forward credibility as fundamental to access the resources crucial for the new firm. Also Klofsten et al (1999) argued in the same way and maintains that "young firms often fail because they simply have not achieved credibility" (p. 90). They showed that the granting of small-scale financial support increased the credibility of the recipient towards other sources of finance. Also Zimmerman and Zeitz (2002) highlight the importance of earning credibility, or legitimacy, as they put it, at an early stage. Legitimacy provides to them "a means to overcome the "liability of newness"" (p. 414) that is referred to as highly contributing to new venture failure. The risk of being stuck in what Birely and Norburn (1985) refer to as "the credibility Merry-Go-Round" (p. 84) is impending if the circle cannot be broken, at least at one point. For the young firm, personal credibility is viewed as the only way to break the circle. Personal credibility may be enhanced by experience and experience can be gained through practice or education.

This can be illustrated by putting the results of the studies of the innovation finance into the research model presented in section 1.6. From the frame of reference we know that finance, even in case of the modest or small sums provided by SIC, is regarded as a vital resource for the supported TBVs in several ways (Klofsten et al., 1999). We also know that to gain this kind of vital resources, interaction with the surrounding environment, the IS, is required. Finally, credibility is put forward as playing a key-role to gain the resources that are regarded as vital for TBVs (Birley et al., 1985; Storey and Tether, 1998a; Klofsten and Lindholm-Dahlstrand, 2000; Zimmerman and Zeitz, 2002).

The following results can be coupled to the matter of credibility for TBVs:

- 'Legal form' of the firm is shown to enhance credibility (Storey, 1994). The variable legal form comes in the statistical analysis out as important for gaining support in general. It is also strongly correlated to the amounts gained. Hence, "a legal form with limited liability seems to give the owner trustworthiness against other actors" (paper one, p 60.)
- Different 'types of industries' seem to "have more or less legitimacy that can be conferred upon the firms operating within them" (Van de Ven, 1993, p 420). Both papers give evidence that certain industries are supported to larger extent

than others. The results of these studies support the idea that industrial type, in case of certain industries, enhances credibility.

- 'Knowledge intensity', which may be interpreted as experience and education of the entrepreneur and/or valuations of innovativeness and future orientation of the industry in which the firm operates, is viewed as important sources of credibility (Van de Ven, 1993). Paper two gives evidence that education intensity correlates to high support rates.

The results listed above are to be seen as indicators on credibility, rather than evidence. The results point out that they are strengthening each other, which imply that e.g. knowledge intensive industries with limited companies are more successful than private persons from less knowledge intensive industries. To be able to understand and explain these results further research with qualitative approach is needed.

This discussion may also shed some light over the issues termed as financial gaps. Private venture capitalists are striving to make profitable investments, and therefore tend to favour companies that have products or services that are close to market launch (Bygrave and Timmons, 1992). This implies that the early stages are left unfounded (Oakey, 2003). Oakey (2003) suggests that "if the private sector is unable or unwilling to seek to close the venture capital funding gap" (p. 169) it must instead be a task for the public sector. Efforts in this direction are still conducted in Sweden, and as examples the Innovation Link, Sweden Industrial Development Fund and ALMI can be mentioned. However, at least the first two actors are to be seen more as complement to private venture capital investments than as efforts towards the ventures within the earliest phases of development.

Mason and Harrison (2001) argue that the funding problem is not only related to the supply side. Therefore they emphasises the importance for TBVs to attain "investment readiness". According to them, this concept includes attitudes to equity-based finance, the presentation of the offer and the match between the entrepreneur's offer and the requirements of the investor. "Investment readiness" may also be interpreted as experience and strategies, gained by practice.

SIC operated towards the earliest stages and were driven by the goal of creating a better innovation climate. The process started with innovation subsidies, in the form of small sums given to people with innovative ideas for pre-studies and idea-evaluation. These subsidies were often the first contact between the entrepreneur and SIC. If the idea turned out to be worth putting efforts on, the entrepreneur was able to continue the development and get finance in the form of a conditional loan. From the databases

we can see[40] that SIC has used a system of repeated applications. The average number of applications for innovation subsidies has been 1.4 applications per individual project. Hence, the entrepreneur had to prepare repeated applications where the idea was presented over and over again, especially in cases that were started with innovation subsidies and were continued with loans. This entails both practice and awareness of external funding at an early stage, which both are seen as useful in other studies (Maigart and Struyf, 1997; Mason and Harrison, 2001). The SIC funding was not equity-based venture capital, but it was external finance, which had to be applied for. Hence this type of innovation funding can be regarded as part of the training to attain "investment readiness".

From section 2.2 the importance of competent capital, in means of capital coupled to advice, is emphasised. One way of providing such competent capital may be cooperation between different support providers. During the SIC program there was one such cooperation between SIC and the Swedish science park organisation, Swedepark, which worked under the denomination "the judgement group of Swedepark". This judgement group worked together with the parks and had administrating officials on its own. The applications were administrated co-operation with the staff off the park of the applicant.[41]

Finally the issue of gender will be touched upon; since some gender differences coupled to legal form emerged for the conditional loans[42]. The results show that almost two thirds of the females[43] that applied for conditional loans represented sole proprietors. Only one fourth applied as limited companies. For the males the division between sole proprietorship and limited companies were almost equal, approximately 40% for each type of legal form. There were no significant difference shown in support rates between males and females. However, when we controlled for legal form it emerged that females with limited companies were the most successful.

Deeper analysis of this issue were made within a statistical report (Norrman, 2004) of conditional loans from a gender perspective, and no major differences could be found according to the gender variable solely, besides the difference in use of firm type mentioned above. The gender differences are explained as being mostly of structural character (Norrman et al., 2004b).

[40] See paper two.
[41] Interview with Torbjörn Hansson, The judgement group of Swedepark.
[42] Differences due to gender have not yet been studied for the innovation subsidies.
[43] 11% of all applications come from females.

4.4.2. RQ 2: WHAT PROBLEMS ARE INHERENT IN EVALUATION AND COMPARISON OF INCUBATOR PERFORMANCE AND HOW CAN BEST PRACTICE BE IDENTIFIED?

The study on the "process-type" of support differs from the studies of innovation finance, in the use of methodological approach, since it aims at conceptual development. The study identifies some main problems inherent in evaluations and comparisons of incubators. The most important problem is that incubators are regarded as generic, especially when it comes to analysis. Furthermore, it is shown that most of the studies undertaken in purpose to evaluate incubator performance follows an implicit model that instead evaluates what can be described as outcome, rather than performance, since incubator goals is not taken into consideration. The study suggests a framework that can be used as basis for identification of best practice incubator models. This framework implies that if incubator performance is to be measured it must be measured in relation to the goals of the incubator. Furthermore, the variations between different incubators should be taken into consideration, which implies that different incubators need to be evaluated or compared using different performance criteria. Three main components has been identified, and taken together they constitute the incubator model. These components are (1) selection strategies, (2) business support strategies, and (3) mediation strategies.

For the studies of innovation finance, the issue of credibility came out as important. Linking to the surrounding environment, the IS, is stated to give credibility to TBVs (Van de Ven, 1993). If the findings of the incubator study are regarded through the research model in section 1.6, it implies that incubators are to be seen as a tool to link TBVs to their relevant innovation systems. From the literature review we know that TBV are affected by "liability of newness", which includes lack of credibility. They are also known to have limited internal resources and have therefore, compared to larger firms, difficulties to influence or shape their external environment.

Hence, the incubator role of being mediator between the tenants and the surrounding environment are worth highlighting. This mediation role may imply as well network mediation, e.g. bridging between incubatees and their external environment, as institutional mediation, e.g. participation in the creation and interpretation of the external environment in the form of both actors and institutions.

The network mediation part is about coupling the incubatees to other actors that are vital for the survival and growth of TBVs. In short, this means opening doors, and thereby extending the networks of their tenants. Ventures that are networked with established organizations are identified with them, and their credibility is thereby enhanced (Zimmerman and Zeitz, 2002). This implies that being coupled to an incubator, especially if it has a good reputation, may enhance the credibility of the tenant towards other actors, such as customers or financiers.

The institutional mediation is coupled to the difficulties for TBVs to influence their external environment. Since TBVs are associated with new products and sometimes also with new markets, their technology might be too new to have been established in a proper IS. Van de Ven (1993) emphasise that it is less often "understood that the source of…" the "…uncertainty confronting individual entrepreneurs and investors resides at the system or community level" (p 221). Furthermore, if an innovation is radical, institutions such as laws, traditions and values might need to be influenced. Since the internal resources of the newborn TBV often are limited, the incubator may play an important role in the creation of a new or modified IS.

4.4.3. ABOUT SELECTION

Not all ventures that apply for support from SIC, incubators or other support actors gain support. It is therefore logical to assume that the support actors make some kinds of selections of whom to support and whom to reject. The study of conditional loans gives evidence that the selection criteria can be explicit as well as tacit or hidden. From the applications of Swedish incubators for the Vinnkubator funding it emerges that the selection conducted by the incubators varies. In some cases it is very careful, well structured, and follows diligent prepared routines in several steps, in order to sort out the most promising tenants. In other cases the selection seems to be shallower and the decision of selection is left to the market. This is in paper three, explained and summarized as a four-field matrix[44] of selection strategies of incubator tenants (see figure 6).

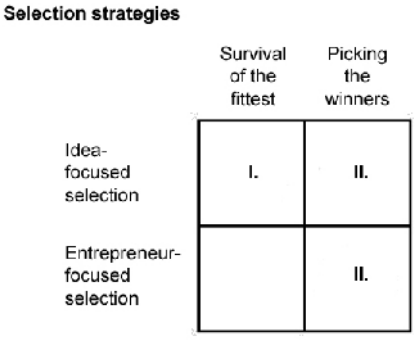


Figure 6, Selection strategies

This matrix points out four possible selection strategies that can be used to separate different incubator models from each other's. The strategies are idea-focused-survival of the fittest, entrepreneur-focused-survival of the fittest, idea-focused-picking the winners and entrepreneur-focused-picking the winners.

[44] For details, see also paper three.

This matrix may also be used in the larger context of the aim of this study. In this context the matrix can explain or rather point out the selection strategies of different support actors or resource providers, which can be regarded as useful to describe the differences between different types of support actors. The incubator study suggests that the selection strategy is coupled to the goals of the selecting incubator. If this suggestion is transferred to support actors in general, the selection strategy used for each actor ought, as for the incubators, to be coupled to the goal(s) of the support actor.[45] Used as such on the private venture capitalists[46], SIC and the incubators imply the following outcome:

- For most private venture capitalists the areas marked II, idea- or entrepreneur-focused-picking the winners-strategy, ought to represent the main selection strategies, since venture capitalists strive to make profitable investments (Bygrave and Timmons, 1992).
- For the innovation finance of SIC the strategy marked I, idea-focus-survival of the fittest, ought to represent the main selection strategy, since the scheme aimed broadly in order to promote development of innovative ideas (SIC, 2002).
- For the incubators, all four strategies may be used, depending on the goal(s) of the individual incubator studied.

4.4.4. THE AIM: TO FIND OUT THE SPECIFIC CHARACTERISES OF PUBLIC SUPPORT FOR TBVS AND METHODS FOR EVALUATING PERFORMANCE

The characteristics of the public support given to TBVs in Sweden can from the previous discussion be summarised as follows:

- The public support given is differentiated and can be divided into two main types: "configuration-type" and "process-type".
- Different types of support use different selection strategies, depending on the main goals of the support provider.
- The public support is given to ventures that through selection process have been judged as being credible in one or several ways.
- The system has not treated the females applying for conditional loans unfairly. If the variable legal form is controlled for, they instead seem to have been very successful.

[45] It must be mentioned though, that the issue of goals is complex, which is discussed in a more detailed way within paper three.
[46] Private venture capitalists are mentioned as an example to contrast the public support of SIC.

Besides these characteristics of the public support given to Swedish TBVs also the following bullet points are worth to highlight; the public support system can:

- Transfer credibility to those who receive the support. This credibility can be used in the interaction with other actors.
- Enhance "investment readiness" (e.g. business development in the form of attitudes to external finance and ability to present the offer) among the supported TBVs.
- Act as mediator between TBVs and other crucial actors.

Taken together, these three bullet points can be regarded as different ways to link TBVs to the surrounding innovation system(s).

4.5. PRACTICAL RELEVANCE

The practical relevance of the study of innovation finance from SIC is that they give important background information of what applicants that de facto have gained support in terms of loans and in terms of subsidies. They also point out that certain variables such as legal form and industry are correlated to support or rejection and to applied and supported amounts. The study of conditional loans has also contributed by providing interesting results concerning variables as gender, and that way contributed in giving a good picture of what ideas that actually have been supported.

Furthermore a large job has been done by collecting and refining the empirical data, which have resulted in two well functioning statistical databases containing a rich number of variables and important facts about the SIC system, that can be used in up-coming studies.

The practical relevance of the incubator study is that it emphasizes the fact that incubators are not generic and can consequently not be regarded as generic. This implies that it cannot be regarded as fruitful to compare apples with pears; instead the comparison must be made upon comparable entities. The paper also gives a theoretical contribution, as how to differentiate between incubators and to categorize them, which is useful when conducting incubator surveys. This is of importance for policy makers that might be interested in comparing different incubators and the performance of different incubators in order to put their efforts where it can be expected to give the most efficient returns. The study is also of importance to incubator managers that can use the framework as instrument for diagnostics of their own organisations, in order to make improvements.

During this study the question of how to make proper evaluations has come up several times. The proposed framework from the incubator study gives some insights,

whereof the most important is that performance has to be evaluated in relation to goals. Otherwise we talk about measuring outcome. This insight may be obvious or basic, but still deserves to be underlined and followed. The proposed matrix of selection can be used as an instrument to point out differences between support actors.

To summarize, there are many practical implications of this study. However, the following points are the most important:

- TBVs must be regarded within their context, their surrounding entrepreneurial environment, or their relevant innovation system.
- Small-scale finance is of high relevance. If the earliest stages of development are forgotten, there are large risks that latter stages will not emerge.
- The SIC system created regional homogeneity. Innovation subsidies were available for application in all of Sweden's 21 counties. The conditional loans were centrally treated, which at least ought to entail that all applicants were treated in an equal way.
- Incubators are not generic; this must be regarded when best practise evaluation and comparisons are made.

5. FURTHER RESEARCH

This thesis has given a rich number of background variables and conditions concerning samples of the publicly funded support that has been given to TBVs in Sweden. It therefore creates an excellent ground for continuation.

In common for all of the studies are that they raise questions[47] that require explanations of why or because of what: The question of how we measure efficiency within the SIC system and within other similar systems is of high importance. A recent investigation concerning the seed-finance of NUTEK (Bager-Sjögren, 2004) gives evidence that the program did not generate any positive effects. Furthermore, a study of incubators and science parks, (Lindholm-Dahlstrand and Klofsten, 2002) points out the mismatch between demand and supply of the support that have been given. Therefore, also these questions need continuation.

This list of interesting items can be added with questions such as:

- Why are there differences between limited companies and sole proprietors with regards to applied amounts or supported amounts?
- Do innovators or entrepreneurs that strive for growth start limited companies to achieve their goals faster?
- What are the correlations between gaining support and the entrepreneur's motivation, and is this factor important?
- How is the selection made according to the administrative officials that have handled the SIC applications?
- Did the SIC system really create enhanced "investment readiness"?

The reasons to the long list of questions for further research are the descriptive and explorative design of the study, and the aim of digging out as much important background variables as possible. A great deal of this work has been done in this thesis.

The intention for the upcoming research, concerning the innovation finance of SIC, is to investigate these why-questions, by using different kinds of qualitative analysis. A survey directed towards the demand side is planned along with interviews or case studies of the supply side. Concerning SIC, there is also an intention to map the parts of the SIC system that concerns advice and networking. The expected result of this continuing study is to increase the understanding of the implications of financial support towards TBVs in Sweden.

[47] See also the further research suggestions that has been made within each of the papers

For the incubator support the proposed framework will be empirically tested. For this work we intend to use the applications for the Vinnkubator programme and complementing the applications by conducting interviews with officials at the incubators and with the incubatees within them. The expected results from the planned continuation of the research of the incubators are to: (1) get the proposed model valuated by empirical tests, and (2) use the model in order to evaluate good practise incubators.

6. PAPER ONE: SEED FUNDING FOR INNOVATIVE VENTURES: A SURVEY OF PUBLIC FINANCE

ABSTRACT

The purpose of this paper is to describe and analyse the mechanisms by which innovative new ventures receive publicly funded financial support. It suggests that 'soft' and informal small-scale financing provided to new firms and idea owners are important in encouraging entrepreneurs in the start-up process, especially in gaining additional financing for the business. As governments provide increased public sector funding to assist entrepreneurial activity, it is important to understand and analyse the key factors that have influenced the rationale in supporting new businesses. The study has used quantitative methods, e.g. statistical analysis, using SPSS. The results presented are drawn from a Swedish database containing 5839 applications for public soft loans during a period of almost ten years. The database is created from a dataset provided by Sweden Innovation Centre (SIC) covering the years 1994 to 2003. The analysis shows, first, that specific variables such as legal form and industry strongly affect the decision by which governments provide funding to new businesses, and second, that both expressed and tacit selection criteria have affected the process that determines which ideas gain support.

INTRODUCTION

Many European countries are pursuing policies to increase the number of individuals interested in starting out new ventures and the quality of these ventures (Storey and Tether, 1998a; Bennett and Robson, 2003). In order to stimulate such developments, most European countries use various forms of financial support tools (Lindholm-Dahlstrand and Cetindamar, 2000; North et al., 2001) including seed capital (which is used in the earliest stages of venture development) and public sector sourced financial support (which is usually supplied on a non-equity basis). This small-scale provision (up to k€ 45) to new ventures can include direct financial support in the form of soft loans and subsidies, as well as indirect support mechanisms such as entrepreneurship training and incubator development (Klofsten et al., 1999; Oakey, 2003).

According to studies such as Klofsten et al (1999) and Lerner (2002), firms in receipt of grant-funded financial support often increase their credibility in attracting further complementary financing from other sources. In addition, small amounts of money provided to new ventures in the first phase of development can be important in motivating business growth, as this funding is often perceived by the entrepreneur as proof that a third party has evaluated the idea and supported its development. Even

relatively small sums, such as innovation subsidies of up to k€ 5, have been demonstrated to be important to the continued expansion of entrepreneurial projects (Klofsten et al., 1999).

Whilst some academics have warned that the public financing of new ventures has had very limited success (Storey, 1994; Cressy and Olofsson, 1997; Bergström, 2000;), others such as Lindholm-Dahlstrand and Cetindamar (2000), McGlue (2002) and Oakey (2003) have claimed that public sector capital can be employed as 'pump priming' funding to trigger further private sector investment. For example, two recent studies (Karaomerlioglu and Jacobsson, 2000; Kutsuna, 2002) have examined the relationship between public and private financing, and have found that public funding is important in situations where there is high risk combined with a lack of tangible assets.

With the exception of Klofsten et al. (1999), there has been relatively little research specifically examining public sector early-stage financing of innovative businesses. For example, contributions such as Lawton (2002), Lerner (2002), Lindholm-Dahlstrand and Cetindamar (2000), North et al. (2001), Oakey (2003) and Storey and Tether (1998b) have examined public early stage finance as only one of a variety of forms of finance to new ventures.

An examination of public-sector support of new innovative ventures is important, especially if, as Storey (1994) suggests, publicly funded financial systems for new business have been shown to be largely ineffective. It is therefore imperative to evaluate and learn lessons from the management of such schemes, especially in planning future financial systems that can support the development of new firms. Drawing on a unique ten-year dataset from Sweden Innovation Centre (SIC), a publicly funded scheme used in Sweden, this quantitative study will examine the basis by which firms and idea owners receive early stage public support and will provide an insight as to how the public sector acts and select their projects for support. In particular, the paper will focus on selection criteria that have been used and the important factors influencing the funding decision.

