



The Role of Incubators in Supporting Sustainable Entrepreneurship

Work Package 3

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Content

- 1 Introduction 5**
- 2 Incubators: A literature review 6**
 - 2.1 Introduction to business incubators 6
 - 2.1.1 Method for selection of papers 7
 - 2.1.2 Basic definitions 7
 - 2.2 General knowledge about business incubators 7
 - 2.3 Business incubators & entrepreneurship 11
 - 2.4 Business incubator modelling and performance evaluation 12
 - 2.5 Green businesses & sustainability 13
 - 2.5.1 Sustainability and economic development 14
 - 2.6 Incubators and regional development 15
 - 2.7 Conclusions 16
- 3 Case studies on incubators in Sweden, Finland & Germany 18**
 - 3.1 Introduction 18
 - 3.1.1 Incubators 18
 - 3.1.2 Business incubation program 18
 - 3.1.3 Business incubation model 18
 - 3.2 Method 19
 - 3.3 Case 1 - Green Tech Park - Sweden 19
 - 3.3.1 Organization 20
 - 3.3.2 Vision 20
 - 3.3.3 Stakeholders and financing 20
 - 3.3.4 Staff 21
 - 3.3.5 Projects at Green Tech Park 21
 - 3.3.6 Selection 22
 - 3.3.7 Evaluation 22
 - 3.3.8 Support 23
 - 3.3.9 Municipality and sustainable development 25
 - 3.4 Case 2 - LADEC - Finland 25
 - 3.4.1 Organization 26

| | | |
|----------|---|-----------|
| 3.4.2 | Vision | 26 |
| 3.4.3 | Stakeholders and financing | 26 |
| 3.4.4 | Selection | 26 |
| 3.4.5 | Support | 27 |
| 3.5 | Case 3 - Green Garage - Germany..... | 29 |
| 3.5.1 | Organization | 29 |
| 3.5.2 | Vision | 30 |
| 3.5.3 | Stakeholders and financing | 30 |
| 3.5.4 | Staff..... | 30 |
| 3.5.5 | Evaluation | 30 |
| 3.5.6 | Selection | 30 |
| 3.5.7 | Support | 31 |
| 3.5.8 | Accelerator program..... | 31 |
| 3.6 | Conclusions | 33 |
| 4 | The Green Entrepreneurship Training Program – A Short Case Study | 34 |
| 4.1 | Background | 34 |
| 4.1.1 | The initiation and development of ENP for “Green Industries” | 34 |
| 4.2 | Contents and execution | 35 |
| 4.2.1 | Target groups and recruitment | 36 |
| 4.2.2 | Program funding..... | 36 |
| 4.2.3 | Feedback from participants..... | 37 |
| 4.3 | Conclusions | 37 |
| 5 | Incubator Survey – Sweden, Finland, Germany..... | 38 |
| 5.1 | Introduction | 38 |
| 5.1.1 | Methods..... | 38 |
| 5.2 | Results..... | 38 |
| 5.3 | Conclusions | 44 |
| 6 | Concluding discussion..... | 45 |

1 Introduction

The aim of this working package is to investigate deficits and potential of the existing incubator support systems for sustainable entrepreneurship. The report also deals with identification of best practices and transfer of good practices.

The overall research questions are:

- What kind of entrepreneurship support do existing incubators for sustainable businesses offer?
- What are the strengths and weaknesses of the incubators in relation to sustainable entrepreneurship?
- What can we learn from good practices in the sustainable entrepreneurship field?

As parts of this work the following research activities have been carried out:

- Literature review on incubators
- Three case studies on incubators
- A case study on an entrepreneurship training program aimed to support green business start-ups
- Survey of incubators in Finland, Germany and Sweden

These activities are presented in the following report.

2 Incubators: A literature review

2.1 Introduction to business incubators

A business incubator is a facility that is connected to a university or a research institution or stands on its own and which provides support and services for newly established firms at the very early stage. The main aim is to give the new firms best possible conditions for their survival and growth. Incubators come in different types. Technology incubators are more focused on high-tech start-ups and often connected to universities or research institutions. Science parks and 'technopoles' are also focused on technology start-ups. Business incubators tend to incorporate all types of firms and usually do not have that focus on new technology firms. The concept of the incubator, as we know it in innovation and entrepreneurship, came to existence in 1959 in the USA when Joseph Mancuso opened the Batavia Industrial Centre in a Batavia, New York.

Some incubators started to appear on European continent already starting from the mid-1960s. In the 1980s the concept expanded rapidly in the rest of the USA and soon became a new comer to both UK and Europe. The firms established in the incubators are referred to the literature as tenants or incubees.

In recent years business incubators and their settings have become a booming industry both in Europe and USA (Hansen et al., 2000). The concept has even expanded into Asia, South America and Africa. Business incubators are needed as a viable tool to support business survival and growth (Markley & McNamara, 1995; Tötterman & Sten, 2005). Incubators help newly established firms through supporting services and the critical and important assistance they give to start-ups (Grimaldi & Grandi, 2005). Incubators help in converting developed technologies and business ideas into new firms by fusing heterogeneous R&D entities from university, government and industry (Etzkowitz, 2002). This is referred to in the literature as the Triple Helix concept.

Grimaldi and Grandi (2005) argued that the variations in incubating organizations are driven by the evolution of business requirements and needs. As these needs become more complex, the need for incubators becomes more apparent and critical. That reflects itself in the ways the university-industry coupling manifest itself. According to Etzkowitz (2002), the university-industry linkages shifted from being linear in its nature to becoming an interactive innovation model. That line of development is apparent in the history of business incubators (ibid). Incubators are moving more into network structures where a number of them join forces together rather than single ones (ibid). Etzkowitz argued that such developments are supported by changes in the regulatory environment and by government funding programs.

The role of business incubators is to support the newly formed firms with available office space and other benefits needed for them to be run smoothly (Hansen et al., 2000). A question, which may be raised, is whether business incubators are able to provide newly started firms with the necessary elements of support to grant them a survival and growth path into maturity (ibid). From the existing experiences, often business incubators are only offering the minimum of services, which do not match what the entrepreneurs await from a business incubation mechanism (ibid). However, a larger number of incubators are more efficient and effective and their impact on the local and national economies is evident.

The way researchers measure the impact of the incubator activities avoid including job opportunities generated by the firms located in them (Markley & McNamara, 1995). In their work Markley and McNamara (1995) used an illustrative example of a single incubator to demonstrate such impact on the local community. One can actually compare an incubator's impact on the development of a local economy to that of attracting external investments in terms of e.g. creating growth (Markley & McNamara, 1995). Tötterman and Sten (2005) addressed the question as to how business incubators can support entrepreneurs in their networking strife. The two writers evaluated three not-for-profit managed business incubators from different parts of Finland. They found that entrepreneurs who have received substantial support from the incubator in their networking activities are more satisfied than the ones who did not get such backing and support. In their work they concluded that incubators should not make financial support their prime goal as entrepreneurs value more other type of support and particular in networking.

2.1.1 Method for selection of papers

A broad review of international literature has been carried out where search terms have been the following: "business incubators", "business incubators and entrepreneurship", "business incubator models", "business incubator performance", "green businesses" and "sustainability" related to business incubators as well as policy impact. In this literature review we have included the most cited papers from ISI (Web of Science)-qualified publications as well as a few recent papers that we deemed relevant for this study.

2.1.2 Basic definitions

Incubators are defined in different ways in the literature, two definitions are most cited. The first is by Rothaermel and Thursby (2005a), which had 58 ISI citations. It covers the technology incubators. That definition of technology incubators emphasizes their location with a traditional university setting and their role in decimating knowledge to the newly started firms placed in the incubator (Rothaermel & Thursby, 2005a). The second one is more general and it comes from a work by Markley and McNamara (1995). According to that definition incubators are locally based institutions that provide shared physical space and business support services to new and young firms (Markley & McNamara, 1995). This definition is cited in the Web of Science database 15 times.

2.2 General knowledge about business incubators

In this first section of the report we will be discussing, in general terms, the concept of the incubator and review how incubators are coupled to issues of economic growth. There will be an emphasis on the role of knowledge transfer in incubation process.

Some incubators are established specifically to facilitate commercialization of knowledge generated from research both in universities and research institutions (Rice, 2002). They provide support for the started businesses in order to survive, thrive and grow. Rice (2002) explored the types of business assistance provided through co-production schemes between the idea-providing entity and the entrepreneur (ibid). The modes of that co-production, and the factors that affect the outcome of such co-production vary and impact the incubation processes in different ways. The allocation of the time

of the incubator manager, the intensity of intervention, the breadth of co-production modalities deployed, and the readiness of the entrepreneur to engage in co-production are revealed as factors affecting the output elasticity's related to co-production inputs (Rice, 2002). Rice sees the business incubator as a producer and facilitator of the business support schemes undertaken by the community. The author perceives also the new firm as a customer to deliverable outputs and a partner in a co-production relationship where the incubator provides (often) the idea and know-how while the entrepreneur provides the drive and effort to commercialize that idea.

There has been an increasing interest in the economic return of publically funded research (Meyer, 2003). One way to commercialize academic research is to set up university spin-off companies (ibid). One key finding was that support mechanisms for that objective do not necessarily promote academic entrepreneurship (ibid). According to Meyer (2003) some support mechanisms could even have a negative impact on the growth-pattern of science-based firms. Incubators come in different forms such as business incubators, technology parks and technology incubators. Technology incubators in particular are unique in their nature. They are often located within or in proximity to a university campus. Their major objective is to make it easier to disseminate knowledge produced through research activities (Rothaermel & Thursby, 2005a). Technology incubators often deal with recent inventions and the latest technical breakthroughs in science. The knowledge flows from such research and development emerge from universities and move to incubator firms. Rothaermel and Thursby (2005a) address the potential impact thereof on performance. The two scholars tested the hypothesis that knowledge flows should enhance incubator firm performance. They discovered some support for that hypothesis. They found that certain factors impact the firm's performance. For example firms' absorptive capacity is an important parameter in that regard (Rothaermel & Thursby, 2005a).

Researchers are eager to propose tools for assessing the performance of technology incubators Chan and Lau (2005). The tool suggested by Chan and Lau (2005) encompass nine elements. These are: resources (both from pooling and sharing mechanism), consultancy support, the impact of public image, the advantages results from the networks, impact of clusters, proximity of the incubators to different actors, costs reductions mechanisms, and financial mechanism for firms (Chan & Lau, 2005). The two writers stress the significance of facilitating effective support mechanisms to new companies.

Knowledge is the key deliverer of the economic growth in what is known as the knowledge economy. There are a number of mechanisms by which knowledge is disseminated from its generating environment to the entrepreneurship and innovations systems. One way by which knowledge is transferred to facilitate the creation of news enterprises is through the spin-off phenomenon. Knowledge has a central role in the creation and development of spin-offs within different contexts (Lockett et al., 2005). The spin-off contribution to firm creations has been addressed, in the context of knowledge-based new firms, in a number of works. In one of these works, Lockett et al. (2005) looked at the managerial and policy implications of the emerging spin-offs. Their investigation focused on a single type of environment where these firms arise, i.e. in the public research institutions. Lockett and the colleagues used a knowledge-based view for their analysis of the firm.

Knowledge gaps create the entrepreneurial opportunities that may lead to creation of the spin-offs. Opportunity exploitation is a central element in the creation of a new firm (Choi & Shepard, 2004) and spin-offs are no exception to that. That is why studying these knowledge gaps encountered by

new ventures are recommended by Lockett et al (2005). Their argument is that such effort is very essential to our understanding for the development of spin-offs within the public research institutions (PRIs). The knowledge gaps can occur at different levels of aggregation. Each of these aggregation levels has its own internal environment that shape and dictate their internal dynamics. Among the most prominent aggregation levels pointed to by Lockett et al (2005) are the public research institutions, the spin-offs, the teams, the individuals and the incubators. The role of these actors and impact is tightly related to the different stages of spin-off development (Lockett et al., 2005).

There are a number of conceptual frameworks used in assessing and managing university incubators. According to Mian (1997) it is widely believed that university technology business incubator (UTBI) contribute to the nurturing of new technology-based firms. In the USA these types of incubators were not fully investigated due to the lack of historical data explaining their performance and delivered output. In order to deal with this issue, Mian (1997) proposed an own framework of performance assessment analysis using a combined survey of the existing body of knowledge in three major areas of knowledge: business incubation, the university's technology and business development support, and organizational assessment practices. This model was based on three performance dimensions: program sustainability and growth; firm survival and growth; and contributions to the sponsoring university's mission. The framework proposed by Mian (1997) provided a good tool to assess the performance of UTBIs. It presented a set of identifiable elements for evaluating UTBIs within the three performance dimensions pointed out above, providing in essence viable measurement indicators.