The support system studied by this research is non-equity based and aimed at new ventures and projects that are intellectually or technologically-advanced. The firms and idea owners in receipt of the funding in this study can generally be described as new technology-based firms. As previous studies have demonstrated (Westhead and Storey, 1997; Lindström and Olofsson, 2001), innovative firms are often associated with high risks but, if successful, will achieve high growth rates. Furthermore, these firms are often spin-offs that are based on ideas generated from either universities or research-intensive companies (Meyer, 2003) and, as such, their technological focus implies that any products, processes or services will need a relative long period of development

from idea to market. This, in turn, entails an increased likelihood of financial obstacles at start-up, especially when new products and services for new markets are being developed (Lindström and Olofsson, 2001). These obstacles are usually reinforced by the fact that equity investors such as venture capitalists are reluctant to make investments where there is ambiguity over an exit strategy and little prospect of getting return on the capital invested (Bygrave and Timmons, 1992) and, instead, tend to favour companies that have products or services that are close to market launch (Oakey, 2003). Furthermore, venture capital investments in early phase ventures are associated with various obstacles, especially with respect to investment costs (Mason and Harrisson, 2004). For example, if the costs of the investment, due diligence and other fixed costs are too high as compared to the size of the investment, then there is an increased risk for potential investors (Harding, 2002). As a result of such concerns, venture capitalists and informal investors - such as business angels - are often reluctant to provide funding for many early stages innovative firms.

Therefore, when it comes to the acquisition of resources, the demand and supply of financial resources are often in disequilibria. This finding is not new - the Macmillan report (1931) reported this phenomenon as a 'financial gap' for business - and more recent research has emphasised other types of 'market failures' such as information asymmetries, knowledge gaps and under-investments in R&D (Storey, 1994; Storey and Tether, 1998a; Martin and Scott, 2000; Harding, 2002; Lerner, 2002; Carpenter and Petersen, 2002).

To date, the literature examining financial gaps (Harding, 2000; North et al., 2001; McGlue, 2002; Mason and Harrison, 2003) has concentrated on the supply of venture capital when the business is more established which is different to the small scale financing addressed in this paper. Indeed, finance in the earliest stages of a venture's development is crucial for survival, and here there is a need for greater examination of the important finance gaps that can exist in the earliest stages of the life of a business. If the new innovative venture is unable to survive its first stages of development, the issue of addressing future financial gaps when the business is established may not even arise.

Another perspective to be examined in this paper is the supposition by many investors that whilst there is capital available in funding the new venture, the lack of suitable projects remains the key problem (Harding, 2000; Mason and Harrison, 2001; McGlue, 2002). One possible explanation of this phenomenon is that independence is a common reason behind starting out a venture (Lindholm-Dahlstrand, 2004), and many entrepreneurs are consequently averse to external ownership and reject any proposed equity-based venture capital investments (Harding, 2000, 2002 ; Berggren et al., 2000; Mason and Harrison, 2001).

Furthermore, venture capital is clearly not the solution for all new ventures as only a very small minority of new knowledge-based firms seeks such funding (North et al., 2001). For example, under-capitalization has been put forward as a winning entrepreneurial strategy with the arguments that lack of capital prevents large overheads and diversified ownership of the venture (Goldstein, 1984). In addition, too much capital can also make the venture drop its focus on its customers and market and instead focus only on the process of obtaining funds (Lerner, 2002). This phenomenon was demonstrated during the recent collapse of the stock exchange, where a number of dot.com companies - despite an enormous supply of venture capital - did not survive and went out of business. Therefore, whilst survival that is based on the ventures internally generated profits might not create the most rapid growth rates, it is still a viable strategy for sustainable and controlled growth in the early stages of development (Goldstein, 1984).

The 'soft' finance from SIC, studied in this paper, has been provided free of any interference with the ownership of the business which means, in contrast to traditional equity-based venture capital, it has not impeded the independence of the entrepreneur. Mason and Harrison (2001; 2002) have discussed the importance of ensuring ventures are 'investment ready', and the requirement that entrepreneurs, at the earliest stage of development, increase their awareness of the various forms of external financing. Indeed, every effort to obtain external resources challenges the management of the venture to develop business plans in order to convince investors and 'practice makes it perfect'.

Hence, this kind of small-scale public-sector supplied financing for entrepreneurs and innovators at the earliest phase of development of the venture can be essential, not least as an instrument to ensure that new ventures address the potential for external financing. As a recent study has shown, availability of finance is key to the development of new innovative businesses (Kaulio, 2003). Another important aspect is that the development of bids for public sector funding can help ventures, even in the very earliest development stages, to prepare for the various evaluation criteria that may be applied more stringently in any future private investment situation.

SWEDEN INNOVATION CENTRE (SIC)

Founded in 1994, the SIC "supports innovators in their absolute earliest phases of development – with financial capital, advice and networks. One of the objectives of SIC's work is to create a better innovation climate in Sweden – a climate where people's attitudes to innovators is positive. And where it is easy for an innovator to receive help to develop his or her concept to a commercialised product or service" (SIC 2002, page 24).

At its inception, the SIC established funds of M€ 56.7 received from the public foundations of employees to help support new innovative projects. The project was to last ten years and all funding was to be, and has been, allocated during this time. During the last decade, there have been three types of financial support directed towards idea owners from the SIC:

- Innovation subsidy, namely a financial grant of approximately k€ 4 with no obligations of payback from the recipient business.
- Conditional loan, a 'soft' type of loan (maximum k€ 43) that had its security only in the specific project receiving backing. If the project turned out well, the venture got five years to pay the loan back, and if the project failed commercially, the loan was written off.
- Scholarship was used for special issues.

The support from SIC was given both to firms and private individuals. The funding was restricted and a project had to fulfil the following conditions: it had to be a new project or innovation, the project or innovation had to be able to commercialise and the project or innovation had to be technically or intellectually advanced. The administration of the applications was conducted by SIC and by authorized external actors such as regional innovation centres, NUTEK, the judgement group of Swedepark and consultants with expert knowledge of different industries. (SIC; SIC 2002; SIC 2004 and interviews)

DATA AND METHOD

This paper presents the results of a quantitative study of the public financing of innovation projects in Sweden. The analysis is drawn from an SPSS-database, created from a dataset provided by SIC which contained 5839 applications (from October 1994 to September 2003). The material received from SIC has then been revised, elaborated, classified and refined by the authors to make statistical analysis possible.

The tools for the analysis used have been limited to cross tabs and comparisons of means. To detect significances in the data material and to see patterns between variables, chi-square test has been used. ANOVA and ANOVA with Bonferroni tests has been used for comparison of means to analyse the amounts of money applied for, and received by, the innovative ventures. The database has a number of general variables, including date of project, geographical location, year of birth, sex of applicant, legal form of firm, type of industry, reason to rejection and administrative official. It also has another thirteen variables for the application (e.g. using areas for the money applied), including Technical pre-study, Commercial pre-study, Swedish patent, Patent Corporation Treaty (PCT), Protection of design and trademark, Construction,

Design, Prototype, CE-mark and tests, Test series of production, Negotiation costs, Initial commercialisation activities and a last 'Unspecified actions' for catching up.

The database has got falling off, mostly of a partial character, which due to the size of the material has been assessed to have low impact. A Systematic falling off exists from the start in 1994 to May 1999 in cases where application is supported. The reason to the falling off is the initial administrative routines. Applied amounts only have been registered in cases not supported and only as total amounts, without specification on using areas. From May 1999, new routines for registration were introduced. In order to be able to compare applied cases with supported cases we have chosen to analyse a selection. The selection, named *'a-selection'*, is the applications with available applied amount, totally 3017 cases. Comments are made where the a-selection is used.

This paper will investigate Conditional loans only and has dispensed with the Scholarships, though they are very heterogeneous as group and only temporarily used, and the Innovation subsidies since the material is very large, approximately 30000 applications, and split upon 21 separate registers.

SAMPLE CHARACTERISTICS

During 1994 to 2003, SIC received a total of 5839 applications for conditional loans. 89% (5209) of the applications were sent in by males and 11% (630) by females. The average number of applications per year was 677 (first and last year excluded). The applications according to the variable legal form of the firm are as follows: sole proprietorship[1] 2465 cases, limited company 2577 cases, trading and limited partnership 469 cases, economic association 16 cases and missing information 311 cases.

During the last ten years, SIC has allocated its funding (dedicated to conditional loans) over thirteen different using area classifications, namely: Prototype and Construction (M€ 11 each), Initial commercialisation activities and Test series of production (M€ 7 each); Unspecified actions (M€ 5), PCT (M€ 4), Swedish patent and Negotiation costs (M€ 3 each), CE-mark, Design, Technical pre-study and Commercial pre-study (M€ 2 each) and Protection of design and trademark (M€ 1).

Whilst the industry variable originally included 65 different industry segments, for the purposes of this study it has been aggregated into new variables. Hence, the industrial structure of the recipients are as follows: Forestry and agriculture (413), Chemicals and metal (652), Computers and IT (612), Machinery (907), Equipment and instruments (1936), Energy and environment (52%) and a mixed 'Other' category (571).

The geographic location of the applicants is spread over the 21 counties of Sweden, but the applicants are most heavily concentrated to the most densely populated

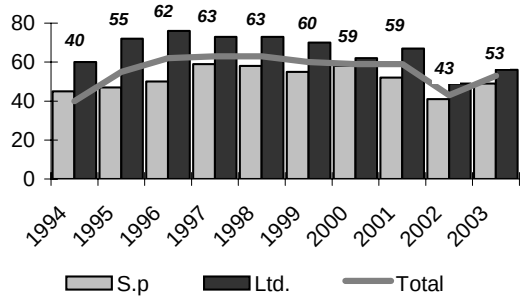
counties such as Stockholm (38%), Gothenburg (14%) and Malmö (8%). Remaining counties represents approximately 2% or less of the applications each ordered on a falling scale, topped by a couple of counties close to Stockholm and Gothenburg and ended with the Baltic sea island, Gotland, that represents 0,3% of the applications.

RESULTS

APPLICATIONS

The total average of supported cases is 57% of all applications. The highest support rate was 63% in 1997 and 1998 and the lowest was 43% in 2002 (see figure 1). The low rate for 2002 can be explained by the decline in the value of the stock exchange (as large parts of the SIC's foundation's funds were related to stock investments).

Figure 1. Success-rate of applications (%, year).



Abbreviations: 'Ltd.' -limited company, 'S.p.'-sole proprietorship, 'Total' -average support rate, all cases.

INDUSTRY

The analysis of the data indicates that the industrial sector in which the business operates can directly affect the possibility of gaining support from the fund. As table 2 shows, there are significant differences in the success rates of applicants across different industries in obtaining funding, as well as in the amounts of funding received. In order to rank the industries, means have been compared by running ANOVA with Bonferroni test to detect if the differences in the funding applied for, and subsequently supported, are significant across the groups. When comparing the means of applied and supported amounts by industry types, computers and IT applicants have higher success rates and obtain higher amounts of funding than the other industries ($p=0.000$). The ranking of the remaining industries is not obvious. Equipment and instruments and Energy and environment have applied for larger amounts than Chemicals and metal and vice versa, but there are no differences in case of supported amounts. The categories Machinery and Other are not significant smaller or larger than the rest.

LEGAL FORM

With regard to applications, there are significant differences in the success rates of business by legal form (table 1). In all cases, the success rate for applicants with limited companies was higher than for applicants classed as sole proprietors. For nine out of thirteen areas, all figures are highly significant. The general pattern shows that limited companies applied for (and gained) higher amounts than sole proprietors. Note that the percentage figures for support presented in table 1 are lower than the general percentage figures for support. This due to the detail of the statistics i.e. it is possible for an applicant to be rejected for support in one area but to obtain funding in others. Therefore, partially rejected applications are not considered for the average support rates and if there is one supported application by a firm, the application in total is judged to be supported.

When analysis was run on the variables legal form and industry, larger differences appeared (see table 2). Applicants with limited companies have shown higher success rates than applicants with sole proprietorship ($p=0.000$) and for all industries (with the exception of Forestry and agriculture and Machinery), the success rates for limited companies are higher. ANOVA with Bonferroni test was run in order to detect if the differences between limited companies and sole proprietors by industry was significant. Significant differences for the amounts applied for, due to legal form, were found for the industries Forestry and agriculture, Chemicals and metal, Machinery, Equipment and instruments and for the last category - Other. For supported applications, there are significant differences for the industries Forestry and agriculture, Machinery, Equipment and instruments and Other. In all cases, applicants with limited companies status have both applied for, and received higher levels of support, than sole proprietors.

There are also differences due to gender on the variable legal form of firm. More females have applied as sole proprietors for funding rather than as representatives of limited companies. 39% (2059) of the males have applied as sole proprietors compared to 64% (406) of the females, whilst 46% (2420) males have applied as limited companies, compared to 25% (157) of the females. However, women have a higher success rate in gaining support, and 77% of the applications from females from limited companies gained support as compared to 65% for the males. The difference due to gender (according to the legal form of the firm) is significant by the chi-square test *(*$p=0.002$*)* for limited companies. In absolute terms, the figures for sole proprietorship and for limited partnerships are also higher for females, although the differences between males and females are not significant.

Table 1. Legal form and using area

	Appl. selection	Appl. Ltd.	Appl. S.p.	Sign. Level applications	Sup. Ltd.	Sup. S.p.	% Sup. Ltd.	% Sup. S.p.	Sign. Level support
Technical pre-study	344	203	141	chi2. p=0.005 anova. p=0.023	88	44	44%	31%	chi2.p=0.026
Commercial pre-study	460	255	205	chi2. p=0.001 anova. p=0.000	109	49	42%	24%	chi2. p=0.001 anova. p=0.000
Swedish patent	778	362	416	chi2. p=0.007 anova. p=0.003	191	177	53%	42%	chi2. p=0.002 anova. p=0.000
Patent Corporation Treaty (PCT)	960	421	539	chi2. p=0.009 anova. p=0.001	192	200	46%	37%	chi2. p=0.045 anova. p=0.002
Protection of design and trademark	674	321	353	-	139	125	43%	35%	chi2. p=0.036
Construction	1099	644	455	chi2. p=0.000 anova. p=0.000	327	156	51%	34%	chi2. p=0.000 anova. p=0.000
Design	725	385	340	chi2. p=0.000	175	100	45%	42%	chi2. p=0.002
Prototype	1068	576	492	chi2. p=0.000 anova. p=0.000	280	174	49%	35%	chi2. p=0.000 anova. p=0.000
CE-mark and tests	848	482	366	chi2. p=0.000 anova. p=0.000	211	117	44%	32%	chi2. p=0.000 anova. p=0.000
Test series of production	936	450	486	chi2. p=0.000 anova. p=0.000	186	187	41%	38%	chi2. p=0.000 anova. p=0.000
Negotiation costs	1055	538	517	chi2. p=0.000 anova. p=0.000	231	183	43%	35%	chi2. p=0.004 anova. p=0.000
Initial comer-cialisation activities	1431	704	727	chi2. p=0.000 anova. p=0.000	330	299	47%	40%	chi2. p=0.000 anova. p=0.000
Unspecified actions	302	146	156	-	63	47	43%	30%	anova. p=0.004

Abbreviations: 'Appl' – application, 'Ltd.' –limited company, 'S.p.'-sole proprietorship, 'Sup' – support and 'Sign' – significant.

Table 2, Type of industry and legal form

	Applied *Number of cases 2663*		Supported *Number of cases 1486*	
	Limited companies	**Sole Proprietors**	**Limited companies**	**Sole Proprietors**
Forestry and agriculture	Cases: 56 Mean: k€ 29* (L)** *(p=0,000)*	Cases: 90 Mean: k€ 19 (S) *(p=0,000)*	Cases: 26 Mean: k€ 24,6 (L) *(p=0,035)* Hit-rate*** 46%	Cases: 47 Mean: k€ 13,7 (S) *(p=0,035)* Hit-rate 52%
Chemicals and metal	Cases: 146 Mean: k€ 29 (L) *(p=0,000)*	Cases: 185 Mean: k€ 19 (S) *(p=0,000)*	Cases: 93 Mean: k€ 17,2 Hit-rate 64%	Cases: 100 Mean: k€ 11,7 Hit-rate 54%
Computers and IT	Cases: 287 Mean: k€ 36	Cases: 87 Mean: k€ 29	Cases: 196 Mean: k€ 25 Hit-rate 68%	Cases: 34 Mean: k€ 18 Hit-rate 39%
Machinery	Cases: 168 Mean: k€ 31 (L) *(p=0,000)*	Cases: 176 Mean: k€ 22 (S) *(p=0,000)*	Cases: 91 Mean: k€ 23 (L) *(p=0,000)* Hit-rate 54%	Cases: 99 Mean: k€ 14 (S) *(p=0,000)* Hit-rate 56%
Equipment and instruments	Cases: 475 Mean: k€ 34 (L) *(p=0,000)*	Cases: 446 Mean: k€ 21 (S) *(p=0,000)*	Cases: 284 Mean: k€ 24 (L) *(p=0,000)* Hit-rate 60%	Cases: 256 Mean: k€ 13 (S) *(p=0,000)* Hit-rate 57%
Energy and environment	Cases: 136 Mean: k€ 31	Cases: 149 Mean: k€ 26	Cases: 73 Mean: k€ 22 Hit-rate 54%	Cases: 56 Mean: k€ 15 Hit-rate 38%
Other	Cases: 101 Mean: k€ 31 (L) *(p=0,008)*	Cases: 161 Mean: k€ 22 (S) *(p=0,008)*	Cases: 55 Mean: k€ 22 (L) *(p=0,001)* Hit-rate 54%	Cases: 76 Mean: k€ 13 (S) *(p=0,001)* Hit-rate 47%

A-selection is used; cases with other legal form than limited company and sole proprietorship are excluded.
* € 1 = SEK 9,03 /Dagens Nyheter 2004-11-12
** Abbreviations: (L) – Larger, (S) – Smaller (than the other category)
*** Hit-rates are calculated in percent of number of applied in the group and in the selection of 2663 cases. The hit-rate for all 2663 cases is 56%.

DISCUSSION

As Landström, (2003) has demonstrated, there was relatively good access to funding for new ventures in the late nineties in Sweden, especially for businesses at the earliest stage of funding. Therefore, finance was not a major problem for innovative new firms, mainly because of a growing venture capital industry investing in early stage funding (SVCA, 2000) and the presence of public actors such as the Sweden Innovation Centre (SIC), which offered conditional loans and subsidies to new firms and idea owners. In addition, there were a range of other actors providing both seed and growth capital, such as ALMI, NUTEK and Industrifonden.

However, the situation in Sweden is different today and shows a venture capital market that is reducing its investments in seed and start-up phases (NUTEK, 2002; SVCA, 2003; SVCA, 2004). Indeed, both the number of investments and the amounts

invested in new ventures by the private sector has declined significantly during recent years. It is also clear that public funding to support investment in new ventures is decreasing and this situation has lead to a growing debate about the future financial system to support innovative new firms. In a recent Swedish report (Neergaard, 2004), it has been suggested that a more integrated system of actors and funds within an innovation system should be considered and a new public financial system for new ventures is under development. Hence, the issues of public financial support directed towards the earliest stages of development within innovative firms are more important than ever.

The results show that a number of variables are significant among the applications supported or rejected. The strongest ones is the legal form of the firm and the type of industry. Furthermore, we will discuss the high rates of support and some deviations according to gender and geographical location.