Business opportunities are recognized and spotted by individuals who have an entrepreneurial drive according to the Schumpeterian view. Thus, studying how exploitation of opportunities takes place is essential in grasping the dynamics of the incubation processes and in building models for the incubators. One of the areas of research related to opportunity exploitation is how decisions are made in relation to firm start-ups. One can tackle such an issue from a number of perspectives. Choi and Shepherd (2004) examined it from a resource-based view. The two writers analysed a sample of entrepreneurs from an incubator. Their findings suggested that entrepreneurs are more likely to exploit opportunities when they have more knowledge of a new product demand; more fully developed necessary technologies, greater managerial capability, and greater stakeholder support. Moreover, the findings of their study shed a light on a less emphasized aspect of the resource-based view. They also found that the new product's anticipated lead-time enhances an entrepreneur's exploitation decision policies.

In relation to the need for the entrepreneur to have information about a demand of new product in order to motivate opportunity exploitation Choi and Shepherd, (2004) stressed the importance of studying new product development coupling it to the opportunity recognition. Opportunity recognition induced through new product development is an essential component in our striving to understand the internal dynamics of the incubation phenomenon (Choi & Shepherd, 2004). Although questions around new product realization, in themselves, are well researched, there is a limited number of studies on new product development that tried to measure the impact of new product introduction on the success or failure of new ventures (Stuart & Abetti, 1987). In order to present a truly representative and condensed evaluation scheme for success parameters Stuart and Abetti (1987) merged together the scientific investigation about new products with the research effort in the area of new venture creation. The two scholars reached to the conclusion that firms which launch their

products into small niche markets have a higher rate of success than when they try to introduce their products to larger markets or markets, which are expanding rapidly. Stuart and Abetti (1987) introduced evidence which is contradictory to the prevailing wisdom and which indicates that the entrepreneur in a smaller firm is in need of practicing strong managerial control and leadership to grant the success of the firm.

The emphasis on the need for individual independence and initiative taking when new products are introduced or new ventures are created may be a decisive factor of success within the larger organizations (Stuart & Abetti, 1987). The research indicates that such is the case indeed (ibid). Stuart and Abetti (1987) found no impact of product or service uniqueness, gross margin, or strategic aggressiveness on success or failure of new ventures in the incubation environment. These findings can be perceived as unexpected. However, Stuart and Abetti (1987) saw this result and the non-existence of a relationship between the stated variables and success or failure of the newly founded enterprises as the logical result of a methodical deficiency and that of the limited size of the sample utilized. On the other hand, the findings support the notion that the entrepreneur is the key factor and that a good matching between the experience of the management team members of the new venture and the business idea upon which the new venture is based.

One of the theoretically important factors related to incubator firms' performance is the strength of their linkages to the research university sponsoring the technology incubator (Rothaermel & Thursby, 2005b). Firm performance for businesses located in an incubator is related to the strength level of their linkages with the knowledge-provider (i.e. the university). Rothaermel and Thursby (2005b) studied two types of university linkages of importance to firm performance: namely, a license agreement and a link to university faculty, while controlling for incubator firm linkages to non-sponsoring research universities, among other factors. Rothaermel and Thursby (2005b) found that a university link to the sponsoring institution reduces the probability of new venture failure. They also suggested that the impact is stronger the stronger the university link. Challenges to the firm, which manifest themselves in elevated environmental dynamism and heterogeneity, evoke more innovation in the firm (Khan and Manopichetwattana (1989). However, environmental hostility would lead to less innovative input (ibid). Another factor, which would enhance innovativeness, according to the authors, is the availability of resources. Three issues are of importance when assessing the effectiveness of an incubation program: program sustainability and growth; firm's survival and growth; and the university's mission alignment (Mian, 1997).

Incubators have a mission of supporting the commercialization of business ideas and new technology breakthroughs. The success of a new firm in an incubator does not depend on the newness of the product but more on the entrepreneurial capabilities of the manager of the new enterprise. The success of the cooperation between the incubator administration and the entrepreneur and their co-production output is dependent on an array of factors. There are a number of ways by which knowledge is disseminated from research institutions and universities to firms. Firms' absorptive capacity is an important factor in enhancing firm performance for those tenants and incubees. Opportunity recognition and the processes engulfing decision about venture creation are very important topics when dealing with business incubation.

2.3 Business incubators & entrepreneurship

In this section we discuss how business incubators facilitate entrepreneurship activities. It is through entrepreneurial input that ideas are transferred into successful commercial entities. The Schumpeterian view is embodied in many of the definitions of entrepreneurship offered in the last five decades or so (Bull & Willard, 1993). The word “entrepreneur” has been presented in various wordings within a wide range of definitions over the last 200 years (Bull & Willard, 1993). None of these definitions gives an answer to the question as to exactly when a person engages in entrepreneurship activities (ibid). The problem is that entrepreneurial activities start before the physical existence of a firm thus creating a research dilemma for investigators for how to apply scientific investigation onto something that does not exist yet. To tackle this Bull and Willard (1993) offered a tentative entrepreneurship theory. According to the two writers a person will carry out an entrepreneurship activity under conditions of task-related motivation, expertise, expectation of personal gain, and a supportive environment (ibid). The role of the entrepreneur is also coupled to the way different universities go about the commercialization of their research output.

An important question in regard to the role of universities in research commercialization is why some universities are more successful than others in creating and establishing high-technology firms. To answer this question O'Shea et al (2005) used a resource-based approach and derived hypotheses to link attributes of resources and capabilities, institutional, financial, commercial and human capital, to university spinoff outcomes. The research output confirmed history dependence for such successful technology transfer to occur. Other factors such as faculty quality, size and orientation of science and engineering funding and commercial capability were also found to be important (O'Shea et al., 2005).

The connection between firm ownership and the entrepreneurial capacity of managers is an important issue to discuss. In their work Cooper and Dunkelberg (1986) examined alternative paths to ownership. They looked at the relationship between the paths to ownership and factors related to the entrepreneur such as: the entrepreneurs' background characteristics; motivations and attitudes; and previous careers, incubator organizations and processes of starting (Cooper & Dunkelberg, 1986). The two writers hypothesized that such paths involve varying ‘degrees of entrepreneurship’ as reflected in the profiles of owner-managers.

The smoothness in which the technology transfer from the lab to the firm occurs is a critical factor to investigate when studying incubators. According to Markman et al. (2005), smoothness would determine the success degree of business incubators and technology parks in university settings to achieve their goals. University technology transfer offices (UTTOs) function as “technology intermediaries” in fulfilling this role (Markman et al., 2005). The writers claim that entrepreneurship theory and research on the role of the UTTO is sparse. Markman et al. (2005) used the grounded theory to build a framework to look at UTTO in facilitating new venture foundation. Their research revealed a complex set of relationships between UTTO structures and strategies, new venture formation, and business incubation. Most important in our view is that the content analysis of UTTO mission statements revealed more emphasis on royalty income than on entrepreneurship (Markman et al., 2005). They found for example that the licensing-for-equity strategy is positively related to new venture formation while the sponsored research licensing strategy is negatively related to new venture creation and the licensing-for-cash strategy, which is the most dominant transfer strategy, was the least correlated to new venture formation (Markman et al., 2005). What this implies is that universities

should be more focused on partnership with the entrepreneurs rather than being eager to cash out their share in the new companies, something the traditional emphasis on exist strategies calls for.

Incubators, in striving to achieve their mission, have to deal with types of risks, the ones related to investment and other types to do with the entrepreneurial processes accompanying the establishment and the running of newly established firms (Carayannis & Von Zedtwitz, 2005). The two writers used a classification system, which placed the current incubators in five groups: the university incubator, the independent commercial incubator, the regional business incubator, the company-internal incubator, and the virtual incubator. They also introduced an overall scheme, which captures the best methods of operations and management from these five classes of incubators.

The failure rate of start-up firms is high over time (Pena, 2002). One way to deal with this issue is to study the impact of different factors on firm performance. One such parameter is the intellectual capital (IC). Pena (2002) analysed the impact IC richness of a firm has on its survival and growth. The results suggested that the human capital of the entrepreneur in combination with organizational capital and relational capital are important intangible assets that enhance firm performance (Pena, 2002). It is the entrepreneur who converts the objectives of an incubator to a true delivered output as a successful firm.

2.4 Business incubator modelling and performance evaluation

Models are needed to explain and understand how systems and the organizations embedded in them function. In the context of the said modelling of incubators it is important to be able to evaluate their performance. Scholars try to find ways of categorising the incubators. We introduced some of these schemes above. Similar attempts were made by Grimaldi and Grandi (2005) who proposed that incubators can either be innovation oriented, university attached or private (ibid). From time to time new types of incubators are postulated and categorized. Hansen et al. (2000) have identified one such new type of incubators that is able to live to the string requirements of a truly functioning incubator. Called the networked incubator, it is more successful than the other traditional types of incubators.

Modelling of the incubation process is a task that is tackled by a number of researchers. Grimaldi and Grandi (2005) proposed two main incubating models (Model 1 and Model 2) based on the way incubators run their businesses. Any incubation model has to start with the fact that technology transfer from national R&D laboratories and from research universities is able to provide economic growth (Rogers et al., 2001). High-technology spin-offs are effective means of technology transfer (ibid). Technology transfer demands trained and skilled personnel, adequate resources, and sound organizational structures (Ibid). The analysis by Westhead and Storey (1995) revealed that having a link with a local higher education institution (HEI) enhanced firm survival over the period 1986–1992. However, the vast majority of the firms' links developed with local HEIs are, for the most, informal ones (Westhead & Storey, 1995).

The focus in the incubation literature, when it comes to evaluation issues, is on the output, according to Bergek and Norrman (2008). The two writers are in the view that the focus should instead be on an overriding and holistic analysis based on defining the goals set and on considering the output of

individual incubators taking into consideration the relevant incubation model. The framework proposed by Bergek and Norrman (2008) include three distinguishing model components: selection, business support and mediation. Companies with university linkages have lower research and development (R&D) expenses while having higher levels of innovative output (George et al., 2002). However university linkages did not lead to higher financial performance than similar firms without such linkages (ibid).

The research performed by Westhead and Storey (1995) was conducted to ascertain the 'added-value' of the science park location (e.g. in close proximity to a university) as an important parameter in enhancing incubator performance. For example, links that companies in the biotechnology industry develop with universities can help them in dealing with the challenges they face in developing and commercializing new products (George et al., 2002). Scholars see incubators as a means for assessing newly established technology firms' ability to survive and grow (Bergek & Norrman, 2008). It is important to identify and pinpoint the optimal operation and management practice and the incubation models that describe them (ibid).

2.5 Green businesses & sustainability

The issue of green businesses' creation as a way to grant good sustainability strategies has been under focus from some time now. The latest report of the UN of 2014 on climate change is alarming and demands a clear push in promoting green businesses. A green business is a business that takes into consideration the environmental issues both in the general strategy of the business and in the product development strategies. Assuring the greenness of a business promotes the sustainable aspects of economic development. One may think that economic progress and sustainability are two contradictory objectives (Porter & der Linde, 1995).

However, experience showed that companies have succeeded in many cases to achieve economic benefits while solving urgent pollution issues (ibid). Entrepreneurship is at the heart of sustainable growth (Carayannis & Von Zedtwitz, 2005) and in that sense it is at the heart of sustainability development. According to the two writers, in recent times there was an elevated belief in incubation as a viable process to promote businesses in establishing and starting up. Thus successful incubation should be at the heart of a green policy. There is a growing social and regulatory concern for the environment (Noci & Verganti, 1999). This is forcing an increasing number of companies to embrace 'green' issues and deal with it as a major source of strategic change (Noci & Verganti, 1999).

The development of the 'green economy' has been accelerated through the implementation of public policies linked to the environment (Hamdouch & Depret, 2010). This strategy, according to Hamdouch and Depret (2010), is a necessary condition for encouraging development of new green technologies. However, the success of this strategy is based on a number of factors. Among these factors are the design, timing, coherence and the pragmatism of policies undertaken. The success of a green strategy is more dependent on these parameters than on the scale of resources commitment (Hamdouch & Depret, 2010). Bansal and Roth (2000) studied the motivations and contextual factors that induce corporate ecological responsiveness. They identified three motivations of significance: competitiveness, legitimation, and ecological responsibility (Bansal & Roth, 2000). These motivations

in their turn are influenced by three contextual conditions: field cohesion, issue salience, and individual concern. Bansal and Roth (2000) also identified conditions that would lead to high corporate ecological responsiveness.

According to Noci and Verganti (1999), there is a debate related to how environmental issues would affect R&D practices and product innovation in firms, specifically SMEs. The two researchers illustrate why 'green' product innovation is considered as a major issue for most firms, even for those that are not directly affected by environmental regulations. Noci and Verganti (1999) also develop a new framework that can be used by SMEs in order to: identify green strategic options, and adjust their R&D and technology strategy in accordance with these options. Companies can play an important role in meeting the sustainability challenge through appropriate strategies and operations, such as green processes and product development (Albino et al., 2009).