THE LEGAL FORM OF THE FIRM

There are many factors that influence growth in new ventures, most of which are directly related to characteristics of the entrepreneur, the venture and its strategy. The legal form of the firm has been put forward as one of the most important variables in several studies, along with factors as the market, location and size (Storey, 1994; Davidsson et al., 2002). For example, Almus and Nerlinger (1999) have indicated that firms with a limited liability status have a higher growth rate than other legal forms of business.

This study supports such a finding and shows that the legal form of the firms is important in obtaining innovation support. In general, strong significant differences are shown due to legal form and in almost every case, applicants with limited companies apply for (and receive) larger amounts of funds than sole proprietors and partnerships. In the context of these findings, it may be interesting to consider whether entrepreneurs that are growth-oriented start limited companies to achieve their goals faster, especially as establishing a limited company in Sweden requires an initial capital investment of k€ 10.7 from the owner/s of the firm, which suggests that they may be more committed to the success of the business.

In order to find out if the legal form of the venture had acted as a hidden selection criterion, the question of the influence of legal form on the decisions was addressed directly to SIC[2]. They responded by stating that the application was considered mainly in terms of its quality and commercial potential, and not because of the legal form of the firm. SIC did admit that there often is a correlation between a well-developed application and the legal form of the applicant, mainly because of the advantage of limited liability status. When the same question was addressed to the judgement group of Swedepark, their[3] answer was similar although they stressed that limited companies

often have better applications due to better-developed business ideas. Another reason put forward by the judgement group is the backing from mentors within the park, as entrepreneurs are supported during their incubator process by the staff of the park (who often assists the judgement group with information for their decisions). The group also stresses that the quality of the applications in general is higher among the applications originated in the science and technology parks, preferably due to the close bounds between the actors. According to the director of the incubator of Västerås Technology Park[4], the ventures in the incubator are recommended to run their business in limited companies instead of sole proprietorship, as a limited company status gives a more assurance to both customers and investors. Furthermore, they assert the limited liability as more protective for the owner.

If government seed capital is to be seen as a catalyst towards additional financing (Klofsten et al., 1999; Lerner, 2002) and if the legal form of the business is an important growth factor, this study supports the argument of Storey (1994), namely that limited liability status is better than other forms of ownership. In particular, a legal form with limited liability seems to give the owner trustworthiness against other actors, including the funding body SIC. Despite the statements from the interviews, the results of the study suggest that the legal form of the firm has acted as an underlying or tacit selection criterion in determining which type of ventures receive public support.

THE INDUSTRY

Various studies have shown that the industrial sector in which the venture operates is one of the important variables for growth (Almus and Nerlinger, 1999; Davidsson et al., 2002). However, the main problem in identifying the importance of industrial sectors is that of classification (Davidsson et al., 2002) due to a blurring of different business activities and variations in industry definition. In the database used in this study, 80% of the cases are defined as manufacturing in different sectors, which gives a problem in comparison with services due to the fact that the groups are warped and some are too small to undertake appropriate analysis. Therefore, the research has focused on examining broad sectored classifications irrespective of manufacturing or service activities i.e. examine whether business ideas in instruments or computers receive more support than those in machinery or pulp.

Since the original variable industry used by SIC was divided into more than sixty groups, this paper has undertaken a broader clustering in order to achieve a more workable model. As shown earlier, the analysis shows that there are differences due to the type of broad industrial classification adopted. The industries Chemicals and metal, Computers and IT, Machinery, Equipment and instruments and Energy and environment, have gained higher rates of support than the other industries, and strong significances are shown due to the legal form. When analysis was run on less

aggregated levels, it appeared that limited companies had very high success rates in the most successful industries. This finding is not too surprising, as Davidsson et al (2002) have shown that the importance for a business of being in a growth industry. Indeed, the most successful industries in gaining support in this study are connected to areas such as information technology, and medicine and medical equipment, both of which have been associated with growth during the last decade (Karaomerlioglu and Jacobsson, 2000; Lerner, 2002; SVCA, 2003).

The study did not ask SIC and other actors whether their decisions had been affected by the type of industry, as mentioned, SIC has used twenty-eight freestanding consultants with expert knowledge on different industries for administration of the applications.

THE GEOGRAPHICAL LOCATION

The differences in geographical location can be linked to several possible explanations. One is how the innovation support from SIC has been marketed. For example, the marketing activities among the regional innovation centres have varied with some regions being more active than others. Another explanation may be due to the location of certain actors supporting the scheme - the head offices of both SIC and its 'collaborator organisation' ALMI are located in Stockholm. Another example is given by one of the authorised administration partners of SIC, the judgement group of Swedepark, which has marketed the support system to Science and Technology parks in Sweden. The group has been working together with the staff of the local parks and the number of applications varies according to their relationships with these parks. The group's closest bonds have been with parks that are located to larger cities with larger universities. The judgement group[5] also explained high technology and innovation as 'a bit of an urban phenomenon'.

THE GENDER VARIABLE

Some differences were found due to gender, especially in terms of the number of applicants and the choice of the legal form of firm. The number of applying females is approximately one out of ten. Furthermore, females tend to be sole proprietors when applying as compared to males, who apply largely as limited companies. However, there is no evidence that there is any discrimination against women while applying for funding and females have been very successful with their applications. The differences seems to be structural and if any efforts are to be made regarding gender, the most important action must be to encourage more females to develop their ideas and start out new ventures, especially as limited companies (Norrman, 2004).

THE SUPPORT SYSTEM

As has been demonstrated, there is a high rate of support of ideas for funding and the most possible explanation of this probably lies in the nature of the support system itself. The process normally first starts for the firm or idea owner through contact with SIC or one of the Regional Innovation Centres. This leads to approximately 20% (4000)[6] applying for innovation subsidy as a first step and around 3.5% (700) applying for a conditional loan. Of those, 57% gained support, which is a high rate, although if the whole process is taken into consideration, it is a relatively small number of the applicants that receive funding. This is comparable to other sources of financing such as venture capital, which invest in between one and four per cent of all offers received (Fredriksen, 1997). However, it must be emphasized that public seed funding and venture capital are two different entities that are used in different phases of the development of the business for different purposes, and high or low success rates depends on a variety of different factors and how they are compared.

It is also worth noting that in order to gain support; the applicant must fulfil a number of pre-qualification criteria. Theoretically, a project that did not fulfil those conditions could scarcely complete the application and would not be considered for funding or may not even apply. As such, the application form itself can act as a selection tool in determining which projects are funded as the project must be new, must be able to commercialise and be technically or intellectually advanced. It was also specified which items were supported and which were not. The using areas, presented in the analysis, also told their language not least of technological height.

Taking a higher risk with investments is a part of the policy of the funding process, according to the managing director of SIC and the judgement group of Swedepark[7]. Both stated that the money lent by SIC is to be considered as seed finance and that the funds are supposed to take higher risks than normal banks. The initial policy of SIC, at least during the first years, was that the benefit of the doubt should always be given to the applicants. This policy emanates from the original purpose of SIC which was to create a better innovation climate in Sweden. Nevertheless, this approach was revised during the latest years of recession. Among researchers there has also been critical voices arisen about 'throwing easy money' on poor projects (Cressy and Olofsson, 1997; Åstebro, 2003), hence, it is important to examine this in more detail in further research i.e. to find out the boundaries between 'throwing money' and giving funds to develop innovative projects.

Taken together there have been several factors and selection criteria and several selectors, both tacit and expressed, affecting the process regarding the ideas that have gained support. Since the database only gives figures, it is important to continue with qualitative research on this issue in order to obtain a wider understanding of the funding process, both from a supply and from a demand perspective.

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The aim of this paper was to describe and analyse the basis by which projects obtain public innovation support from a supply side perspective. The conclusions have been drawn from statistical analysis of a database created from the computerised diary system of SIC. From the analysis, the following points are worth highlighting:

- The 'legal form of the firm' is the most important factor to gain support.
- The variable 'type of industry' is important.
- Both expressed and tacit selection criteria have affected the process that determines which ideas gain support.

Regarding the legal form of the firm, the analysis shows that applicants with limited companies both apply for (and are supported with) higher amounts than applicants who are sole proprietors. This supports other studies (Storey, 1994; Almus and Nerlinger, 1999; Davidsson et al., 2002) that have shown the importance of legal form. This has been supported also by the qualitative interviews undertaken with key actors, although neither SIC nor the judgement group of Swedepark have admitted that any attention have been paid to legal form of the firm in the administration process. However, both institutions indicated that applications from limited companies often have more mature business ideas. Therefore, the research indicates that a legal form with limited liability is important, not least, in terms of trustworthiness for the owner against other actors. But, whether the legal form of the business is actually a tacit or hidden selection criterion has to be investigated in other studies.

As far as this study can ascertain, ventures from industries that have been associated with growth have been allocated the highest rates of funding, which supports findings from previous research studies (Karaomerlioglu and Jacobsson, 2000; SVCA, 2003). The variable also seems to be strengthened by the variable 'legal form'. Even in this case limited companies had the advantage.

The study suggests that success rates of applicants have been high, especially in comparison to other sources of financing, although if the whole process of application is taken into account, the proportion of firms being given support is similar to other sources such as venture capitalists.

Many questions have been raised during this study. Among them are issues like:

- Do entrepreneurs or inventors that strive after rapid growth start limited companies to achieve their goals faster, or is it due to their choice of legal form that they gain support, dare to take higher risks and thereby achieve faster growth?

- It has been argued that public support systems for new ventures are ineffective in socio-economic terms? What can be learnt for the future from the past ten years of the SIC-project?
- Does type of industry affect the decisions to support or reject applications for support?
- What is the selection process for supporting new ventures, especially the detailed criteria for selection?
- Is the kind of support that has been given by SIC an important factor in motivating those who have gained support? Does it play a role in making the ventures aware of external financing?
- Where is the border between *'throwing money'* on projects and investing in innovations that create wealth? On what side of this border has SIC been operating?

This study has provided rich background information and a base for several hypotheses. To achieve a genuine knowledge about public financing in early stages and to answer the above sample of questions, this study must be completed with qualitative studies on both the supply side and the demand side. It is therefore important to go on with qualitative studies of both applicants and representatives for the supply side. Among the group applicants it is important to survey both those that have gained support and those that have failed. With the former, it will be interesting to take a closer look at both the cases that have had success in their business and started to pay their loan back *and* with those that have gained support and failed with their projects. Also, to obtain gain knowledge on the entire SIC process, it is important to survey even the innovation subsidies.

This material has given us a quantitative description of what has happened during the ten year SIC project and the follow-up study will help provide answers as to the future direction and design of public innovation systems.

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ENDNOTES

1. This variable consists of applicants with sole proprietorship and of applicants that have applied as private persons, which also were allowed. Henceforth we will refer to this variable as sole proprietorship.
2. Interviews with Per Laurell and Roger Yttergren at SIC
3. Interview with Torbjörn Hansson, The judgement group of Swedepark
4. Interview with Sven-Arne Paulsson, Director of the incubator of Västerås Technology Park
5. Interview with Torbjörn Hansson, The judgement group of Swedepark
6. All figures are taken from SICs own material and statements.
7. Per Laurell and Torbjörn Hansson, as above

REFERENCES

Almus, M. and E. A. Nerlinger (1999), Growth of New Technology-Based Firms: Which Factors Matter? *Small Business Economics*, 13, pp. 141-154.

Bennett, R.J. & Robson, P.J.A. (2003), Changing Use of External Business Advice and Government Supports by SMEs in the 1990s, Regional Studies, 37 (8), pp 795-811

Berggren, B, Olofsson, C, and Silver, L. (2000), Control aversion and the search for external financing in Swedish SMEs, *Small Business Economics*, 15, pp. 233-242.

Bergström, F. (2000), Capital Subsidies and the Performance of Firms, *Small Business Economics*, 14, pp. 183-193.

Bygrave, W. D. & Timmons, J. A. (1992), *Venture capital at the crossroads.* (Boston: Harvard Business School Press.)

Carpenter, R. E. & Petersen, B.C. (2002), Capital market imperfections, high-tech investment, and new equity financing, *The Economic Journal*, 112, pp. 54-72.

Cressy, R. & Olofsson, C. (1997), The financial conditions for Swedish SMEs: Survey and research agenda, *Small Business Economics*, 9, pp. 179-194.

Davidsson, P, Kirchhoff, B, Abdulnasser H-J, & Gustafsson H. (2002), Emperical Analysis of Business Growth Factors Using Swedish Data, *Journal of Small Business Management*, 40, pp. 332-349.

Goldstein, J. (1984), Undercapitalization as a winning entrepreneurial strategy, *4th Annual Babson College Entrepreneurship Research Conference.* Georgia Institute of Technology: Center for Entrepreneurial Studies, Babson College, Wellesley, pp. 409-428

Harding, R. (2002), Plugging the knowledge gap: an international comparison of the role for policy in the venture capital market, *Venture Capital: An International Journal of Entrepreneurial Finance*, 4 (1), pp. 59 - 76.

---- (2000), Venture capital and regional development: towards a venture capital system, *Venture Capital: An International Journal of Entrepreneurial Finance*, 2 (4), pp. 287-311.

Karaomerlioglu, D. C. & Jacobsson S. (2000), The Swedish venture capital industry: an infant, adolescent or grown-up? *Venture Capital: An International Journal of Entrepreneurial Finance*, 2 (1), pp. 61-68.

Kaulio, M. A. (2003), Initial conditions or process of development? Critical incidents in the early stages of new ventures, *R&D Management,* 33 (2), pp. 165-175.

Klofsten, M, Jonsson, M. & Simón J. (1999), Supporting the pre-commercialisation stages of technology-based firms: the effects of small-scale venture capital, *Venture Capital: An International Journal of Entrepreneurial Finance*, 1 (1), pp. 83-93.

Landström, H. (2003), *Småföretaget och kapitalet, Svensk forskning kring små företags finansiering.* (Kristianstad: SNS Förlag.)

Lawton, T. C. (2002), Missing the target: assessing the role of government in bridging the European equity gap and enhancing economic growth, *Venture Capital: An International Journal of Entrepreneurial Finance*, 4 (1), pp. 7-23.

Lerner, J. (2002), When Bureaucrats Meet Entrepreneurs: The Design of Effective Public Venture Capital Programmes, *Economic Journal*, 112 (477), p. F73.

Lindholm-Dahlstrand, Å. (2004), *Teknikbaserat nyföretagande - tillväxt och affärsutveckling.* (Lund: Studentlitteratur.)

Lindholm-Dahlstrand, Å. & Cetindamar, D. (2000), The dynamics of innovation financing in Sweden, *Venture Capital: An International Journal of Entrepreneurial Finance*, 2 (3), pp. 203-221.

Lindström, G. & Olofsson, C. (2001), Early stage financing of NTBFs: an analysis of contributions from support actors, *Venture Capital: An International Journal of Entrepreneurial Finance*, 3 (2), pp. 151-168.

Macmillan, H. P. (1931), Committee on Finance and Industry Report. London: His Majesty's Stationery Office.

Martin, S. & Scott, J.T. (2000), The nature of innovation market failure and the design of public support for private innovation, *Research Policy,* 29, pp. 437-447.

Mason, C.M. & Harrisson, R.T. (2004), Improving access to early stage venture capital in regional economies: A new approach to investment Readiness, *Local Economy*, 19 (2) pp 159-173.

Mason, C.M. & Harrison, R.T. (2002), Barriers to investment in the informal venture capital sector, *Entrepreneurship & Regional Development*, 14 (3), pp. 271-287

---- (2003), Closing the Regional Equity Gap? A Critique of the Department of Trade and Industry's Regional Venture Capital Funds Initiative, *Regional Studies*, 37 (8), p. 855

---- (2001), 'Investment Readiness': A Critique of Government Proposals to Increase the Demand for Venture Capital, *Regional Studies*, 35 (7), pp. 663-668

McGlue, D. (2002), The funding of venture capital in Europe: issues for public policy, *Venture Capital: An International Journal of Entrepreneurial Finance*, 4, (1), pp. 45-58.

Meyer, M. (2003) Academic entrepreneurs or entrepreneurial academics? Research-based ventures and public support mechanisms, *R&D Management*, 33 (2), pp.107-115.

Neergaard, C. de (2004), Bättre finansiering för kommersialisering av innovationer, NUTEK (Ed.). Stockholm.

Norrman, C. (2004), Genus och innovationer - En studie av SICs villkorslån mellan åren 1994 och 2003 (Gender and innovations – A study of the conditional loans provided by SIC between 1994 and 2003), Unpublished report.

North, D, Smallbone, D, & Vickers, I. (2001), Public Sector Support for Innovating SMEs, *Small Business Economics*, 16, pp. 303-317.

NUTEK (2004), Riskkapitalbolagens aktiviteter Första kvartalet 2004

(The activities of Venture capitalist's Q1 2004), in R2004:7. Stockholm: NUTEK.

Oakey, R.P. (2003), Funding innovation and growth in UK new technology-based firms: some observations on contributions from the public and private sectors, *Venture Capital: An International Journal of Entrepreneurial Finance*, 5 (2), pp. 161-179.

SIC, Näring åt Goda idéer - Ansökan om villkorslån, (Information Broschure/ Application form) Stiftelsen Innovationscentrum/ Sweden innovation centre: Stockholm, Sweden

---- (2002), Stiftelsen Innovationscentrum 2002 (Sweden Innovation Centre 2002). Stiftelsen Innovationscentrum: Stockholm, Sweden

---- (2004), 10 år med Stiftelsen Innovationscentrum (10 years with Sweden Innovation Centre). Stiftelsen Innovationscentrum: Stockholm, Sweden

Storey, D.J. (1994), Understanding the small business sector. London: Routledge.

Storey, D.J. & Tether B. S. (1998a), New technology-based firms in the European union: an introduction, *Research Policy*, 26 (9), pp. 933-946.

---- (1998b), Public policy measures to support new technology-based firms in the European Union, *Research Policy*, 26 (9), pp. 1037-1057.

SVCA (2000), Directory 2000-2001. Swedish Private Equity &Venture Capital Association, Stockholm, Sweden

---- (2002), Directory 2002-2003. Swedish Private Equity &Venture Capital Association, Stockholm, Sweden

---- (2003), Directory 2003-2004. Swedish Private Equity &Venture Capital Association Stockholm, Sweden

Westhead, P. & Storey D.J. (1997), Financial constraints on the growth of high technology small firms in the United Kingdom, *Applied Financial Economics*, 7 (2), pp.197-201

Åstebro, T. (2003), The return to independent invention: evidence of unrealistic optimism, risk seeking or skewness loving

7. PAPER TWO: PUBLIC INNOVATION SUPPORT AND INNOVATIVE IDEAS

ABSTRACT

For society to develop and achieve sustainable economic growth, a continuous flow of new venture ideas that can be transformed into flourishing businesses is needed. The societal efforts to obtain this have often been by provision of different kinds of seed funding. However, the number of actors and efforts, both private and public, providing funding directed towards new ideas are few. In this paper we are interested in investigating the past to learn for the future about the role of publicly provided funding towards early stages ventures. In particular, we are interested in how the type of industry affects to what extent ideas gain public support, and how these results correspond with theories of entrepreneurship, innovation and growth.

INTRODUCTION

The creation and growth of new ideas into sustainable businesses has been recognized as one of the most important factors for economic growth (1994; Davidsson et al. 1996), and a key component in achieving innovation in society (Ds 2004:36). It has also been recognized that one of the most critical conditions for new venture start-ups to be able to pursue growth opportunities is access to various types of financing in the very early stages (SOU 1993:70; Ds 1994:52; SOU 1996:69; EuropeanCommission 1998; Anell and Nygårds 1999). However, young firms that are in the beginning of a growth phase often have problems accessing such initial and very essential capital. Financing the very first idea and firm development with the capital of the owner manager is generally not an alternative, since these resources are usually either exhausted or too small (Bygrave and Timmons 1992), and young firms seldom attract external capital, due to lack of credibility, short business history and an absence of steady cash flows (Zimmerman and Zeitz 2002). Hence, a mismatch between demand and supply of financial resources, that can be termed a "financial gap", often appears between the earliest stages and the time for market launch in new firms (Harding 2000; Carpenter and Petersen 2002; McGlue 2002; Oakey 2003; Lindholm-Dahlstrand 2004).