There are adequate and effective strategies that can be embraced by businesses in order to meet the sustainability challenge (Albino et al., 2009). Among these are green processes and green product development (ibid). The named scholars stated that embracing various green schemes and strategies was found to be higher for companies who are keen to develop green products than the ones who are not interested in that (Albino et al., 2009). To meet those objectives Albino et al. (2009) proposed a new taxonomy to deal with environmental strategies.

Sherman and Chappell (1998) studied in-depth and identified the most adequate methods that should be embraced by an incubator's management so that they would be able to assess the effect of the program they are running on the local areas or regions. The development of a green economy demands the contribution of green business in the overall development of societies. Regional and national policies need to be tuned into that. Some scholars, such as Bansal and Roth (2000), studied the factors that promote positive corporate ecological responsiveness. Firms in particular are important for sound promotion strategies for a green economy.

2.5.1 Sustainability and economic development

Sustainability is becoming a central issue when discussing development schemes. It is impacted by the work conditions among other factors. Work conditions directly impact firm performance and as does sustainability in general. The nature of the workplace as well as the pace of work have both witnessed a clear shift with tendencies of acceleration and stress on the workforce. McRobbie (2002) studied these issues in relation to the work environment in the UK culture industries. The writer concluded that a multi-skilling and de-specialization is promoted by growth, change and competition in the arts and media industry. The researcher also found that creativity is positively enhanced by the values of entrepreneurialism, individualization and reliance on commercial sponsorship (McRobbie, 2002).

The top management team structure in high-technology university-based start-ups was studied in relation to a number of factors including composition, dynamics and performance (Ensley & Hmieleski, 2005). The two writers found that the teams are more homogenous than the independent start-ups (ibid). They also found that university-based start-ups are worse performers when net cash flow and revenue growth are considered. The impact of both the latest financial crisis and the pressing climate change has driven businesses into caring for the issue of sustainability and is driving the

evolution of sustainable business (Potts, 2010). The regional aspects of sustainability have been neglected in favour of national and international sustainability strategies (ibid). Potts (2010) looked at two regional case studies in New South Wales (NSW), Australia in order to investigate the evolving regional sustainability and its relationship to important actors including governments, communities and the individual. Potts (2010) introduced the concept of the 'natural advantage', as the model that integrates innovation and sustainability at a regional level (Potts, 2010). The existing transportation models have a number of problems embedded in them such as pollution, vehicle noise level, accidents, resource depletion, and inaccessibility of amenities (Nykvist & Whitmarsh, 2008).

In order to deal with these issues a new innovative mobile system was needed (Nykvist & Whitmarsh, 2008). Achieving the shift to this more innovative transport mobile system, three mechanisms can be utilized: altering the transportation technology used, using new models, and reduce the load on the existing transportation systems (Nykvist & Whitmarsh, 2008). Drawing on concepts from the transitions literature, Nykvist and Whitmarsh (2008), build concepts based on the three proposed mechanisms and introduced feasible niched innovative activities using practices which differ from the existing ones. The two writers provided empirical evidence on existing work within the three stated mechanisms in both Sweden and UK.

Nykvist and Whitmarsh (2008) studied the existing processes of co-evolution, divergence and tension related to each of the proposed niches. Their conclusion is that the most important element of strategy in promoting the desired transition to new regime of transportation is an early market introduction and conquering. They also found that different transport products have different success rates in the various countries.

In a knowledge-based economy new products and services are needed to create wealth (Nowak & Grantham, 2000). This is contrary to the traditional concept of the wealth of nations where resources and raw material played the major role. These new products and service have to be largely based on new software programs and technologies. Although the industry does have some larger firms, most of them being international, the software sector in general is dominated by smaller enterprises (Nowak & Grantham, 2000). These businesses are mainly small ones with niche markets. They are basically entrepreneurial ventures (Nowak & Grantham, 2000). In their work, Nowak and Grantham (2000) proposed a "virtual incubator" model to facilitate start up success and business network formation. Sustainability is an issue, which is gaining more attention, and many studies are looking at that issue in relation to the conditions of the work place, workforce creativity and firm performance.

2.6 Incubators and regional development

Incubators play an important and decisive role in regional development. Actually that relationship was in the mind of the early scholars who called for the promotion of the regional development. Coupled to these aspects is the knowledge dimension. Incubators are the tools via which knowledge is disseminated from the knowledge-generating systems such as the universities and research institutions into the economic pool of society. Knowledge-based regional development occurs in four stages according to a model proposed by Etzkowitz and Klofsten (2005). These stages are inception, implementation, consolidation and renewal. Etzkowitz and Klofsten stated that innovation policy is cre-

ated 'bottom-up'. It is an outcome of a 'collective entrepreneurship' paradigm created via collaboration among three major type of actors: business, government and academic actors (Etzkowitz & Klofsten, 2005). That structure is referred to in the literature as the Triple Helix. Etzkowitz and Klofsten (2005) argued that the key event in this knowledge-based regional development is the creation of an entrepreneurial university. Universities and other higher education institutions (HEIs) are an important resource network for high technology firms.

In order to develop stronger links with industry, HEIs seek to establish science parks (Westhead & Storey, 1995). Etzkowitz et al (2005) studied the Brazilian case as an illustrative example. The Brazilian meta-innovation systems is characterized by and created by a battery of initiatives bottom-up and also in a lateral way rather than top-down (Etzkowitz et al., 2005). The fact that the same organizational mechanisms can lead to success and being effective in one context, while the same cannot be said for another context, can be understood using the meta-innovation model (ibid).

The reason is that in Brazil, the business and social goals were aligned while that was not the case in other countries (ibid). Etzkowitz et al (2005) see the Brazilian development model as having the potential to be transferred to other countries (ibid). Incubators are the scheme through which knowledge is disseminated and utilized in economic development of a region or a country. Knowledge-based regional development occurs in four stages according to a model proposed by Etzkowitz and Klofsten (2005). These stages are inception, implementation, consolidation and renewal. The stages encompass the time frame within which the business idea is transferred to be a firm. Incubation models are more likely country-specific although there are general underlying conditions for their success.

In table 1 below you will find examples of well-cited papers with a short note on their content and message.