As a consequence of the expressed need of early-stage financing and the need of new innovative ideas to ensure sustainable societal growth (Storey and Tether 1998; Bennett and Robson 2003), there is a increasing debate about the role of the government and the supply of various forms of public financing on the market. There are several reasons for the more intense focus on the governmental involvement in the financial market, which traditionally has been an arena for venture capitalist and other

private investors. First, experiences show that private venture capitalists neglect investments in the very early stages of firms' life cycle due to the high risks involved, especially when the potential business only exists as an idea (Bygrave and Timmons 1992). Second, even when financing is available, there may be reasons not to use equity-based financing in the very early stages, the primary one being that the entrepreneur might benefit from the freedom to test the idea on the market without the pressure and involvement of an external owner (Berggren et al. 2000; Harding 2000, 2002; Mason and Harrison 2002). Third, another way of getting access to financing, commonly used by new ventures, is to develop close relationships to customers as early as possible and let them take part in the financing of the new product (Klofsten and Lindholm-Dahlstrand 2000), and studies have shown that small-scale public financing to facilitate such relationships might be one of the most advantageous financial solutions for new ventures (e.g. Klofsten et al. (1999)).

However, as far as we have seen there is relatively little research conducted on public financing of innovative ideas and new ventures. Studies such as Klofsten et al. (1999), Oakey (2003) and Lindholm Dahlstrand and Cetindamar (2000) have mainly highlighted the "phenomenon" and put forward the advantages of such financing. In particular, documentation summarizing experiences of existing or past initiatives of such public financing is scarce. Most of the various evaluations from past support programs are quite shallow, internally oriented and ordered by the program manager or owner. As a consequence, both the theoretical and practical understanding of the field is quite underdeveloped and further research is needed.

The aim of this paper is to develop new insights about how public financing works in a market that creates and develops new innovative ideas. We are especially interested in how industry type affects which ideas gain public support, and how these results correspond with the theories of entrepreneurship, innovation and growth.

In an earlier study, Norrman et al. (2004; 2005), we surveyed public soft loan financing, which, however, is a limited part of the total public financing directed towards the early stages. In this study we have expanded our database to include publicly financed innovation subsidies, which normally precedes the soft loans. In the following, generate hypothesis concerning what industries and ventures receive public support based on literature in combination with results from our earlier study.

THEORETICAL FRAMEWORK AND HYPOTHESIS GENERATION

In the last few years, Swedish innovation policy has become increasingly influenced by the research on "innovation systems", especially sectoral ones (i.e. innovation systems in which activities are linked by a particular product group or share some common knowledge (Malerba 2005). This is by no means a unique policy focus, at least not within the European Union. Indeed, of the seven thematic priorities within the

Sixth Framework Programme at least five are of a sectoral character: (1) life sciences, genomics and biotechnology for health, (2) information society technologies, (3) nanotechnologies and nanosciences, (4) aeronautics and space and (5) food quality and safety.

We would expect this sectoral focus to show in the public funding of innovation activity, especially since there are a wide variety of innovation patterns across manufacturing and service sectors, in terms of both the activities involved (e.g. R&D, design, software, training, marketing, and innovative investments), and the amounts devoted to innovation (Sirilli and Evangelista 1998). Explanations for these variations include differences in technological regimes (Malerba and Orsenigo 1993) and in technological trajectories (Nelson and Winter, 1977). With respect to the latter, Pavitt (1984, p. 353) concluded that "… sectors vary in the relative importance of product and process innovations, in sources of process technology, and in the size and patters of technological diversification of innovating firms". It is reasonable to expect such differences to influence the amounts of public innovation support received by applicants. Furthermore, various studies have shown that the industrial sector in which the venture operates is one of the important variables behind growth (Almus and Nerlinger 1999; Davidsson et al. 2002), and that industries associated to growth attract more funding (Karaömerlioglu and Jacobsson 2000; Lerner 2002; Norrman et al. 2004). In summary, we would expect ideas from different industries to receive different amounts of public funding. This was also indicated in our earlier study of soft loans, in which some industries were shown to have better support rates than others (Norrman et al. 2004; Norrman and Klofsten 2005).

Hypothesis 1: The industry that the idea is related to affects the amount of public innovation subsidy granted by the public financier.

However, firms that are classified in a particular industry may be extremely heterogeneous with respect to their technology base (Rickne and Jacobsson 1999) and the products and processes they develop. It might, therefore, be more fruitful to focus on other aspects when studying an industry. One such aspect, which is frequently used by policymakers, is the knowledge intensity of the industry, presumably reflecting the view that knowledge is "the preeminent resource of the firm" (Grant 1996, page 384). Since many policy documents highlight the importance of supporting knowledge-based industrial sectors with future international growth potential (e.g. Ds 1994:52; Neergaard 2004), we would expect ideas stemming from such sectors to receive higher amounts of public financing than ideas from other sectors.

Hypothesis 2: Ideas derived from knowledge-based industries attract more public financing than ideas from industries that are not knowledge-based.

Of course, all industries make use of knowledge to some extent, and deciding what is "knowledge-based" and not is, thus, a difficult task. (See, "Data, samples and method" below) In this study we have defined a knowledge-based firm as "one whose strength and competitive edge derives from the engineering know-how of people who are integral to the firm, and upon the subsequent transformation of this know-how into products or services for a market" (Klofsten 1992, page 16). In order to capture these aspects, we have opted for two different measures: "education intensity" and "patent intensity", where the former presumably reflects the know-how of people and the latter the transformation of know-how into products.

Human capital may be assumed to be one of the most important inputs to knowledge-intensive activity; knowledge may be seen as embedded in people. For example, engineers and scientists are assumed to be the main carriers of technology (Jacobsson and Oskarsson 1995). Educational statistics can, consequently, be expected to capture activities that neither result in patents nor scientific publications and that are perhaps not even reported as R&D in the statistics (for example in smaller firms or in process engineering) (Jacobsson et al. 1996).

Patent data ought to be a quite good indicator of activities requiring high technical knowledge-intensity, since an invention needs to be novel to the world, technically reproducible and industrially exploitable and needs to contain solutions that are not obvious to the average practitioner in order to be able to patent (Jacobsson and Philipson 1996). However, it should be noted that patents are not the only way to protect an invention from imitation and that not all types of innovative activities are reflected in the patenting of a company (Patel and Pavitt 1991). Moreover, the propensity to patent varies between firms, sectors and technologies (Patel and Pavitt 1991; Jacobsson and Philipson 1996). In particular, patents may be expected to underestimate the knowledge-intensity of firms in the service sector (Rickne and Jacobsson 1999) and non-technical knowledge areas, since software, organizational innovations and other "soft" inventions are seldom patented. Nevertheless, patents are commonly used as an indicator of technological activity.

We may, thus, divide Hypothesis 2 into three sub-hypotheses:

Hypothesis 2a: Ideas derived from industries characterized by high education and patent intensities attract more public financing than ideas from industries characterized by low education and patent intensities.

Hypothesis 2b: Ideas derived from industries characterized by high education intensity attract more public financing than ideas from industries characterized by low education intensity.

Hypothesis 2c: Ideas derived from industries characterized by high patent intensity attract more public financing than ideas from industries characterized by low patent intensity.

In previous studies (Norrman et al. 2004; Norrman and Klofsten 2005) we have found that the legal form of a venture seems to influence the support rate. Ventures with limited liabilities have shown higher support rates than those run under personal ownership. We have also been able to show that limited companies both apply for and are supported with larger amounts than sole proprietors. Possible explanations concerning the legal form might be sought both from the perspective of the venture and from its context, e.g. that entrepreneurs choose a limited liability to make a better impression, or that financiers, in explicit or implicit ways, require limited liabilities to support the venture. In our previous study (Norrman et al. 2004), we found indications on both; An incubator manager recommends his tenants to start out their ventures as limited companies, since his opinion is that a limited liability gives a more solid impact on customers and financiers. Similarly, one of the administrating officials of the governmental scheme admits that limited companies often show better-founded applications. Furthermore, a limited company can be considered as an investment from the entrepreneur in hers or his idea, since it requires an equity capital of approximately k€ 10.7, which might vouch for a more serious staking.

Hypothesis 3: Limited companies attract more public financing than sole proprietors/private persons.

DATA, SAMPLES AND METHOD

This paper presents the results of a quantitative study of a governmental scheme for finance of innovation projects, the *Sweden Innovation Centre (SIC)*. The scheme was incepted 1994 in purpose to create a better innovation climate in Sweden, which included as well changes in attitudes as direct support of ideas, in terms of both finance and advice. The original fund consisted of M€ 56.7. During almost 10 years, SIC supported innovative ideas or projects "in their absolute earliest phase of development" (SIC 2002, page 24). The most important types of financial support, aimed directly towards idea owners, were *innovation subsidies* (regionally administrated financial grants of approximately k€ 4, with no obligations of payback from the recipient business) and *conditional loans* (centrally administrated "soft" types of loans). In this study, we have investigated the innovation subsidies.

The support from SIC was given both to new firms and private individuals with innovative ideas or projects. The funding was restricted and to get supported the idea or project had to be a new, able to commercialize and technically or intellectually advanced. Firms, if any, were not supposed to be older than three years. (SIC;, 2002, 2004) The innovation subsidies have been used mainly in purpose to evaluate the relevance of new ideas or projects and to create surveys within the areas of technology, market abilities, design and novelty search.

The analysis is drawn from an SPSS-database, containing innovation subsidy records and created from a dataset provided by the regional innovation centers of Sweden Innovation Center (SIC). The tools of analysis used have been frequencies, cross tabs and different tools for comparisons of means. For classifications of the data, we have used cluster analysis. To detect significances in the data material and to see patterns between variables, chi-square test has been used. ANOVA and ANOVA with Bonferroni tests have been used for finding significances when comparing means.

The data have been obtained from registers provided by 12 (out of 21) counties in Sweden. It is well distributed over Sweden, both densely and less densely regions are represented, and the northern regions as well as the southern. The registers have been kept and administrated independently by the regional innovation centers and have now, for the first time ever, been merged into one database. The funds were principally provided by SIC, but there were also contributions from other sources (e.g. other public-, regional- and EU-funding).

The database contains 17,722 applications distributed per year as follows: 1990: *85*; 1991: *153*; 1992: *181*; 1993: *247*; 1994: *251*; 1995: *593*; 1996: *911*; 1997: *1,231*; 1998: *1,667*; 1999: *1,997*; 2000: *2,082*; 2001: *2,268*; 2002: *2,450*; 2003: *2,061*; 2004: *1,471*; and 2005: *72*. In total 11,261 cases has gained support (63%) and 6,460 of the cases has not been supported. 10,076 cases were supported by SIC and 1,736 by the other funding sources (some cases were supported both by SIC and by other sources).

The database contains a number of general variables (well-matching with our database on soft loans, which makes comparisons possible) distributed as follows: *Legal form of firm*: private person or sole proprietorship, 15,416 (87%), limited company, 1759 (10%), partnership, 489 (3%) and others, less than 1%.

The use of the subsidies has been restricted to 12 available *using areas*, which were possible to combine. Data are distributed as follows (first amount is number of supported cases, second mean supported amount and third total amount invested. €1= SEK9.09, The European Central Bank 2005-03-16): technical pre-study, 2,084 cases, €610, k€127, commercial pre-study, 400 cases, €1,084, k€434, Swedish patent, 2,145 cases, €2,114, k€453, patent corporation treaty, 113 cases, €2,690, k€304, protection of design and trademark, 718 cases, €627, k€450, construction, 253 cases, €1,530, k€387, prototype, 2,011 cases, €1,601, k€322, design, 391cases, €1,449, k€567, test series, 440 cases, €1,518, k€668, negotiation, 166 cases, €1,228, k€204, commercialization, 648 cases, €1,236, k€801, unspecified, 2,824 cases, €1,183, k€945. The total amount invested is k€1,853.

When studying the variable *Industry* it must be mentioned that classification of the same is problematic, not least due to a blurring of different business activities and uncontrollable variations in industry definition (Davidsson et al. 2002; Norrman and

Klofsten 2005). The administrating personnel at the regional innovation centers have used a list of more than 60 industry classification codes that, in principal, derives from the SNI 92 (Swedish Standard Industrial Classification). We have aggregated the data into broader and more manageable groups with regard to industrial sector in the first hand. The cases are distributed as follows: Forestry and agriculture: 1,310 (7.4%), Chemicals, plastics and non-metal products: 749 (4.2%), Electrical and optical equipment: 2,546 (14.4%), Metal and transport equipment: 4,807 (27.1%), Computers and IT: 1,027 (5.8%), R&D and education: 101 (0.6%), Electricity, gas and water: 681 (3.8%), Other manufacturing: 3,128 (17.7%), Other, non-manufacturing: 669 (3.8%), and Missing: 2,704 (15.3%), making a total of: 17,722 (100%) cases.

To be able to give answers on our hypothesis, we have to measure the effect of the industry on amounts received. Thereby we also have to separate industries that are classified as knowledge intensive from those that are less knowledge intensive. Hence, we need an instrument for this classification. We have chosen to use a combination of indicators, namely an education rate and a patent rate.

For the education rate we have used official statistics from SCB (SCB 2001) on education and type of industry. The rate used is based on the percentage of individuals, per type of industry, with academic studies of more than three years (i.e. a minimum of Bachelor's Degree). The patent rate consists of a rate based on supported cases with national patent and PCT applications in percent of the total for the type of industry, within the database. We are here following the work of (Jacobsson et al. 1996). Both the education rate and the patent rate are applied on the same groups of classification for the variable *industry*, which consists of 20 different classifications, e.g. the, in our database represented, main groups of the 1992 Swedish Standard Industrial Classification (SCB 2002).

The easiest way to classify our cases would probably have been by using the means for patents and the means for education as borders to create four fields within a plot-diagram over all industries with patent- and education intensity on the axis. However, since several types of industries turned out to be placed close to the borders we decided to let the computer do the clustering for us. The clustering was made by using K-means cluster analysis and resulted in five final clusters. An alternative way of determination of knowledge intensity could have been by using the OECD classification of high- respective low-technology industries. The reason for not doing so was that the OECD classification only embraced manufacturing and that the match with their classification was not good enough. After showing the results of our own classification, we make comparisons to the OECD classification on the classes matching with ours.

The database has got falling off, mostly of a partial character, which due to the size of the material has been assessed to have low impact. There are no data available on amounts applied, which entails that we cannot tell whether differences in supported amounts are related to applied amounts or to other factors. Some of the counties have got falling off in the report of unsupported cases (information from the Regional Innovation Centers).

A system of repeated applications has been used and the number and order of repetitions is possible to detect by using the last character of the diary number. In the analysis, however, first applications and repeated applications have been treated as individual cases due to technical reasons. The average individual project has made 1.4 applications. There are 13,159 individual first-application projects present (of which 56% are supported) and the remaining 4,563 are repetitions of which 2,971 (85% supported) are coded as second-repeat projects, 1,031 as third-repeat projects (84% supported), and 349 as fourth-repeat projects (81% supported). The rest of the cases (212 cases) are five-or-more-repeat projects (69% supported). This system affects the total amounts gained per individual project, in cases of more than one repeat. This source of error will be treated where it can be feared to affect the results.

ANALYSIS

HYPOTHESIS 1

Hypothesis 1: The industry that the idea is related to affects the amount of public innovation subsidy granted by the public financier.

Analyzing supported amounts and type of industry on this aggregated level gives the following results, which unequivocally supports the hypothesis: R&D and education (average € 3433) has attracted significantly higher amounts than all other industries (ANOVA and ANOVA Bonferroni p=0.000 all categories except Computers and IT. Computers and IT, p=0,005). Computers and IT (average € 2451) is ranked second and has attracted significantly (ANOVA and Bonferroni p=0,000) more than all categories except R&D and education. Electrical and optic equipment (average € 1820) is, by the same tests, found to be larger than Agriculture and forestry (p=0,009), Metal and transport equipment (p=0,000) and Other manufacturing (p=0,008). Between the remaining categories the ranking is not significant. The lowest means in absolute figures are those of the categories Metal and transport equipment (average € 1442) and Agriculture and forestry (€ 1508) and the remaining categories are found between those and the top three.

Since there are differences in number of repetitions of the applications for each project between the industries we have re-counted the figures to control for the impact of repeated applications. For the top four industries the ranking, in absolute figures,

are intact even after taking the repeats in consideration. For the remaining industries there were some differences, which is not surprising since the mean amounts originally were rather close and without clear and significant ranking order.

HYPOTHESIS 2

Hypothesis 2a: Ideas derived from industries characterized by high education and patent intensities attract more public financing than ideas from industries characterized by low education and patent intensities.

The industries have been clustered by their knowledge- and patent-intensity, and according to the below results, the hypothesis 2a is supported. (The types of industries are here shown in a more detailed way than above. The reason behind not using the aggregated types of industries is that its classifications are spread over the clusters, which can cause confusions for the reader.)

Cluster 1: Non-assembled products (low education-rate (6.97) and low patent rate (4.51)). The cluster consists of the following types of industry: Food products, Wood products, Plastic products, Non metallic mineral products and Renting activities (1,231 cases 706 or 57% supported, in mean with € 1,331)

Cluster 2: Processed and assembled products and consumer services (low education rate (4.72) and close to mean patent-rate (13.17)). The cluster consists of the following types of industry: Health and social work, Textile products, Pulp and paper products, Metal basic products, metal products, Machinery and equipment products, Transport equipment products, Other products, Trade and service of motor vehicles, Retail, Trade, Hotels and restaurants and Personal service (8,700 cases 5811 or 67% supported, in mean with € 1,500)

Cluster 3: Knowledge-based services (very high education rate (31.09) and very low patent rate (3.9)). The cluster consists of the following types of industry: Education, Publishing and printing products and Consultancy (158 cases 96 or 61% supported total, in mean with € 1,845)

Cluster 4: Technology based products and services (high education rate (15.81) and high patent rate (16.93)). The cluster consists of the following types of industry: Agriculture and forestry, Electricity, gas and water supply, Electrical and optic equipment products and Recreation, culture and sport (3,704 cases 2,575 or 69.5% supported, in mean with € 1,761)

Cluster 5: Science based products and services (very high education rate (35.33) and very high patent rate (19.52)). The cluster consists of the following types of industry: Chemical and pharmaceutical products, Computers and IT and R&D (1,223 cases 824 or 67% supported, in mean with € 2,514)

The mean patent rate is 13.73 and the mean education rate is 10.48 for all cases within the database. The mean support rate for all cases is 63.5%. The differences between the clusters are significant (ANOVA Bonferroni test) between cluster 5 and cluster 1, 2 and 4 (p=0.000) and 3 (p=0.016), where cluster 5 has received the highest amounts, and between cluster 4 and cluster 1 and 2 (p=0.000), where cluster 4 has gained the higher amounts. The support rates, in percent, are not following the knowledge intensity rate in the same way as the amounts supported do. The difference between the clusters in support rates is significant (Chi-Square p=0,000).