2.7 Conclusions

To conclude it could be said that incubators and the promotion of young firms are still a very hot topic. Green and sustainability-related issues and their connection to growth and development of firms has also become a hot topic. However, there are very few studies about green or sustainable incubators. If the word "sustainable" is brought up it has other meanings e.g. financial self-sustainability (without external support) or sustainability related to long-term policy support.

Table 1: Examples of well-cited papers in incubator literature

Business incubators – general

In the past decades business incubators have become a widely recognized concept worldwide (Sci-llitoe & Chakrabarti, 2010).

Business incubators are needed as a viable tool to support business survival and growth (Tötterman & Sten, 2005).

Incubators are locally based institutions that provide shared physical space and business support services to new and young firms (Markley & McNamara, 1995).

Business incubators and entrepreneurship

Business incubators facilitate entrepreneurial processes where ideas are shaped into successful commercial business (Carayannis & Von Zedtwitz, 2005).

Business incubator models

Innovation-oriented, university-attached, public or privately owned incubators (Grimaldi & Grandi, 2005).

A focus should be on the strategies and formulated by the incubator (Bergek & Norrman, 2008).

Green businesses and sustainability

Appropriate environmental standards can generate innovation and increase the productivity of businesses and thereby raise their competitiveness. (Porter & der Linde, 1995).

Incubators and sustainability

Few studies have dealt with incubators and their relation to environmental sustainability. The study identifies the variables and develops a framework for analysing the green incubators (Fonseca & Jabbour, 2012)

Qualitative data collected from 53 firms in the United Kingdom and Japan revealed three motivations: competitiveness, legitimation, and ecological responsibility. These motivations were influenced by three contextual conditions: field cohesion, issue salience, and individual concern (Bansal & Roth, 2000).

Conceptual framework for assessing and managing the university technology business incubator a model is comprised of three performance dimensions: (1) program sustainability and growth; (2) tenant firm's survival and growth; and (3) contributions to the sponsoring university's mission (Mian, 1997).

3 Case studies on incubators in Sweden, Finland & Germany

Starting transformation in the early stages of start-ups can be a solution for encouraging green entrepreneurship & eco-innovation. In order to study the role of incubators in supporting sustainable entrepreneurship a sample incubator that works with green/ sustainable start-ups in each country was chosen and studied by help of interviews with managers, stakeholders, tenants and CEOs at each incubator. The aim of this study is to explore the dynamics of green incubating and in doing so highlight their particular characteristics in selecting tenants and their working models toward green entrepreneurship.

In this chapter a short explanation of different types of incubator will be presented. For each case study we will review their organization, vision, evaluation, selection process and different kinds of support rendered to tenants.

3.1 Introduction

Below is a presentation of some different kinds of incubator definitions.

3.1.1 Incubators

Business incubators facilitate entrepreneurial processes where ideas are shaped into successful commercial businesses (Carayannis & Von Zedtwitz, 2005). According to Grimaldi and Grandi (2005) incubators help newly established firms through supporting services and the critical and important assistance they give to start-ups.

3.1.2 Business incubation program

Business incubation program is a process young growing companies in the incubator goes through with guided management and technical assistance of the incubator, accelerating the successful development of the enterprise using incubator's network and facilities (Grimaldi & Grandi, 2005).

3.1.3 Business incubation model

According to the report by Lewis et al (2011) some researchers divide incubators into four categories: 1) With walls 2) Without walls (virtual incubators) 3) International incubators 4) Accelerators.

With walls

Incubator with wall is the so-called traditional business incubator with multitenant facility and on-site management.

Without walls (Virtual incubator)

These are business incubators that do not provide on-site space for their tenants. This kind of program is cheaper since the location costs are eliminated and is appropriate for rural areas where the client base is often spread out or in cases where firms prefer not to be located in an incubator. On the other hand beside the common challenges all incubator face, virtual incubators have encountered the crucial challenge of providing networking environments for their clients.

International incubators

International incubators help companies enter foreign markets through offering some specialized services e.g. translation services, language and cultural training, visa processes, housing assistance and help on integration issues.

Accelerators

Some professionals use the terms accelerator & incubator interchangeably. Although they are similar and may overlap, a firm enters an accelerator program after graduation from the incubator program. Accelerators provide guidance and mentorship for firms to grow just like incubators do, but in a more mature stage of the firm's life cycle.

3.2 Method

According to Eisenhardt (1989) a case study is based on an identified problem or question that one tries to find explanations for in its surroundings. Case studies can involve either single or multiple cases, and numerous levels of analysis (Yin, 1984). Case studies can be used to accomplish various aims: to provide description (Kidder, 1982), test theory (Pinfield, 1986; Anderson, 1983), or generate theory (e.g., Gersick, 1988; Harris & Sutton, 1986). Here, three cases were selected, one case in each of the countries participating in the SHIFT project – Sweden, Finland, and Germany – in order to gain insights into strategies and activities of sustainability-oriented incubators.

In Sweden Green Tech Park (GTP) was chosen since it is one of the incubators in Sweden that has an ambition to support and encourage green entrepreneurship and sustainable development economically, socially and ecologically. In Finland LADEC was chosen getting help from our Finnish partner in selecting the incubator since it a general incubator with a focus on Bioenergy/biomaterials, clean-web/sustainable it, food/urban agriculture, green building, lighting/energy efficiency, energy storage/smart grid, solar & wind energy, transportation, waste management and water (resource recovery, energy, treatment, etc.). In Germany we studied Green Garage (GG), which is the first incubator in Germany that exclusively targets climate innovations.

Interviews were carried out with managers, stakeholders and tenants during a three months period in Spring 2014 through telephone and/ or Skype and the duration of each interview was about half an hour. For further information, please see the references section, under "interviews/personal communication". Interview guides with specific questions to different stakeholders are presented in appendix 1.

3.3 Case 1 - Green Tech Park - Sweden

Green Tech Park (GTP) encourages new ideas and opportunities, but it is more than just a business park since it works for business development with nature as a resource and sustainable entrepreneurship with a focus within the green industry (sustainable in all three areas of economically, socially and ecologically). Green Tech Park is a combination of a technology park (consisting of well-established companies), a science park (organizing activities and projects together with universities), and an incubator for new start-ups. Briefly described, GTP is a business park with a modest profiling around "a meeting place for the green industry".

3.3.1 Organization

Many of the incubators and science parks in Sweden are mixed use; however some are focused within specific segments like green tech and sustainability (SISP homepage 2014). Green Tech Park was created out of a need for the development of innovation and entrepreneurship within the green sector. It is one of the incubators in Sweden, which has an ambition to support and encourage green entrepreneurship and sustainable development economically, socially and ecologically.