When comparing the distribution of the manufacturing industries in the clusters 1-5 in our database with the classification of OECD (2003, page 156) of low and high technology the correspondence is rather good. OECD has, as "low-technology industries" classified recycling, wood, pulp, paper, printing and publishing, food, textile and leather. Most of these industries are found in our clusters 1 "non-assembled products" and cluster 2 "processed and assembled products". As "medium-low-technology industries" OECD classifies building and repairing boats, rubber and plastics, petroleum products, other non-metallic mineral products, and basic metal and metal products, all found in our clusters 1 and 2. As "medium-high-technology industries" OECD classifies electrical machinery, motor vehicles, chemicals (excluding pharmaceuticals), transport equipment and machinery equipment. These are found in our clusters 2 and 4 (technology based products and services). As "high-technology industries" OECD classifies aircraft and spacecraft, pharmaceuticals, office, accounting and computing machinery, communication equipment and medical precision and optical instruments. Except for the last class that is found within our cluster 4, those classes are found in our cluster 5, science-based products and services.

Hypothesis 2b: Ideas derived from industries characterized by high education intensity attract more public financing than ideas from industries characterized by low education intensity.

Hypothesis 2c: Ideas derived from industries characterized by high patent intensity attract more public financing than ideas from industries characterized by low patent intensity.

The impact of the knowledge dimension on supported amounts has been investigated by running comparisons of means with ANOVA-tests on a scaled patent rate variable and a scaled education rate variable.

The result gives for the education rate variable an almost linear correlation between education level and level of amounts supported. The least educated are in mean supported with € 1,642 and the most educated with € 2,542. The differences in the means are significant (ANOVA p=0.000) and between least and most educated (ANOVA Bonferroni p=0.000). For the amounts supported on the middle of the

education scale, most amounts are significantly lower than the sum for the most educated and significantly higher than the sum for the least educated.

When running a similar analysis on the patent rate, the correlation is not linear in the same extension as for the education rate. The most patent intensive cases are not rewarded with the highest supported amounts. Instead, the second most patent intensive group of cases has achieved the highest amounts. However the least patent intensive group was supported with the lowest amounts. The differences are significant by using ANOVA test (p=0.000) but not between the groups.

HYPOTHESIS 3

Hypothesis 3: Limited companies attract more public financing than sole proprietors/private persons.

This hypothesis is supported in this study, as in our earlier studies. The legal form is important and limited liabilities, especially limited companies attract larger amounts than liabilities that directly affect the owner's private economy, as sole proprietorship does. When running legal form of the firm against amounts supported the following results are given: Sole proprietors have received in mean € 1469, limited companies € 2834 and partnerships € 1953. The differences in amounts are significant (ANOVA p=0.000 and ANOVA Bonferroni p=0.000) between all three types of legal form analyzed. Since there are differences in number of repetitions between the different legal forms, we have controlled for this, and the order was not affected in absolute figures. Even the support-rate is better for limited companies and partnership (74% and 76% respectively) than for sole proprietors and private persons (62%).

When running the clusters against type of firm, the following results are given for limited companies (mean=10.2%) and sole proprietors (mean=86.6%), me = more than expected and le = less than expected:

- Cluster 1: Limited companies 6.9% (le), sole proprietors/ private persons 91.6% (me)
- Cluster 2: Limited companies 8.3% (le), sole proprietors/ private persons 89% (me)
- Cluster 3: Limited companies 11.4% (me), sole proprietors/ private persons 76.6% (le)
- Cluster 4: Limited companies 12.3% (me), sole proprietors/ private persons 83.9% (le)
- Cluster 5: Limited companies 20.5% (me), sole proprietors/ private persons 73.6% (le)

CONCLUSIONS AND DISCUSSION

The aim of this paper was to develop new insights about how public financing works in a market that creates and develops new innovative ideas. We were especially interested in how industry type affects which ideas gain public support, and how these results correspond with the theories of entrepreneurship, innovation and growth. To be able to give answers we put up 3 main hypothesis and we drew the following conclusions from our analysis.

Hypothesis 1: The industry that the idea is related to affects the amount of public innovation subsidy granted by the public financier.

The hypothesis was supported to some extent; certain industries, namely R&D and Education and Computers and IT have received significantly higher amounts than all other industries. These industries have been identified as growth industries (Storey 1994; Almus and Nerlinger 1999; Davidsson et al. 2002), and it is possible, or even likely, that the administrators have been affected by generic attitudes and debates about what characterizes firm growth, and that their decisions about support have been affected by these understandings. It must, though, be emphasized that the cases within our database are in their absolute earliest phases, which implies that it might be a little bit early to draw too hard conclusions over determinants of growth.

Hypothesis 2a: Ideas derived from industries characterized by high education and patent intensities attract more public financing than ideas from industries characterized by low education and patent intensities.

Yes, the ideas found in cluster 4 and 5, which both are characterized by high, or even very high, patent and education intensities have received significantly higher amounts than ideas within clusters 1 and 2, which are characterized by low education intensity and low to medium patent intensity.

When we compared our clusters to the classification used by OECD (2003), the correspondence was quite good. The OECD report also shows that approximately 50% of the venture capital investments in the OECD countries are directed towards the industries that are typed as high-technology sectors. Therefore, it is not surprising that these industries, even on an early stage of development, attract more funding than others.

Since our database did not allow us to study correlations between applied and supported amounts, we do not know if the industries in cluster 5 also have applied for larger amounts. For the conditional loans, however, we found correlations between high applied amounts and high supported amounts, and it is reasonable to expect that this relationship holds for this study as well, since a good deal of the projects that has

applied for conditional loans also have applied for the innovation subsidy, as their first move on their way to the market.

Hypothesis 2b: Ideas derived from industries characterized by high education intensity attract more public financing than ideas from industries characterized by low education intensity.

Yes, we think so. There is an almost linear correlation between education intensity and level of amounts supported. As a consequence, cluster five that has the highest education intensity has received significantly higher amounts than any other cluster. On the other hand, cluster 3, has not attracted significantly higher amounts than cluster 4, in spite of its higher education intensity. However, we think this can be explained by the low number of cases within cluster 3, at least to some extent.

Hypothesis 2c: Ideas derived from industries characterized by high patent intensity attract more public financing than ideas from industries characterized by low patent intensity.

There is no linear correlation between patent intensity and amounts received in this database. One possible explanation for this is that, in practice, far from all patents are knowledge-intensive in the sense implied above. Based on case descriptions within the database and information from the innovation centers, we estimate that approximately 60 % of the patent applications concern low-tech or non knowledge-based products. They comprise inventions such as useful plastic tools for removing garbage from the zinc or other types of clever implements sprung from the needs of innovative people, often as solution of a self-experienced problem. A small share of the applications for patent money concerns science-based ideas. Furthermore, it must be mentioned that an idea that is considered technically or intellectually advanced are not a guaranteed market success (Storey 1994; Heydebreck et al. 2000), and to get support from SIC the idea must be able to commercialize.

Hypothesis 3: Limited companies attract more public financing than sole proprietors/private persons.

Yes, limited companies have, also in this study, shown to attract significantly larger amounts than all other legal forms.

SUMMARY

There is not one simple and obvious explanation for the differences in the amounts received by different ideas. It is impossible to separate the effects of the different variables from each other, which is shown by the following example. Cluster 5, the most knowledge-intensive cluster, was shown to be significantly stronger than all other clusters, and cluster 4 was stronger than the less knowledge-intensive clusters 1 and 2, which support the hypothesis that knowledge intensity is an important variable. However, cluster 3, received higher amounts, in absolute figures, than cluster 4, even if there were no significant differences. Furthermore, the support rates in percent did not

follow the knowledge intensity rate, in the same way as for the supported amounts. Thus, knowledge intensity gives some explanations, but not all. This is especially interesting since the support from SIC was directed towards new ideas or projects with technically or intellectually advancement. Since ideas were also supposed to be evaluated in terms of their commercial abilities, the perceived market potential of the ideas has probably affected the received amounts as well, but to what extent is impossible to tell from this data.

The variable legal form is strongly related to amounts received, but the number of limited companies is not that high and there exist limited companies within all clusters, which implies that, the legal form in it self is not the only determinant of success. Instead, it seems like strong legal forms strengthen strong types of industries. Stronger legal forms also seem to be related to knowledge intensive ideas. In our previous research of the conditional loans the distribution between limited companies and sole proprietors was more even, about 43% each. There were strong significances telling that limited companies both applied for and received higher amounts than sole proprietors (Norrman and Klofsten 2005). Since the target group for conditional loans to a large extent consists of idea owners that have continued their process, there is a great overlap between the groups, which implies that it is likely that the correlations between limited companies and application for higher amounts holds for this study as well.

Finally, the industry perspective cannot be left out entirely, although we will leave to future studies to explain why. We can, from this study only conclude that there is something more to industry than knowledge intensity and legal form.

IMPLICATIONS FOR FUTURE RESEARCH

This quantitative study has, together with our previous quantitative study on conditional loans from the same provider, given us a rich background for an upcoming qualitative study of both the support system and those who has benefited from the support given. We are interested in how decisions about support have been made, in particular with regards to what factors have affected the decisions. We are also interested to know more about how the supply side has been organized. Concerning the demand side, we want to know how decisions of support or rejection have affected the applicants, what other resources they have used, their view of strong and weak points of the support scheme etc. Furthermore, we are interested in following up the question about the legal form, and what factors that can be presumed to affect the choice of legal form among early stages ventures. The overall objective is to learn from the past and be able to give valuable insights for the creation of a new public support system.

REFERENCES

Almus, M. and E. A. Nerlinger (1999). "Growth of New Technology-Based Firms: Which Factors Matter?" *Small Business Economics*, 13: 141-154.

Anell, E. and P. Nygårds (1999). *Statens åtgärder för fler och växande företag (report written for the Swedish ministry of Industry, Employment and Comminications)*. Stockholm, Näringsdepartementet.

Bennett, R. J. and P. J. A. Robson (2003). *Changing Use of External Business Advice and Government Supports by SMEs in the 1990s.*, Carfax Publishing Company.

Berggren, B., C. Olofsson and L. Silver (2000). "Control aversion and the search for external financing in Swedish SMEs." *Small Business Ecommics*, 15: 233-242.

Bygrave, W. D. and J. A. Timmons (1992). *Venture capital at the crossroads*. Boston Massachusetts, Harvard Business School Press.

Carpenter, R. E. and B. C. Petersen (2002). "Capital market imperfections, high-tech investment, and new equity financing." *The Economic Journal*, 112: f54-72.

Davidsson, P., B. Kirchhoff, A. Hetemi-J and H. Gustafsson (2002). "Emperical Analysis of Business Growth Factors Using Swedish Data." *Journal of Small Business Management*, 40: 332-349.

Davidsson, P., L. Lindmark and C. Olofsson (1996). *Näringslivsdynamik under 90-talet (Business dynamics in the 90s)*. Stockholm, Nutek.

Ds (1994:52). *Småföretagens riskkapital försörjning (small firms and the provision of seed capital)*. Stockholm, Näringsdepartementet.

Ds (2004:36). *Innovativa Sverige - En strategi för tillväxt genom förnyelse (Innovative Sweden, a strategy for growth through renewal)*. Stockholm, Näringsdepartementet och utbildningsdepartementet.

EuropeanCommission (1998). *Risk capital: a key to job creation in the European Union*. Brussels, European Commission.

Grant, R. H. (1996). "Prospering in Dynamically-competitive Environments: Organizational capability as knowledge integration." *Organizational Science*, 7 (4): 375-387.

Harding, R. (2000). "Venture capital and regional development: towards a venture capital system." *Venture Capital: An International Journal of Entrepreneurial Finance*, 2 (4): 287-311.

Harding, R. (2002). "Plugging the knowledge gap: an international comparison of the role for policy in the venture capital market." *Venture Capital: An International Journal of Entrepreneurial Finance*, 4 (1): 59-76.

Heydebreck, P., M. Klofsten and J. C. Maier (2000). "Innovation support for new technology-based firms: the Swedish Teknopol approach." *R&D Management 30*, 1: 89-100.

Jacobsson, S. and C. Oskarsson (1995). "Educational statistics as an indicator of technological activity." *Research Policy*, 24: 127-136.

Jacobsson, S., C. Oskarsson and J. Philipson (1996). "Indicators of technological activities -- comparing educational, patent and R&D statistics in the case of Sweden." *Research Policy*, 25: 573-585.

Jacobsson, S. and J. Philipson (1996). "Sweden's technological profile. What can R&D and patents tell and what do they fail to tell us?" *Technovation*, 26 (5): 245-253.

Karaömerlioglu, D. C. and S. Jacobsson (2000). "The Swedish venture capital industry: an infant, adolescent or grown-up?" *Venture Capital: An International Journal of Entrepreneurial Finance*, 2 (1): 61-68.

Klofsten, M. (1992). *Tidiga utvecklingsprocesser i teknikbaserade företag*. Linköping, Linköping University.

Klofsten, M., M. Jonsson and J. Simón (1999). "Supporting the pre-commercialisation stages of technology-based firms: the effects of small-scale venture capital." *Venture Capital: An International Journal of Entrepreneurial Finance*, 1 (1): 83-93.

Klofsten, M. and Å. Lindholm-Dahlstrand (2000). "Financing Technology-Based New Ventures: Credibility and Value Creation". *New technology-based firms at the turn of the century*. W. During, R. Oakey and M. Kipling, Elsevier Science Ltd.

Lerner, J. (2002). *When Bureaucrats Meet Entrepreneurs: The Design of Effective Public Venture Capital Programmes.*, Blackwell Publishing Limited.

Lindholm-Dahlstrand, Å. (2004). *Teknikbaserat nyföretagande - tillväxt och affärsutveckling*. Lund, Studentlitteratur.

Lindholm-Dahlstrand, Å. and D. Cetindamar (2000). "The dynamics of innovation financing in Sweden." *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol 2, No 3: pp 203-221.

Malerba, F. (2005). "Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors." *Economics of Innovation & New Technology*, 14 (1/2): 63-82.

Malerba, F. and L. Orsenigo (1993). "Technological Regimes and Firm Behavior." *Industrial and Corporate Change*, 2 (1): 45-71.

Mason, C. M. and R. T. Harrison (2002). *Barriers to investment in the informal venture capital sector.*, Taylor & Francis Ltd.

McGlue, D. (2002). "The funding of venture capital in Europe: issues for public policy." *Venture Capital: An International Journal of Entrepreneurial Finance*, 4 (1): pp 45-58.

Neergaard, C. d. (2004). *Bättre finansiering för kommersialisering av innovationer*. NUTEK. Stockholm.

Norrman, C. and M. Klofsten (2005). "Seed funding for innovative ventures: A survey of public finance." *Working paper submitted for Venture Capital: An International Journal of Entrepreneurial Finance (jan. 2005)*:

Norrman, C., M. Klofsten and E. Sundin (2004). What ideas get public innovation support? A survey study of early stage financing of new ventures. 2004 Babson

Kauffman Entrepreneurship Research Conference, University of Stratclyde, Glasgow.

Oakey, R. P. (2003). *Funding innovation and growth in UK new technology-based firms: some observations on contributions from the public and private sectors*.

OECD (2003). *OECD Science, Technology and Industry Scoreboard*.

Patel, P. and K. Pavitt (1991). "Large firms in the production of the world's technology: an important case of "non-globalisation"." *Journal of International Business Studies*, 22 (1): 1-21.

Pavitt, K. (1984). "Sectoral patterns of technical change: Towards a taxonomy and a theory." *Research Policy*, 13 (6): 343-373.

Rickne, A. and S. Jacobsson (1999). "New technology-based firms in Sweden -- a study of their direct impact on industrial renewabl." *Econ. Innov. New Techn.*, 8: 197-223.

SCB (2001). *Statistiska meddelanden UF 84 SM 0201 (Educational attainment and employment of the population 2001-01-01)*. S. Öberg, SCB, Statistics Sweden.

SCB (2002). *SNI 92*, SCB, Statistics Sweden.

SIC *Näring åt Goda idéer - Ansökan om villkorslån (Application form)*. Stockholm, Stiftelsen Innovationscentrum/ Sweden Innovation Centre.

SIC (2002). *Stiftelsen Innovationscentrum 2002 (Sweden Innovation Centre 2002)*. Stockholm, Stiftelsen Innovationscentrum.

SIC (2004). *10 år med Stiftelsen Innovationscentrum (10 years with Sweden Innovation Centre)*. Stockholm, Stiftelsen Innovationscentrum.

Sirilli, G. and R. Evangelista (1998). "Technological innovation in services and manufacturing: results from Italian surveys." *Research Policy*, 27 (9): 881-899.

SOU (1993:70). *Strategi för småföretagsutveckling (strategy for small firm development)*. Allmänna förlaget, Stockholm, Näringsdepartementet.

SOU (1996:69). *Kompetens och kapital (Competence and capital)*. Allmänna Förlaget, Stockholm, Företagsstödsutredningens betänkande.

Storey, D. J. (1994). *Understanding the small business sector*. London, Routledge.

Storey, D. J. and B. S. Tether (1998). "Public policy measures to support new technology-based firms in the European Union." *Research Policy*, 26 (9): 1037-1057.

Zimmerman, M. A. and G. J. f. Zeitz (2002). "Beyound survival: Achieving new venture growth by building legitimacy." *Academy of Management Review*, 27 (3): 414-431.

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8. PAPER THREE: SORTING OUT THE APPLES, PEARS AND FRUIT SALADS IN INCUBATOR PERFORMANCE EVALUATION

ABSTRACT

Incubators are becoming a ubiquitous phenomenon in many parts of the world since they are regarded as solutions to increase the birth rates of technology-based enterprises. Considering the large amounts of money invested in incubators, the identification of best practices is of importance. This requires performance comparisons between incubators using different incubator models. The aim of the paper is twofold: (1) to sort out the key concepts and identify some of the problems inherent in the evaluation and comparison of incubator performance and leading to "apple-and-pear" comparisons and (2) to develop a framework that can serve as a basis for identifying best practice incubator models. We argue that it is necessary to take goal differences between incubators into account if performance instead of outcome is to be measured. Further, we identify the need to distinguish different incubator model from each other. We put forward a framework in which differences with regard to three key incubator model components are emphasised: selection strategies, business support strategies and mediation. Future research includes the empirical testing of this framework. If it proves to be generally useful, it will be applied in best practice studies.

INTRODUCTION

The concept of 'incubator' is often used as an overall denomination for organisations that constitute or create a supportive environment that is conducive to the "hatching" and development of new firms (Chan and Lau, 2005; Lindholm-Dahlstrand and Klofsten, 2002; Lyons and Li, 2003; VINNOVA, 2004). Such incubators are becoming a ubiquitous phenomenon in many parts of the world. Policy makers on national and local levels have come to view them as a tool for promoting the emergence of new technology-based growth firms, economic development and innovativeness. They are used as vitamin injections for 'tired' regions and as contraction-stimulators or painkillers in the birth of university spin-offs.

Considering the great credence for – and the large amounts of money invested in – incubators by governments, universities, research institutions, municipal agencies and other interested parties, the question of what return society gets on these investments has been raised. An important research issue has, therefore, been to describe the 'value-added' of incubators in comparison to other business environments, i.e. their unique contribution to new venture development, survival and growth and entrepreneurship (Chan and Lau, 2005; Phan et al., 2005):

"A recent global increase in the level of activity of these institutions has stimulated an important academic debate concerning whether such property-based initiatives enhance the performance of corporations, universities, and economic regions … and has led to an interest among policymakers and industry leaders in identifying best practises." (Phan et al., 2005, p. 2)

Consequently, the evaluation of incubator performance has attracted some attention (cf. Aernoudt, 2004; Allen and McCluskey, 1990; Bhabra-Remedios and Cornelius, 2003; Chan and Lau, 2005; Grimaldi and Grandi, 2005; Hackett and Dilts, 2004a; Lindelöf and Löfsten, 2004; Mian, 1996a, 1997; Nolan, 2003; OECD, 1997; Pena, 2004; Phan et al., 2005). There does not seem to be much consensus with regards to the definition of 'performance' and how it should be evaluated and compared, however. This might be one explanation why some studies have suggested that business incubation is an effective business development tool (Bollingtoft and Ulhoi, 2005) whereas other studies have found few significant differences between incubatees and off-incubatees (cf. Pena, 2004).

There are large variations between incubators, both in terms of output (traditionally measured as number of new firms, jobs, firm survival, investments etc.) and in terms of how they select and support their incubatees. It seems unlikely that all 'incubator models', i.e. different ways to organise and manage incubators, have the same potential to perform well. Comparing incubatees with off-incubator ventures is, therefore, not enough if we are to help policy makers to make resource allocation decisions, ventures to choose which incubators to apply to, and incubator managers to design selection criteria and support systems. In order to be able to identify best practices, we need to identify and compare the performance of incubators using different models.

The lack of a theoretical base for incubator performance evaluation was recognised almost ten years ago (cf. Mian, 1997), but only little effort seems to have been made to deal with this problem in recent years. *The aim of this paper is, therefore, to sort out a number of problems inherent in the evaluation and comparison of incubator performance and to develop a framework that can serve as a basis for identifying best practice incubator models.* We argue that there is an immediate risk of comparing apples with pears – or, rather, different types of fruit salads – making it extremely difficult and deceptive to draw any conclusions concerning best practices. Based on entrepreneurship and innovation systems research as well as on personal experiences of business incubation, we first illustrate the importance of distinguishing between different types of incubators before making performance evaluations and comparisons, and then illustrate how such distinctions can be made.

IN SEARCH OF A DEFINITION OF 'INCUBATOR'

Generally an incubator can be viewed as "… a support environment for start-up and fledgling companies" (Peters et al., 2004, p. 83). In the incubator literature, a large number of detailed and largely similar definitions have been put forward.[48] Four components have received particular attention in previous research:[49]

1. shared office space, which is rented under more or less favourable conditions to incubatees,
2. a pool of shared support services to reduce overhead costs,
3. professional business support or advice ("coaching") and
4. network provision, internal and/or external.[50]

The relative importance of each component has varied over time, from an initial focus on facilities and administrative services to a more recent emphasis on the importance of business support (Peters et al., 2004). In our opinion the latter is the most important – without business support activities, the denomination "hotel" is a better description than incubator – but we nevertheless cannot agree with those who argue that co-location is not a necessary feature of an incubator (e.g. Nolan, 2003; von Zedwitz, 2003). In contrast, we are convinced that the use of shared localities is an important advantage, since it besides shared overhead resources also provides opportunities for knowledge transfer and experience sharing between the incubatees (see also Lewis, 2001).

Despite the apparent similarities between different definitions, the incubator concept has shown to be anything but clear in practice: "… there has been a recurring problem of definitions in which science parks and incubators can encompass almost anything from distinct organisations to amorphous regions" (Phan et al., 2005, p. 168). One source of confusion could be the lack of clarity with regards to whether an incubator is an organisation or a more general entrepreneurial environment. For example, in a often cited article by Autio and Klofsten (1998), the business network SMIL is compared to the business incubator Spinno. We have therefore chosen to reserve the concept of incubator for *organisations* dedicated to the support of emerging ventures.

[48] For a very detailed overview of present definitions, see Hackett and Dilts (2004b)

[49] One or more of these are mentioned in the following studies: Aernoudt (2004), Allen and McCluskey (1990), Bollingtoft and Ulhoi (2005), Brooks (1986), Chan and Lau (2005), Clarysse et al. (2005), Collinson and Gregson (2003), Colombo and Delmastro (2002), Hackett and Dilts (2004a; 2004b), Hansen et al. (2000), Hsu et al. (2003), Lyons and Li (2003), Mian (1996a), Nolan (2003), Peters et al. (2004), Phillips (2002), Rice (2002), Rothschild and Darr (2005), Smilor (1987), VINNOVA (2004) and von Zedtwitz (2003).

[50] To these basic components, Aernoudt (2004), Brooks (1986) and von Zedtwitz (2003) add access to or assistance in acquiring seed and/or venture capital.

Another possible source of confusion is the lack of specification with regard to what part of the venture development process is considered. Bhabra-Remedios and Cornelius (2003) identify the possibility to differentiate between different types of incubators based on the development stage of the firms on which they are focusing: start-ups, business development or maturity. Most researchers seem to agree that incubation is related to the early phase of a ventures life (see, e.g., Aernoudt, 2004; Bhabra-Remedios and Cornelius, 2003; Grimaldi and Grandi, 2005; Hackett and Dilts, 2004a; Lindelöf and Löfsten, 2004). In order to qualify the concept of early phase, we follow the work of Klofsten (1992; 2005), who separates between two stages in the development of new ventures (see Figure 1): pre-commercialisation and commercialisation. In the first stage, the aim is to reach a "launching platform", where the idea is concrete enough to be communicated to others and there is agreement on its marketability. If successful, the idea enters the commercialisation stage, where the next step is to reach a "business platform" (Klofsten, 2005), where the firms has secured an input of resources and developed an ability to manage and utilise these resources.[51]

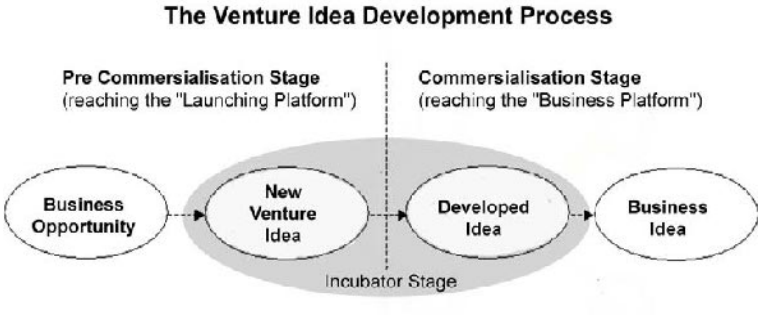

Figure 1: The venture development process. (Adapted from Klofsten (2005))

As is indicated by the shaded part in Figure 1, most incubators are concerned with ventures whose ideas are approaching the launching platform, but have not yet reached a fully established business platform. This corresponds well to the conclusion of Brooks (1986) that incubation should be aimed at bridging or closing the gap between the new venture idea and the developed idea, or in his wording: "the attempt stage".[52] Consequently, the incubator concept should not be used for organisations such as science parks and technology parks, which are generally designed for the support of much more mature ventures.

[51] For a more detailed discussion of the 'business platform' concept, see Davidsson and Klofsten (2003).
[52] With regards to the lower limit to the scope of incubators, incubators may be less likely to concentrate on the first-day entrepreneur than, e.g., business angels (von Zedwitz, 2003).

In summary, in this paper the concept of incubator is reserved for organisations that supply joint location, services, business support and networks to early stage ventures.

TODAY'S "MODEL" OF INCUBATOR PERFORMANCE EVALUATION

According to our knowledge, Allen and McCluskey (1990) provided the first systematic overview of incubator performance literature. They identified the need for increased conceptual clarity with regard to incubator development in general and incubator performance in particular. During the 1990s, several researchers attempted to address the issue of incubator performance, but no single evaluation framework was developed (Mian, 1997). According to later reviews, there is still a lack of "… a complete evaluation framework that will allow for benchmarking activities and outcomes" (Bhabra-Remedios and Cornelius, 2003, p. 12; see also Lindelöf and Löfsten, 2004), which according to some researchers is due to difficulties with regards to defining the "nature of performance" (Nolan, 2003; Phan et al., 2005).

However, putting together all the fragmented efforts within the incubator performance evaluation field, an implicit model emerges (see Figure 2). The two parts of the model – incubator goals and incubator performance – are discussed to a greater or lesser extent by most researchers.

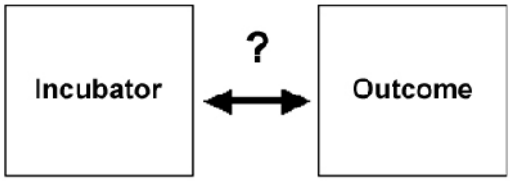

Figure 2: Today's implicit model of incubator performance evaluation

Above, incubators were described as organisations providing support to new ventures. *Incubator goals* refer to what incubator stakeholders expect the incubators to achieve by providing such support. *Incubator performance* refers to the extent to which incubator outcomes correspond to goals. We thus, make a difference between outcome and performance, where the latter is a relative measure taking expected outcomes (i.e. goals) into account.

Many previous studies have been concerned with identifying criteria and indicators to evaluate incubator performance. For example, in a study of 127 US incubators Allen and McCluskey (1990) used three criteria: occupancy, jobs created and firms graduated. In addition to these, Phillips (2002) included indicators such as tenant revenues, number of patent applications per firm and number of discontinued businesses in her

comparison between different types of incubators in the US. These are only a couple of examples of the larger number of papers identifying lists of performance evaluation criteria (cf. Chan and Lau, 2005; Colombo and Delmastro, 2002; OECD, 1997). Perhaps the most comprehensive list was provided by Mian (1996a; 1996b; 1997), who added management policies and their effectiveness as well as services and their value added to the list of 'ordinary' performance outcomes.[53] However, in most studies such criteria have been used without regard to the goals of the studied incubators. In our wording, they, thus, measure *outcome* rather than performance. This is problematic since comparisons based on such measures are valid only to the extent that the studied incubators are homogenous with regards to goals.

However, such homogeneity is rare. Some incubators aim at accelerating the development of new firms, others at commercialising research from universities and institutes. Some incubators are set up by real estate owners with over-capacity, while others are set up by local authorities in order to give new life to tired regions. The list can be made long. That incubators differ in terms of goals is often recognised by incubator researchers. For example, they have earlier concluded that "no two incubators are alike" (Allen and McCluskey, 1990, p. 64), that incubators "articulate objectives differently depending upon their sponsor's interests" (Mian, 1996b, p. 194) and that "goals vary from one organisation to another" (Bhabra-Remedios and Cornelius, 2003, p. 11). They have also recognised that different incubators have "unique origins and characteristics including goals" [Mian, 1997 #8, p. 263], or at least make "different priorities" within the same basic goals (Bollingtoft and Ulhoi, 2005).

It is, thus, surprising that when it comes to evaluating incubator performance all incubators are usually examined as if they have the same outcome objectives (Bearse, 1998; Sherman, 1999). As an illustration, Aernoudt (2004) makes clear distinctions between different kinds of business incubators and points out the deficiencies of mixing them up, yet without taking this into further consideration in her results.

The problem is of course that different goals correspond to different outcome indicators. If the goal is to create jobs, growth in sales is probably not the best indicator since it is not necessarily coupled to number of employees. On the other hand, it might be an excellent indicator for an incubator striving to commercialise research ideas. To compare incubators with different goals using the same indicator is, hence, like comparing apples with pears.

To further complicate things, incubators may have multiple goals. To a large extent, this is due to the fact that incubators may have multiple stakeholders with differing

[53] In addition, some researchers list more general types of 'incubator characteristics' without clearly stating whether these characteristics influence performance or not (cf., e.g., Grimaldi and Grandi, 2005).

interests (OECD, 1997). This implies that we are not only in the danger of comparing apples to pears – in the worst case, we can make ourselves guilty of comparing different types of fruit salads.

It may, however, be argued that the goal of the incubator may be irrelevant for the evaluator and that the outcome in itself, thus, is a good enough measure. For example, people that are interested in job creation would presumably be satisfied with identifying those incubators that produce the largest number of jobs, regardless of whether this is the incubators' goal or not. Since we are primarily concerned with evaluations and comparisons that aim at identifying best practices, we however argue that measures of outcomes are of limited value by themselves. If we fail to control for goal differences, we have no way of explaining differences in outcomes, to find out if they are, in fact, the result of differences in practices or merely of differences in focus.

As recognised by Mian (1997) "evaluation of performance or outcomes requires that the alternative programs are relatively well defined, with substantially similar aims but clearly differentiated strategies for attaining them" (Mian, 1997, p. 261). This implies that, in order to identify best practices, we not only need to control for goal differences, but also have to be able to distinguish between different incubator models, i.e. *how* or *in what way* incubators support new ventures. The aim is to compare the performance of different models, i.e. their outcomes in relation to some predefined goal. However, although several researchers have discussed the importance of incubator management and identified the need for finding best practices (cf. Autio and Klofsten, 1998; Colombo and Delmastro, 2002; Hannon, 2003; Mian, 1997), to our knowledge no one has explicitly dealt with the issues of how incubator support is currently provided and how incubators differ in this respect.

To sum up, in most incubator performance evaluations, incubators are regarded as more or less generic with regards both to *what* they strive to achieve and *how* they organise themselves in order to achieve it. It, thus, implies an immediate risk of comparing incompatible entities and does not support the identification of best practice incubator models. Our conclusion is that when best practice identification is the issue, we need a way to distinguish between incubators with different goals and models if we are to avoid making "apple and pear" comparisons.

DISTINGUISHING BETWEEN DIFFERENT INCUBATORS

To categorise incubators is not an obvious task (OECD, 1997), and a number of previous efforts have been made (see the comprehensive review by Hackett and Dilts (2004b)). Most of these have got their merits, but when it comes to evaluation, comparison and best practice identification, they are useful only if goals and incubator models are homogeneous within each category. According to our experience, this is seldom the case. In the following, we will therefore suggest some bases for making

distinctions based primarily on incubator model features, but also taking differences in goals into account. Our framework is summarised in Figure 3.

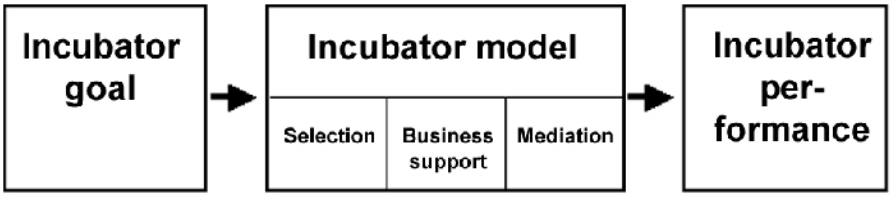

Figure 3, The proposed framework for incubator performance evaluation

DECODING INCUBATOR GOALS

Some of the categorisations mentioned above take their departure in the overall purpose of the incubators. Two main principles have been used. The first is based on ownership and governance and makes a distinction between for-profit[54] and non-for-profit incubators (see, e.g., Bollingtoft and Ulhoi, 2005; Lyons and Li, 2003; Peters et al., 2004). The second is based on the overall focus of the incubator in terms of how it expects to influence its larger environment. A common distinction is that between (a) incubators that aim at enhancing economic development and/or reduce unemployment in a region by facilitating the start-up of new companies, increasing their survival rate and growth and, more generally, by training entrepreneurs, and (b) incubators that aim at stimulating firms involved in emerging technologies or the commercialisation (or transfer) of research done in universities, research institutes and firms (see, e.g., Bhabra-Remedios and Cornelius, 2003; Mian, 1997; Nolan, 2003; OECD, 1997; Peters et al., 2004; Phillips, 2002; Sherman, 1999). Several other attempts have also been made with features of both these categorisation principles (see, e.g., Aernoudt, 2004; Grimaldi and Grandi, 2005; von Zedwitz, 2003).

With only a few exceptions (Bearse, 1998; Brooks, 1986), these categorisations do not seem take into account that goals may differ within these categories and that incubators may have mixed goals. Constructing a multitude of categories in order to cover all possibilities cannot be recommended, though. Instead, we suggest researchers to follow the advice of Bearse (1998) and let classifications fall out of the data. This implies that categories defined for other purposes or evaluations should be avoided (Bearse, 1998). Comparisons should then, preferably, only be made between incubators that fall into the same class, but at the very least evaluators should weight outcome indicators differently for different classes (Bearse, 1998).

Decoding the goals of an incubator requires the researcher to identify incubator owners, board members, financiers etc. and ferret out their agendas. This is, of course,

[54] Here we also include real-estate incubators.

not an easy task to undertake, especially since the 'explicit' goals stated by incubator managers in, for example, official documents, interviews and applications for funding usually only reflect part of the picture. There are plenty of examples of incubators trying to portray themselves from the best possible angle with regards to whatever they believe that the recipient will value. For example, in a study by Mian (1997), all four incubators stated that their goal was to "seek participation in the state's economic development activities". Is this statement likely to reflect the true goal(s) of these incubators?

If it is impossible to identify incubator goals, we suggest that researchers instead could consider the incubators' portfolios of incubatees and compare incubators with similar portfolios. Even if such comparisons do not allow the identification of best practices in relation to a particular goal, it at least gives some indications on how best to support a particular type of venture portfolio. If incubators do not even have portfolios with similar characteristics, the conclusion must be that comparisons are fruitless since "a comparative evaluation approach is justifiable only when programs are truly comparable" (Mian, 1997, p. 261).

DEVELOPING THE 'INCUBATOR MODEL' CONCEPT

As mentioned above, little has been written with regards to incubator models, i.e. how and in what way incubators provide their support. From the reviewed literature, we can however discern the main components of such models:[55] *Selection* refers to decisions concerning which ventures to accept for entry and which to reject. *Infrastructure* consists of 'administrative' services. *Business support* is associated with coaching/training activities. *Mediation* refers to how the incubator connects the incubatees to each other and to the outside world. Finally, *graduation* is related to exit policies, i.e. decisions concerning under what circumstances incubatees should leave the incubator.

However, not all of these are equally important when separating different incubator models from each other. Judging from earlier research, most incubators seem to supply more or less the same set of general administrative services, including shared office space and equipment as well as facilities-related services and office services such as reception and clerical services (Bollingtoft and Ulhoi, 2005; Chan and Lau, 2005; Colombo and Delmastro, 2002; Lalkalka, 2003; Lyons and Li, 2003; Mian, 1996a; Rice, 2002). Furthermore, we have not seen any reference in the literature to substantial differences with respect to graduation policies. We, therefore, suggest that selection, business support and mediation are the main distinguishing components of incubator models.

[55] See e.g. Soetanto (2004), Hackett and Dilts (2004b) and Peters et al. (2004).

SELECTION

According to Hackett and Dilts (2004b), most of what has been done concerning incubator models is related to the issue of incubatee selection. Researchers seem to agree that selection is an important incubator management task (e.g. Colombo and Delmastro, 2002; Lumpkin and Ireland, 1988; Peters et al., 2004), since it is the basis for effective resource allocation, with respect both to individual incubators (Lumpkin and Ireland, 1988) and to the general economy (Hackett and Dilts, 2004b). The task of identifying firms that are "weak-but-promising", while avoiding those that cannot be helped through business incubation as well as those that do not need incubation, is a challenge which requires "a sophisticated understanding of the market and the process of new venture formation" (Hackett and Dilts, 2004b, p. 61; cf. also Lumpkin and Ireland, 1988).

Opinions differ, however, with regards to what the appropriate selection criteria are, which perhaps explains why different incubators put different emphasis on different criteria (cf. Lumpkin and Ireland, 1988). Available options include the prior employment experience and technical expertise of the entrepreneur or the venture team, the properties of the market the venture is aiming at, the properties of the product or service and the profit potential of the venture (Hackett and Dilts, 2004b). In principle, these may be divided into two overall approaches: selection focused primarily on the idea and selection focused primarily on the entrepreneur(s). In order to pursue an idea-focus approach, incubator managers must have access to deep knowledge in relevant technological fields in order to evaluate the viability of ideas, i.e. the product, the market and the profit potential related to the combination of these. The entrepreneur-focus approach, in contrast, requires knowledge of more general business development requirements in relation to which the experience, skills and characteristics of entrepreneurs may be evaluated.