In order to support the university, the municipality established Green Tech Park in 2009 on the Campus area of SLU (Swedish University of Agricultural Sciences) in Skara. The campus development was a way of trying to make all the students and scientist from the agriculture university meet the businesses and organizations in an area and to encourage the municipality to invest in a house, which resulted in green tech park that today inhabits 30 different companies from start-up to well established ones.

Green Tech Park offers an open forum for players in the innovation system. Green Tech Park is not only a stimulating environment at SLU Campus in Skara, but also creative meeting place throughout Västra Götaland¹. The operation is organized through conferences, seminars, workshops and trainings. This spring (2014) five seminars were held at Green Tech Park to encourage optimum energy and resources utilization and minimum environmental impact.

Companies that at the time of the study were located at Green Tech Park are listed in a table in appendix 2.

3.3.2 Vision

Green Tech Park's aim is to be a platform for entrepreneurship in sustainable development and business opportunities in the agricultural sciences and to develop into a leading centre for the development of green industries. The goal is to help starting new companies and developing existing companies using the possibility of networking, between SLU, business, public sector and other stakeholders. The vision is to continue to be a business park and a meeting place for the green industry.

3.3.3 Stakeholders and financing

There are the main three stakeholders of GTP:

- The municipality of Skara, which owns the company and the house,
- The Association of Local Authorities in Skaraborg (Skaraborgs Kommunalförbund) that is an organization uniting the fifteen municipalities in Skaraborg
- Västra Götaland region

¹ Västra Götaland County (Swedish: Västra Götalands Län) is a county on the western coast of Sweden. The county is the second largest (in terms of population) of Sweden's counties and it is subdivided into 49 municipalities.

Green Tech Park is owned by Skara campus AB which itself is a part of Skara Municipality's business corporation Rådhuset AB (Town Hall). Skara campus AB owns and manages Green Tech Park and is Skara Municipality's initiative for business development. Representatives from the municipality have a place on the board at Green Tech Park to directly participate in GTPs planning and decision making.

The municipality of Skara supported development and invested in operating costs (about 2.3 million SEK per year) during the first two years of operations. Otherwise, it is a project based organization although the project activity does not contribute to the financing of the property; it builds more businesses in the house. Green Tech Park also receives funding through the share of projects that are partially tied to the house.

3.3.4 Staff

In spring of 2014 GTP has three employees of which just one has a permanent employment and that is Ulf Lindén employed by the municipality. He is also the business developer and responsible for the rental and booking questions. Ulf is the representative for the municipality and he is also the manager for development, planning and sustainability strategies. Pascal Tshibanda is the CEO at Skara Campus AB and comes from a position as business strategist working with regional development mostly through various EU projects at Skaraborg's local federations. He was a journalist from the beginning and has worked many years at the Swedish Radio and holds a master degree in Sustainable Development from the UK. He has also worked on the national organization Cleantech Inn Sweden as a coordinator of a cluster of innovative Swedish biogas company. Andrea Thiger has a short-term employment at GTP and is the Communications Manager and project leader for the project green process arena, which is funded by the region and the association for local authorities and Skara municipality.

3.3.5 Projects at Green Tech Park

Different projects are going on at GTP that are financed by various organizations e.g. Skara Municipality, Skaraborgs local federations, SLF (Foundation for Agricultural Research), SLU (Swedish University of Agricultural, Foundation for oilseed research and the Region Västra Götaland. Some of the projects are listed below:

Green Process Arena

This is a project that started in spring 2013 to promote sustainable rural development in Västra Götaland by stimulating green entrepreneurs and the creation of networks within fields such as small-scale bioenergy production and food production, green care and development of the regional horse business. Green Process Arena is based at Green Tech Park and is funded by the association of local authorities in Skaraborg, Västra Götaland and Skara Municipality.

Green Region

In order to highlight and promote sustainable projects, organizations, businesses and activities in Skaraborg in an international market Project Green Process Arena has created a website named

Green Region by getting help from AlizonWeb, one of the companies at Green Tech Park. This website contains information about the region, projects on sustainability in the region and the green projects and activities based in Skaraborg.

Agroväst

The company was founded 21 years ago and its purpose is to assist the Swedish farmers and to be a link between farmers and research through a number of different projects. In many cases researchers do research on matters that are not so important for farmers. Agroväst helps create linkages between farmers and researchers, which can lead to e.g. problems from farmers reaching the researchers who then might come up with implementable solutions.

Energigården

Project Energigården is a project under Agroväst. The goal of the program on energy farms is to replace 5 TWh of gasoline, diesel and oil fuel used throughout the region with renewable energy from agriculture and forestry by the year 2020.

3.3.6 Selection

Although Västra Götaland, especially Skaraborg, has one of the largest concentrations of businesses in the green industry and there is also great potential for new businesses that can leverage existing resources to develop new products and services, it is still difficult for Green Tech Park to get a critical mass of applications from green start-ups. Therefore, despite the goal Green Tech Park had from its start to keep a green profile with green companies and develop sustainability, they are now letting places out to other businesses, keeping the house occupied when there is no green idea coming in. Otherwise they were basically only interested in companies that are green from the beginning and have a green business idea related to natural resources, especially the rural area. Those who want to immerse themselves in the green can do it, but it is not a compulsory requirement in order to be at GTP in the current situation.

3.3.7 Evaluation

According to all tree staff at Green Tech Park the incubator is more interested in the entrepreneur than the idea itself and focuses mostly on the person's characteristics. If one can develop the entrepreneur, he or she will always have a lot of good ideas for the companies. A skilled entrepreneur has the abilities to develop almost any idea, while new ideas without entrepreneurship skills are not a guarantee of success. There have been examples of those who have had good ideas but did not have the ability to push the idea strongly enough in an entrepreneurial way. There are those who may have a weaker idea from the beginning, but are very good at getting things done and understand how business works. They succeed most of the times. GTP was initially intended to focus solely on green industries, but has over time evolved into a more general business incubator with a focus on entrepreneurship and networking.

3.3.8 Support

GTPs way to raise awareness and give more support to its tenants is among other ways through seminars and workshops that are free of charge and are held at least once a month. Lecturers come from different companies and organisations such as YH (Higher Vocational Education), Jordbruksverket (Board of Agriculture) and even from GTPs tenants and Skaraborg's politicians.