However, selection is not only a matter of criteria – it is also a matter of flexibility or strictness in applying them. We may here distinguish between two basic approaches. In the "picking-the-winners" approach, incubator managers try to identify a few successful ventures ex ante. When this approach is taken to its extreme, incubators resemble private venture capital firms. In the "survival-of-the-fittest" approach, incubator managers apply less rigid selection criteria, take on a larger number of firms and rely on markets etc. to provide the selection processes that over time will separate winners from losers.[56]

If we combine these two types of approaches of the selection component, we get four "selection strategies" (see figure 4), which are likely to result in very different

[56] These approaches have some common features with Clarysse et al.'s (2005) different "models of spinout activities".

incubator "portfolios" of incubatees. With a "survival-of-the-fittest idea" strategy, the incubator portfolio will presumably consist of a quite large number of ventures related to one or a few technological fields. With a "survival-of-the-fittest-entrepreneur" strategy, the incubator portfolio will be much more diversified, with ventures representing many different knowledge areas. A "picking-the-winning-ideas" strategy is likely to result in a highly niched portfolio of a few firms within a quite narrow technological area. Finally, a "picking-the-winning-entrepreneur" strategy, incubatee ventures will be lead by a few handpicked entrepreneurs on which incubator managers have high hopes.

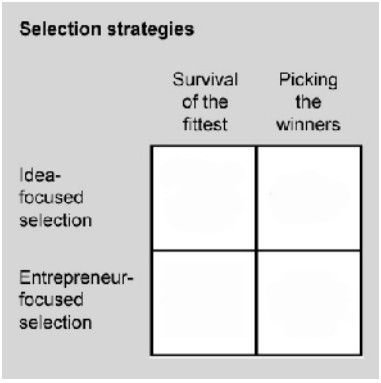

Figure 4, Selection strategies

BUSINESS SUPPORT

The importance of providing business support in addition to more general administrative services has been emphasised in recent incubator literature, and different researchers have made a number of descriptions of the types of services and support provided by incubators to incubatees. The business support services generally identified include advice and services concerning general business matters such as accounting, legal matters and advertising, financial assistance, entrepreneurial training and business development services (Bollingtoft and Ulhoi, 2005; Chan and Lau, 2005; Lalkalka, 2003; Lyons and Li, 2003; Mian, 1996a). Those of most concern to us here are those related to business development and entrepreneurial training, including coaching and education related to business planning, leadership and marketing.

As has been noted by, e.g. Bhabra-Remedios and Cornelius (2003), the success of incubator tenants is not only dependent on the nature of these services, but also on how they are supplied. Hackett and Dilts (2004a) observe that business assistance approaches may differ with regards to time intensity (percentage of working hours devoted to monitoring and assisting incubatees), comprehensiveness (the degree to which assistance include strategic and operational assistance as well as administrative-related services) and degree of quality (the relative value of the assistance). A more

general approach is that of Rice (2002), who distinguishes between different types of counselling:

1. *Reactive and episodic counselling*, which is entrepreneur-initiated – the entrepreneur requests help dealing with a crisis or problem and the assistance is focused on this problem and is generally of limited duration)
2. *Proactive and episodic counselling*, which is incubator-initiated – the manager engages entrepreneurs in informal, ad hoc counselling, which may be referred to as "counselling by walking around"
3. *Continual and proactive counselling*, which is incubator-initiated – the venture is subjected to an ongoing review and "intense-aggressive" intervention by incubator managers.

These categories differ with respect to whom the initiator is (the entrepreneur or the incubator staff) and to the support intensity or continuity. According to our opinion, what both these dimensions come down to in the end is the view of the incubator's role in the incubation process. Incubators may, then, be placed on a scale depending on the extent to which they see themselves as managers of the incubation process or as external facilitators of a process primarily managed by the incubatees themselves. At the one extreme, which we call baby-sitting, ventures are guided through the incubation process by the steady hand of the incubator staff and its advisors. To use a citation from Leleux (2001) "it is not lawn tennis at Wimbledon; it is more like mud rugby at Landsdown Road. You are in the dirt with your entrepreneur all day long." At the other extreme, which we call laissez-faire, incubatees are left entirely to themselves and are provided with very little assistance.

MEDIATION

In order to explain the concept of 'mediation', we take our departure in the innovation system approach. This part of the literature on innovation emphasises that innovation processes are not primarily the concern of individual actors, but instead involve a variety of feedback loops between activities and take place within broader *innovation systems* consisting of actors, networks and institutions (Breschi and Malerba, 1997; Carlsson and Stankiewicz, 1995; Edquist, 1997; Freeman, 1995; Jacobsson and Johnson, 2000; Lundvall, 1992; Nelson, 1992). These may be found on different system levels – technology, sector, region and/or nation – and may be prominent features of the selection environment (Johnson and Jacobsson, 2001).

As the incubation process, consequently, transcends the incubator (Hackett and Dilts, 2004a), one important incubator role is to act as an intermediary – or mediator – between incubatees and relevant innovation systems (Peters et al., 2004). The incubator thereby provides a "bridge" between the incubatee and its environment (Merrifield,

1987), with the purpose of leveraging entrepreneurial talent and/or resources (Bollingtoft and Ulhoi, 2005; Grimaldi and Grandi, 2005).[57]

Two dimensions of this role have been described in earlier literature. First, incubators may engage in *network mediation*, i.e. matching incubatees with other actors (Brooks, 1986; von Zedwitz, 2003), with the purpose of compensating for the incubatees' lack of established entrepreneurial networks (Peters et al., 2004; Smilor, 1987; von Zedwitz, 2003).[58] Such networks may provide information, knowledge and expertise that are vital for the survival of new ventures and may also reduce the uncertainty they experience (Collinson and Gregson, 2003). Networks can emerge between incubatees and external actors, such as potential customers, partners, employees, university researchers and financiers (cf. Bollingtoft and Ulhoi, 2005; Clarysse et al., 2005; Hackett and Dilts, 2004b). There is, however, also an 'inherent' potential for interaction between incubatees, which is of importance for, e.g., social capital building and the development of agglomeration economies (Aernoudt, 2004; Bhabra-Remedios and Cornelius, 2003; Bollingtoft and Ulhoi, 2005; Brooks, 1986; Collinson and Gregson, 2003; Colombo and Delmastro, 2002).

Second, incubators may engage in *institutional mediation*, i.e. mediating the impacts of institutions on incubatees (Hackett and Dilts, 2004b). Through mediation, incubators may help incubatees to understand, interpret and perhaps even influence the institutional demands introduced by regulations, laws, traditions, values, norms and cognitive rules.[59] They may also increase the visibility, credibility and understandability of incubatees in the eyes of external actors, thereby helping incubatees obtain legitimacy and social acceptance (Bollingtoft and Ulhoi, 2005; Collinson and Gregson, 2003; Smilor, 1987; see also Suchman, 1995; and Zimmerman and Zeitz, 2002).

There is evidence that some incubators' mediation activities are limited to certain regions, whereas other incubators work on a more international scale within a limited technological field (cf. Carayannis and von Zedwitz, 2005; Clarysse et al., 2005). We, therefore, suggest that it is fruitful to distinguish incubators based on the type of innovation system they primarily connect to: regional innovation systems (RIS) or technological/sectoral innovations systems (TIS/SIS). In the case of cluster formation these two categories overlap. Until it has been verified through empirical studies

[57] Critical resources include, e.g., knowledge and technology, financial capital, market related resources and human capital (see, e.g., Begley et al., 2005; Bollingtoft and Ulhoi, 2005; Hindle and Yencken, 2004; Mian, 1996a; Rice, 2002; Rickne, 2000).

[58] We have chosen the concept of 'network mediation' instead of the more commonly used 'networking' in order to distinguish the intermediary role of the incubator from its activities to build a network from which it can source expertise for its business support activities. The latter may, however, be an important basis for the former; incubators usually use their 'incubator network' in their mediation role.

[59] For a comprehensive overview of different types of institutions, see Scott (1995).

whether the technological or the regional dimension is the more important, we recommend that clusters be treated as a third category.[60]

SUMMARY AND CONCLUSIONS

The aim of this paper was to sort out some of the problems leading to "apple-and-pear" comparisons in incubator performance evaluation and comparison and to develop a framework that can serve as a basis for identifying best practice incubator models.

In summary, most researchers seem to follow an implicit "model" for incubator performance evaluation that has two main deficiencies. First, most studies fail to take incubator goals into consideration and, thus, measure outcome rather than performance. Second, the issues of how incubator support is currently provided, i.e. which incubator models that are used, and how incubators differ in this respect are usually neglected. These deficiencies imply an immediate risk of comparing incompatible entities, i.e. apples, pears or different types of fruit salads, making it extremely difficult and deceptive to draw any conclusions concerning best practices.

In order to avoid these problems, we recommend researchers who aim at identifying best practices to take into account that incubators are different by letting classes of incubators "fall out" of the data and evaluating each class using different performance criteria. In addition, incubators need to be categorised with respect to the models they use if best practises are to be identified. We, therefore, suggest that different incubators may be distinguished from each other by using three key incubator model components – selection strategies, business support strategies and mediation.

With respect to selection, we put forward a four-field categorisation matrix consisting of the following strategies: picking-the-winning-idea, picking-the-winning-entrepreneur, survival-of-the-fittest-idea and survival-of-the-fittest-entrepreneur. We also suggest that *business support* strategies may be positioned on a scale from a "laissez-faire" strategy to a "baby-sitting" strategy. Finally, we make a distinction between *mediation* focused on regional innovation systems, technological innovation systems and clusters respectively.

It should be noted that the distinctions suggested above are yet to be confirmed empirically. As the next step, we will therefore analyse applications for government funding from a population of approximately 40 incubators, which contain detailed information on stakeholders, goals and models. This information will be complemented by interviews with incubator managers and incubatees. However, we

[60] According to some researchers, incubators have a close connection with clusters and may even serve as catalysts or accelerators of cluster formation (Carayannis and von Zedwitz, 2005). Others have found that being located in a strong cluster may improve incubator performance (Hsu et al., 2003).

have already received comments from a number of incubator managers, who feel comfortable with the proposed categorisations and find them useful as a tool to communicate their chosen strategies and models.

If the framework proves to be generally useful, we will apply it in studies of the relationship between incubator model and performance. Opinions have been put forward that there is one best practice model that suits all types of incubators. For example, Hackett and Dilts (2004a) claim that the more incubators behave like venture capitalist firms and the more intense their business support is, the better incubator performance can be expected. In contrast, our hypothesis is that there is room for several different models, suiting different contexts, and that the important thing is the alignment between incubator model and incubator goals as well as within the model (between selection, business support and mediation strategies). If this hypothesis is confirmed, the framework may also be used as a diagnostic instrument to evaluate alignment within incubators.

REFERENCES

Aernoudt, R., 2004. Incubators: Tool for Entrepreneurship? Small Business Economics. 23, 127-135.

Allen, D. N., McCluskey, R., 1990. Structure, policy, services, and performance in the business incubator industry. Entrepreneurship: Theory & Practice. 15 (2), 61-77.

Autio, E., Klofsten, M., 1998. A Comparative Study of Two European Business Incubators. Journal of Small Business Management. 36 (1), 30-43.

Bearse, P., 1998. A Question of Evaluation: NBIA's Impact Assessment of Business Incubators. Economic Development Quarterly. 12 (4), 322-333.

Begley, T. M., Tan, W.-L., Schoch, H., 2005. Politico-Economic Factors Associated with Interests in Starting a Business: A Multi-Country Study. Entrepreneurship Theory and Practice. 29 (1), 35-55.

Bhabra-Remedios, R. K., Cornelius, B. (2003): Cracks in the Egg: improving performance measures in business incubator research. Paper presented at the Small Enterprise Association of Australia and New Zealand 16th annual Conference, Ballarat, 28 September-1 October 2003.

Bollingtoft, A., Ulhoi, J. P., 2005. The networked business incubator--leveraging entrepreneurial agency? Journal of Business Venturing. 20 (2), 265-290.

Breschi, S., Malerba, F., 1997. Sectoral Innovation Systems: Technological Regimes, Schumpeterian Dynamics and Spatial Boundaries, in: Edquist, C. (Ed.), Systems of Innovations. Technologies, Institutions and Organizations. Pinter Publishers, London, pp.

Brooks, O. J., 1986. Economic Development Through Entrepreneurship: Incubators and the Incubation Process. Economic Development Review. 4 (2), 24.

Carayannis, E. G., von Zedwitz, M., 2005. Architecting gloCal (global-local), real-virtual incubator networks (G-RVINs) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: lessons learned and best practices from current development and business incubation practices. Technovation. 25 (2), 95-110.

Carlsson, B., and, Stankiewicz, R., 1995. On the Nature, Function and Composition of Technological Systems, in: Carlsson, B. (Ed.), Technological systems and economic performance: the case of factory automation. Kluwer Academic Publishers, Dordrecht, pp. 21-56.

Chan, K. F., Lau, T., 2005. Assessing technology incubator programs in the science park: the good, the bad and the ugly. Technovation. 25 (10), 1215-1228.

Clarysse, B., Wright, M., Lockett, A., Velde, E. V. d., Vohora, A., 2005. Spinning out new ventures: a typology of incubation strategies from European research institutions. Journal of Business Venturing. 20 (2), 183-216.

Collinson, S., Gregson, G., 2003. Knowledge networks for new technology-based firms: an international comparison of local entrepreneurship promotion. R&D Management. 33 (2), 189-208.

Colombo, M. G., Delmastro, M., 2002. How effective are technology incubators?: Evidence from Italy. Research Policy. 31 (7), 1103-1122.

Davidsson, P., Klofsten, M., 2003. The Business Platform: Developing an Instrument to Gauge and to Assist fhe Development of Young Firms. Joumal of Small Business Management. 41 (1), 1-26.

Edquist, C., 1997. Systems of Innovation Approaches - Their Emergence and Characteristics, in: Edquist, C. (Ed.), Systems of Innovation: Technologies, Institutions and Organizations. Pinter Publishers, London, pp. 1-35.

Freeman, C., 1995. The 'National System of Innovation' in historical perspective. Cambridge Journal of Economics. 19 (1), 5-24.

Grimaldi, R., Grandi, A., 2005. Business incubators and new venture creation: an assessment of incubating models. Technovation. 25 (2), 111-121.

Hackett, S. M., Dilts, D. M., 2004a. A Real Options-Driven Theory of Business Incubation. Journal of Technology Transfer. 29 (1), 41-54.

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

Hannon, P. D., 2003. A conceptual development framework for management and leadership learning in the UK incubator sector. Journal of Education and Training. 45 (8/9), pp 449-460.

Hansen, M. T., Chesborough, H. W., Nohira, N., Sull, D. N., 2000. Networked Incubators Hothouses of the New Economy. Harvard Business Review. 78 (5), 74-84.

Hindle, K., Yencken, J., 2004. Public research commercialisation, entrepreneurship and new technology based firms: an integrated model. Technovation. 24 (10), 793-803.

Hsu, P., Shyu, J. Z., Yu, H., Yuo, C., Lo, T., 2003. Exploring the interaction between incubators and industrial clusters: the case of the itri incubator in Taiwan. R&D Management. 33 (1), 79-90.

Jacobsson, S., Johnson, A., 2000. The Diffusion of Renewable Energy Technology: An Analytical Framework and Key Issues for Research. Energy Policy. 28 (9), 625-640.

Johnson, A., Jacobsson, S., 2001. Inducement and Blocking Mechanisms in the Development of a New Industry: The Case of Renewable Energy Technology in Sweden, in: Coombs, R., Green, K., Walsh, V., Richards, A. (Ed.), Technology and the Market: Demand, Users and Innovation. Edward Elgar, Cheltenham/Northhampton, pp. 89-111.

Klofsten, M. (1992): Tidiga utvecklingsprocesser i teknikbaserade företag. Department of Management and Economics. Linköping University, Linköping.

Klofsten, M., 2005. New Venture Ideas: An Analysis of their Origin and Early Development. Technology Analysis & Strategic Management. 17 (1), 105-119.

Lalkalka, D. (2003): Current Trends in Business Incubation. Paper presented at the The Africa Regional Conference on Business Incubation, Bagamayo, Tanzania, 2-4 December, 2003.

Leleux, B. (2001): The long and winding road of business incubation. Interviewed by Alan McCluskey for Connected Magazine, J. t.

Lewis, D. A. (2001): Does technology incubation work? A Critical Review. Reviews of Economic Development Literature and Practice, No. 11. U.S. Economic Development Administration, Dep. of Commerce, Washington D. C.

Lindelöf, P., Löfsten, H. (2004): Teori och metoder för val av indikatorer för inkubatorer (Theory and methods for the choice of indicators for incubators). No. 138. Institute for Management for Innovation and Technology (IMIT), Göteborg, Sweden.

Lindholm-Dahlstrand, Å., Klofsten, M., 2002. Growth and Innovation Support in Swedish Science Parks and Incubators, in: Oakey, R., During, W., Kauser, S. (Ed.), New Technology-Based Firms at the new millenium. EIsevier Science, Oxford, pp. 31-46.

Lumpkin, J. R., Ireland, R. D., 1988. Screening practices of new business incubators: The evaluation or critical success factors. American Journal of Small Business. 12 (4), 59-81.

Lundvall, B.-Å. 1992. Introduction, in: Lundvall, B.-Å. (Ed.), National Systems of Innovation - toward a Theory of Innovation and Interactive Learning. Pinter Publishers, London, pp. 1-19.

Lyons, T. S., Li, S. (2003): The State of the Wisconsin Incubation Industry in 2002: An Analysis of the Results of the Survey of Membership. Report prepared for The Wisconsin Business Incubation Association.

Merrifield, D. B., 1987. New Business Incubators. Journal of Business Venturing. 2 (3), 277-284.

Mian, S. A., 1996a. Assessing value-added contributions of university technology business incubators to tenant firms. Research Policy. 25 (3), 325-335.

Mian, S. A., 1996b. The university business incubator: A strategy for developing new research/technology-based firms. The Journal of High Technology Management Research. 7 (2), 191-208.

Mian, S. A., 1997. Assessing and managing the university technology business incubator: An integrative framework. Journal of Business Venturing. 12 (4), 251-285.

Nelson, R. R., 1992. National Innovation Systems: A Retrospective on a Study. Industrial and Corporate Change. 1 (2), 347-374.

Nolan, A., 2003. Public policy on business incubators: an OECD perspective. Journal of Entrepreneurship and Innovation Management. 3 (1/2), 22-30.

OECD (1997): Technology incubators: nurturing small firms. No. OCDE/GD(97)202. OECD, Paris.

Pena, I., 2004. Business Incubation Centres and New Firm Growth in the Basque Country. Small Business Economics. 22 (3/4), 223-236.

Peters, L., Rice, M., Sundararajan, M., 2004. The Role of Incubators in the Entrepreneurial Process. Journal of Technology Transfer. 29 (1), 83-91.

Phan, P. H., Siegel, D. S., Wright, M., 2005. Science parks and incubators: observations, synthesis and future research. Journal of Business Venturing. 20 (2), 165-182.

Phillips, R. G., 2002. Technology business incubators: how effective as technology transfer mechanisms? Technology in Society. 24 (3), 299-316.

Rice, M. P., 2002. Co-production of business assistance in business incubators: an exploratory study. Journal of Business Venturing. 17 (2), 163-187.

Rickne, A. (2000): New Technology-Based Firms and Industrial Dynamics. Evidence from the Technological System of Biomaterials in Sweden, Ohio and Massachusetts. Department of Industrial Dynamics. Chalmers University of Technology, Göteborg.

Rothschild, L., Darr, A., 2005. Technological incubators and the social construction of innovation networks: an Israeli case study. Technovation. 25 (1), 59-67.

Scott, W. R., 1995. Institutions and Organizations. Sage Publications, Thousand Oaks.

Sherman, H. F., 1999. Assessing the intervention effectiveness of business incubation programs on new business start-ups. Journal of Developmental Entrepreneurship. 4 (2), 117-133.

Smilor, R. W., 1987. Commercializing technology through new business incubators. Research Management. 30 (5), 36-41.

Soetanto, D. P. (2004): Research of the role of the incubation policy in helping the growth of new technology based firm. Paper presented at the Globelics Academy 2004, Lisbon, May 25 - June 3 2004.

Suchman, M. C., 1995. Managing Legitimacy: Strategic and Institutional Approaches. Academy of Management Review. 20 (3), 571-610.

VINNOVA (2004): Vad är en inkubator? URL: http://www.vinnova.se/Main.aspx?ID=650668d5-85bb-4048-bab4-1aa41c5d032e. (Acc. 2004-07-05).

von Zedwitz, M., 2003. Classification and management of incubators: aligning strategic objectives and competitive scoope for new business facilitation. International Journal of Entrepreneurship and Innovation Management. 3 (1/2), 176-196.

Zimmerman, M. A., Zeitz, G. J. f., 2002. Beyound survival: Achieving new venture growth by building legitimacy. Academy of Management Review. 27 (3), 414-431.

9. REFERENCES

9.1. LITTERATURE

Aernoudt, R. (2004). "Incubators: Tool for Entrepreneurship?" Small Business Economics 23: 127-135.

Allen, D. N. and R. McCluskey (1990). Structure, Policy, Services, and Performance in the Business Incubator Industry. Entrepreneurship: Theory & Practice, Blackwell Publishing Limited. 15**:** 61.

Andersson, S. (1979). Positivism Kontra Hermeneutik. Göteborg, Korpen.

Arbnor, I. and B. Bjerke (1994). Företagsekonomisk Metodlära. Lund, Studentlitteratur.

Asheim, B. T. and M. S. Gertler (2004). The Geograpy of Innovation: Regional Innovation Systems. The Oxford Handbook of Innovation. J. Fagerberg, D. Mowery and R. Nelson. Oxford**:** 291-317.

Auken, H. E. V. and L. Neeley (1996). "Evidence of Bootstrap Financing among Small Start-up Firms." Journal of Entrepreneurial & Small Business Finance 5(3): 233.

Autio, E. and M. Klofsten (1998). "A Comparative Study of Two European Business Incubators." Journal of Small Business Management: 30-43.

Bager-Sjögren, L. (2004).Att Mylla Med Villkorslån Och Skörda Tillväxt: Utvärdering Av Nuteks Såddfinansiering Till Teknikföretag. Stockholm, ITPS

Berggren, B., C. Olofsson and L. Silver (2000). "Control Aversion and the Search for External Financing in Swedish Smes." Small Business Ecommics 15: 233-242.

Bergström, F. (2000). "Capital Subsidies and the Performance of Firms." Small Business Economics 14: 183-193.

Bhabra-Remedios, R. K. and B. Cornelius (2003). Cracks in the Egg: Improving Performance Measures in Business Incubator Research. Small Enterprise Association of Australia and New Zealand 16th annual Conference, Ballarat.

Birley, S., D. Norburn and I. MacMillan (1985). "Small vs. Large Companies: The Entrepreneurial Conundrum." Journal of Business Strategy 6(1): 81.

Bollingtoft, A. and J. P. Ulhoi (2004). "The Networked Business Incubator--Leveraging Entrepreneurial Agency?" Journal of Business Venturing 20(2): 265-290.

Brooks, O. J. (1986). Economic Development through Entrepreneurship: Incubators and the Incubation Process. Economic Development Review, International Economic Development Council. 4**:** 24.

Bygrave, W. D. and J. A. Timmons (1992). Venture Capital at the Crossroads. Boston Massachusetts, Harvard Business School Press.

Carlsson, B. (2004).Innovation Systems: A Survey of the Litterature from a Schumpeterian Perspective. International J.A. Schumpeter Society Conference, Milan, Italy, June 9-12.

Carpenter, R. E. and B. C. Petersen (2002). "Capital Market Imperfections, High-Tech Investment, and New Equity Financing." The Economic Journal 112: f54-72.

Chan, K. F. and T. Lau (2004). "Assessing Technology Incubator Programs in the Science Park: The Good, the Bad and the Ugly." Technovation 25(10): 1215-1228.

Clarysse, B., Wright, M., Lockett, A., Velde, E. V. d., Vohora, A., 2005. Spinning Out New Ventures: A Typology of Incubation Strategies from European Research Institutions. Journal of Business Venturing. 20 (2), 183-216.

Colombo, M. G. and M. Delmastro (2002). "How Effective Are Technology Incubators?: Evidence from Italy." Research Policy 31(7): 1103-1122.

Cressy, R. (2002). "Funding Gaps: A Symposium." The Economic Journal 112: F1-F16.

Cressy, R. and C. Olofsson (1997a). "European SME Financing: An Overview." Small Business Economics 9: 87-96.

Cressy, R. and C. Olofsson (1997b). "The Financial Conditions for Swedish SMEs: Survey and Research Agenda." Small Business Ecommics 9: 179-194.

Cusumano, M. A., Y. Mylonadis and R. S. Rosenbloom (1992). "Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta." Business History Review 66(1): 51.

de Meza, D. (2002). Overlending? Economic Journal, Blackwell Publishing Limited. 112**:** F17.

de Neergaard, C. (2004). Bättre Finansiering för Kommersialisering av Innovationer. Rapport, Stockholm

Drucker, P. F. (1985). Innovation Och Nyföretagande (Innovation and Entrepreneurship). Borås 1986, Forum.

Ds (2004:36). Innovativa Sverige - En Strategi för Tillväxt Genom Förnyelse (Innovative Sweden, a Strategy for Growth through Renewal). Stockholm, Näringsdepartementet och utbildningsdepartementet

Edquist, C. (2004). Systems of Innovation, Perspectives and Changes. The Oxford Handbook of Innovation. J. Fagerberg, D. Mowery and R. Nelson. Oxford**:** 181-208.

Etzkowitz, H. (2005). Tripplehelix - Den Nya Innovationsmodellen. Stockholm, SNS.

Falkeström, A. and M. Larsson (2000). En Studie Av Det Svenska Inkubatorsystemet. Examensarbete, Linköpings Universitet

Gustavsson, B. (2004). Kunskapande Metoder Inom Samhällsvetenskapen. Lund, Studentlitteratur. 299 pages.

Hackett, S. M. and D. M. Dilts (2004a). "A Real Options-Driven Theory of Business Incubation." Journal of Technology Transfer 29: 41-54.

Hackett, S. M. and D. M. Dilts (2004b). "A Systematic Review of Business Incubation Research." Journal of Technology Transfer 29: 55-82.

Harding, R. (2000). Venture Capital and Regional Development: Towards a Venture Capital System. Venture Capital: An International Journal of Entrepreneurial Finance. 2,**:** 287-311.

Harding, R. (2002). Plugging the Knowledge Gap: An International Comparison of the Role for Policy in the Venture Capital Market. Venture Capital: An International Journal of Entrepreneurial Finance. 4**:** 59 - 76.

Heydebreck, P., M. Klofsten and J. C. Maier (2000). "Innovation Support for New Technology-Based Firms: The Swedish Teknopol Approach." R&D Management 30 1: 89-100.

Holme, I. M. and B. K. Solvang (1991). Forskningsmetodik Om Kvantitativa och Kvalitativa Metoder. Lund 1995, Studentlitteratur.

Hsu, P., J. Z. Shyu, H. Yu, C. Yuo and T. Lo (2003). Exploring the Interaction between Incubators and Industrial Clusters: The Case of the Itri Incubator in Taiwan. R & D Management, Blackwell Publishing Limited. 33**:** 79-90.

Huffman, D. and J. M. Quigley (2002). The Role of the University in Attracting High Tech Entrepreneurship: A Silicon Valley Tale. Annals of Regional Science, Springer - Verlag New York, Inc. 36**:** 403.

Johannisson, B. (2005). Entreprenörskapets Väsen. Lund, Studentlitteratur.

Klofsten, M. (1992). Tidiga Utvecklingsprocesser I Teknikbaserade Företag. Department of Management and Economics. Linköping, Linköping University.

Klofsten, M. (1997). Management of the Early Development Process in Technology-Based Firms. Technology, Innovation and Enterprise: The European Experience. D. Jones-Evans and M. Klofsten. Chippenham, Wiltshire, Macmillan Press LTD**:** 148-178.

Klofsten, M. (2005). "New Venture Ideas: An Analysis of Their Origin and Early Development." Technology Analysis & Strategic Management 17(1): 105-119.

Klofsten, M., M. Jonsson and J. Simón (1999). Supporting the Pre-Commercialisation Stages of Technology-Based Firms: The Effects of Small-Scale Venture Capital. Venture Capital: An International Journal of Entrepreneurial Finance. 1**:** 83-93.

Klofsten, M. and Å. Lindholm-Dahlstrand (2000). Financing Technology-Based New Ventures: Credibility and Value Creation. New Technology-Based Firms at the Turn of the Century. W. During, R. Oakey and M. Kipling, Elsevier Science Ltd. Chapter 10**:** 127-142.

Lalkalka, D. (2003). Current Trends in Business Incubation. The Africa Regional Conference on Business Incubation, Bagamayo, Tanzania, 2-4 December.

Lawton, T. C. (2002). Missing the Target: Assessing the Role of Government in Bridging the European Equity Gap and Enhancing Economic Growth. Venture Capital: An International Journal of Entrepreneurial Finance. 4**:** 7 - 23.

Lerner, J. (2002). When Bureaucrats Meet Entrepreneurs: The Design of Effective Public Venture Capital Programmes. Economic Journal, Blackwell Publishing Limited. 112**:** F73.

Lindelöf, P. and H. Löfsten (2004). Teori Och Metoder För Val Av Indikatorer För Inkubatorer (Theory and Methods for the Choice of Indicators for Incubators). Göteborg, Sweden, Institute for Management for Innovation and Technology (IMIT) CTH, Institutionen för Industriell Dynamik

Lindholm-Dahlstrand, Å. (2004). Teknikbaserat Nyföretagande - Tillväxt Och Affärsutveckling. Lund, Studentlitteratur.

Lindholm-Dahlstrand, Å. and D. Cetindamar (2000). The Dynamics of Innovation Financing in Sweden. Venture Capital: An International Journal of Entrepreneurial Finance. 2**:** 203-221.

Lindholm-Dahlstrand, Å. and M. Klofsten (2002). Growth and Innovation Support in Swedish Science Parks and Incubators. Oxford, EIsevier Science.

Lindström, G. and C. Olofsson (2001). Early Stage Financing of Ntbfs: An Analysis of Contributions from Support Actors. Venture Capital. 3**:** 151-168.

Ljung, J. (1993). Idébaserad Verksamhet En Studie av Frikyrkan som Organisation. Ekonomiska Institutionen. Linköping, Linköping University.

Lumpkin, J. R. and R. D. Ireland (1988). "Screening Practices of New Business Incubators: The Evaluation or Critical Success Factors." American Journal of Small Business 12(4): 59-81.

Lyons, T. S., Li, S. (2003): The State of the Wisconsin Incubation Industry in 2002: An Analysis of the Results of the Survey of Membership. Report prepared for The Wisconsin Business Incubation Association.

Löfsten, H. and P. Lindelöf (2003). "Determinants for an Entrepreneurial Milieau: Science Parks and Business Policy in Growing Firms." Technovation 23: 51-64.

Macmillan, H. P. (1931). Committee on Finance and Industry Report. London, His Majesty's Stationery Office

Maigart, S. and C. Struyf (1997). "Financing High Technology Startups in Belgium: An Explorative Study." Small Business Ecommics 9: 125-135.

Malerba, F. (2005). "Sectoral Systems of Innovation: A Framework for Linking Innovation to the Knowledge Base, Structure and Dynamics of Sectors." Economics of Innovation & New Technology 14(1/2): 63-82.

Martin, S. and J. T. Scott (2000). The Nature of Innovation Market Failure and the Design of Public Support for Private Innovation. Research Policy**:** 437-447.

Mason, C. M. and R. T. Harrison (1997). "Business Angel Networks and the Development of the Informal Venture Capital Market in the U.K.: Is There Still a Role for the Public Sector?" Small Business Economics 9: 111-123.

Mason, C. M. and R. T. Harrison (2001). 'Investment Readiness': A Critique of Government Proposals to Increase the Demand for Venture Capital. Regional Studies, Carfax Publishing Company. 35**:** 663-668.

Mason, C. M. and R. T. Harrison (2002). Barriers to Investment in the Informal Venture Capital Sector. Entrepreneurship & Regional Development, Taylor & Francis Ltd. 14**:** 271-287.

Mason, C. M. and R. T. Harrison (2003). Closing the Regional Equity Gap? A Critique of the Department of Trade and Industry's Regional Venture Capital Funds Initiative. Regional Studies, Carfax Publishing Company. 37**:** 855.

McGlue, D. (2002). The Funding of Venture Capital in Europe: Issues for Public Policy. Venture Capital: An International Journal of Entrepreneurial Finance. 4**:** 45-58.

Mian, S. A. (1996). "Assessing Value-Added Contributions of University Technology Business Incubators to Tenant Firms." Research Policy 25(3): 325-335.

Mian, S. A. (1997). "Assessing and Managing the University Technology Business Incubator: An Integrative Framework." Journal of Business Venturing 12(4): 251-285.

Norrman, C. (2004). Genus och Innovationer - En Studie av SICs Villkorslån Mellan Åren 1994 och 2003, Linköpings Universitet.

Norrman, C., M. Klofsten and E. Sundin (2004a). What Ideas Get Public Innovation Support? A Survey Study of Early Stage Financing of New Ventures. 2004 Babson Kauffman Entrepreneurship Research Conference, University of Stratclyde, Glasgow.

Norrman, C., M. Klofsten and E. Sundin (2004b). What Venture Ideas Get Public Innovation Support? A Study of Early Stage Financing from a Supply Side Perspective. 12th Annual High Technology Small Firms Conference,, University of Twente, Enschede, The Netherlands.

North, D., D. Smallbone and I. Vickers (2001). "Public Sector Support for Innovating Smes." Small Business Economics 16: 303-317.

Oakey, R. P. (2003). Funding Innovation and Growth in UK New Technology-Based Firms: Some Observations on Contributions from the Public and Private Sectors. Venture Capital,. 5**:** 161-179.

Paavola, S. and K. Hakkarainen (2005). Three Abductive Solutions to the Meno Paradox with Instinct, Inference, and Distributed Cognition. Studies in Philosophy & Education, Springer Science & Business Media B.V. 24**:** 235-253.

Peirce, C. S. (1990). Pragmatism Och Kosmologi. Göteborg, Didalos AB.

Penrose, E. T. (1959). The Theory of the Growth of the Firm. London, Basil Blackwell Publisher.

Peters, L., M. Rice and M. Sundararajan (2004). "The Role of Incubators in the Entrepreneurial Process." Journal of Technology Transfer 29: 83-91.

Phan, P. H., D. S. Siegel and M. Wright (2004). "Science Parks and Incubators: Observations, Synthesis and Future Research." Journal of Business Venturing 20(2): 165-182.

Phillips, R. G. (2002). "Technology Business Incubators: How Effective as Technology Transfer Mechanisms?" Technology in Society 24: 299-316.

Rice, M. P. (2002). "Co-Production of Business Assistance in Business Incubators: An Exploratory Study." Journal of Business Venturing 17(2): 163-187.

Rickne, A. (2000). New Technology-Based Firms and Industrial Dynamics: Evidence from the Technological System of Biomatherials in Sweden, Ohio Ans Massachusetts. Department of Industrial Dynamics. Göteborg, Chalmers University of Technology**:** 340.

Rickne, A. and S. Jacobsson (1999). New Technology-Based Firms in Sweden--a Study of Their Direct Impact on Industrial Renewal. Economics of Innovation & New Technology, Routledge, Ltd. 8**:** 197.

Rothschild, L. and A. Darr (2005). Technological Incubators and the Social Construction of Innovation Networks: An Israeli Case Study. Technovation. 25**:** 59-67.

Shane, S. and D. Cable (2002). Network Ties, Reputation, and the Financing of New Ventures. Management Science, INFORMS: Institute for Operations Research. 48**:** 364.

SIC Näring Åt Goda Idéer - Ansökan Om Villkorslån. Stockholm, Stiftelsen Innovationscentrum/ Sweden innovation centre. Information Broschure/ Application form.

SIC (2002). Stiftelsen Innovationscentrum 2002 (Sweden Innovation Centre 2002). Stockholm, Stiftelsen Innovationscentrum

SIC (2004).10 År Med Stiftelsen Innovationscentrum (10 Years with Sweden Innovation Centre). Stockholm, Stiftelsen Innovationscentrum

Siegel, D. S., P. Westhead and M. Wright (2003). "Assessing the Impact of University Science Parks on Research Productivity: Exploratory Firm-Level Evidence from the United Kingdom." International Journal of Industrial Organization 21(9): 1357-1369.

Stinchcombe, A. L. (1965). Social Structure and Organizations. Handbook of Organizations. J. G. March. New York, Garland Publishing Inc. 1**:** 142-193.

Storey, D. J. (1994). Understanding the Small Business Sector. London, Routledge.

Storey, D. J. and B. S. Tether (1998a). "New Technology-Based Firms in the European Union: An Introduction." Research Policy 26(9): 933-946.

Storey, D. J. and B. S. Tether (1998b). "Public Policy Measures to Support New Technology-Based Firms in the European Union." Research Policy 26(9): 1037-1057.

SVCA (2000). Directory 2000-2001. Stockholm, Swedish Private Equity &Venture Capital Association.

SVCA (2002). Directory 2002-2003. Stockholm, Swedish Private Equity &Venture Capital Association.

SVCA (2003). Directory 2003-2004. Stockholm, Swedish Private Equity &Venture Capital Association.

SVCA (2005). Directory 2005-2006. Stockholm, Swedish Private Equity &Venture Capital Association.

Swedberg, R. (2000). Schumpeter Om Skapande Förstörelse Och Entreprenörskap. Smedjebacken, City University Press.

Van de Ven, A., H (1993). "The Development of an Infrastructure for Entrepreneurship." Journal of Business Venturing 8: 211-230.

Westhead, P., S. Batstone and F. Martin (2000). Technology-Based Firms Located on Science Parks: The Applicability of Bullock's "Soft -Hard" Model. Enterprise & Innovation Management Studies. 1**:** 107-139.

Westhead, P. and D. J. Storey (1997). Financial Constraints on the Growth of High Technology Small Firms in the United Kingdom. Applied Financial Economics, Routledge, Ltd. 7**:** 197-201.

Wigblad, R. (2003). Outline of Research Strategies for Experimential Knowledge. 17th Nordic Conference of Business Studies, Reykjavik.

Winborg, J. (2003). Pengar är Inte Alltid Lösningen (Money is Not Always the Solution). Småföretaget Och Kapitalet, Svensk Forskning Kring Små Företags Finansiering. Landström. Kristianstad, SNS Förlag**:** 29-44.

Vinnova (2005). Vinnova - För ett Innovativt Sverige, Vinnova Information, Vi 2005:3 (Vinnova Stands for Swedish Agency for Innovation Systems). Stockholm.

Yin, R. K. (1994). Case Study Research. Thousand Oaks, Carlifonia, Sage Publications.

Zimmerman, M. A. and G. J. f. Zeitz (2002). "Beyound Survival: Achieving New Venture Growth by Building Legitimacy." Academy of Management Review 27(3): 414-431.

Åstebro, T. (2003). "The Return to Independent Invention: Evidence of Unrealistic Optimism, Risk Seeking or Skewness Loving?" The Economic Journal 113: 226-239.

9.2. INTERVIEWS

Per Laurell, Managing Director of SIC

Roger Yttergren, SIC

Torbjörn Hansson, The judgement group of Swedepark

9.3. WWW

http://www.almi.se

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http://www.industrifonden.se

http://www.nbia.org

http://www.sisp.se

http://www.svca.se

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