According to Green Tech Park's staff it is basically an ethical reason that drives the entrepreneur toward a sustainable business, however business developers here are trying to give them as much knowledge as possible about other benefits of thinking green for example:

- Future legislations: In not a far future, companies which are not green are not going to be able to compete at an international level.
- Educate a sustainable team: Training all employees in the principles of sustainable development will make this the company's spirit.
- Sustainability provides cost saving methods leading to reducing energy consumption.
- Marketing opportunities: Raising awareness will change the consumer's preferences more toward sustainable business.

Having Nyföretagarcentrum², Drivhuset³ and Ung Företagsamhet⁴ organizations in the house Green Tech Park helps them give both hard and soft support to its tenants.

Soft support

- Networking, e.g. with other entrepreneurs, customers and other support agencies. Here you have access to a vast network and expertise both in-house, but also regional, national and international contacts.
- Education, mentoring support and business coaching support using experienced advisors to help with the business idea, matters affecting the financial, marketing, develop business skills and development assistance of new products and services. Green Tech Park provides a resource bank and a broad network of expertise both within and outside the Green Tech Park that help people and businesses grow forward. In GTPs network there are researchers from different universities, politicians, business developers, experts and consultants in different areas, business associations and international contacts.

² Nyföretagarcentrum is the national mother organisation of Enterprise Agencies covering 200 of Sweden's 290 municipalities. Since 1985 they work hard to stimulate the start of more new companies in Sweden.

³ Drivhuset is a Swedish organization in 13 locations in Sweden wants to help students to develop entrepreneurship realize ideas, business ideas and start a company.

⁴ Ung Företagsamhet (Junior Achievement Sweden) is a non-profit organization working to promote entrepreneurship among Swedish students and to facilitate relationships between industry and the Swedish school system.

Hard support

Functional physical environment, physical resources and facilities like office space and conference rooms with inspiring environments and a low rent is provided for GTPs tenants. Tenants have the possibility to use office locations of varying size with the opportunity to hire some of the office space; they have access to modern and well-equipped conference and meeting rooms, both wired and wireless internet, copier machine, and café and lunch room in an open and pleasant environment, furnished outdoor environment close to nature. Free marketing under the umbrella Green Tech Park through Facebook, newsletter and website is also an advantage for tenants at GTP. The incubator has good cooperation with Connect west and can help with making contact with ALMI (a governmental provider of Advisory Services, Loans and Venture Capital) as well as banks for financing new businesses.

Informal support

The gathering of different companies and organizations leads to a creative atmosphere with a positive energy in the house. Green Tech Park arranges different activities such as lunches on Thursdays once a month where members of the Board of the Rådhuset AB (town hall) are participating in several of the lunches creating the opportunity to discuss and ask questions of leading local politician and raise ideas and suggestions. On Fridays there is a Friday snack for tenants at Green Tech Park where they take turns to offer refreshments and give a presentation about their company or any topic. These gatherings give the possibility for discussing joint development with colleagues, local people and competitors.

Green Tech Park tries to support companies not just in how to run businesses that are economically profitable but also support other values such as personal development for example through seminars. Events at the park also give possibilities for companies to meet with e.g. researchers from university and develop their relations. Provided support is not only related to general start-up questions but can also be specifically related to the green sector.

Formal support

Start-ups are involved in a development program where they have regular meetings with a few people from SLU holding, Nyföretagarcentrum and Drivhuset and Ulf Lindén from GTP that help them with business development. They put down concrete goals and evaluate them, which are specifically personalized for each entrepreneur. To a certain point, they must have accomplished some tasks in order to move forward. Some start-ups from Gothia Science Park in Skövde city (26.5 km distance) have chosen to sit here in Skara because the type of company they are working with is more suitable in the environment in Green Tech Park compared to what Skövde can offer.

3.3.9 Municipality and sustainable development

Västra Götaland has a target to break its fossil fuel dependency by 2030⁵ as a way for promoting sustainable solutions and eco-innovations. This is for example done through public procurement where public sector is a substantial provider of services such as e.g. meals at hospitals and elderly care homes.

Skaraborg (the Association of Local Authorities) consists of fifteen neighbouring municipalities with around 300 000 inhabitants. Skaraborg owns 1100 cars that they are leasing for 36 months to promote biogas and environmentally friendly cars in order to create a second hand market. They are the owners of the public transport system, so if they are promoting environmentally friendly solutions and specially biogas this will also creating a market for those who are producing biogas and it will give Volvo for instance an incentive to start to manufacture biogas busses. Key players at GTP work with bio-energy to industry and the public sector with a view to strengthening renewable solutions and phase out fossil fuel, according to VG strategy.

According to Leif Bigsten who is Falköping's development manager in Falköping municipality, employees have got the opportunity to make use of a company car, but only those cars that run on biogas and nothing else are approved. Since the municipality have its own biogas production available in landfills this helps to create commercial opportunities for creating market. (Skaraborgs Kommunalförbund homepage)

Unfortunately, green businesses here are basically self-employed or family companies, and find it difficult to compete. According to staff at GTP working with raising the awareness among citizens through communication is a way of supporting the development of these businesses. This is done through for example open and free seminars where individual citizens can meet with representatives of government and businesses and discuss and learn about sustainability.

3.4 Case 2 - LADEC - Finland

LADEC is located in the Niemi area of the town of Lahti and is the most significant research, education and business cluster in the environmental sector in Finland. Three existing business operators in the Lahti region, Lahti Science & Business Park and the main part of the Lahti Regional Development Company's (Lakes) and Lahti Region Enterprise Agency's operations, united in January 2013 to operate under the name of LADEC for regional development and to boost sustainable growth, develop good conditions for business growth, growth enterprise and international competitiveness in Lahti Region. Lahti region is among the largest growth centres in Finland offering an ideal location for companies.

⁵ The Sustainable Chemistry 2030 initiative, where the chemical companies in the city of Stenungsund, Sweden's largest chemistry and materials cluster, have developed a joint ambition to work toward a fossil-independent West Sweden by 2030 (Norrman & Lindbergh, 2013).

Even though LADEC is a regional development agency focusing on cleantech and industrial design a lot of work is done at the national level. For 6 years Lahti was in charge of developing clean tech industry in Finland while the Finnish ministry of economy and employment nominated Lahti to be national coordinator of a Finnish green tech cluster and now LADEC is responsible for the development and internationalization of the Finnish Cleantech Cluster and attracting investors to Finland. The cluster has promoted the creation of more than 60 new cleantech companies and 500 jobs. The prestigious Sustainable World Capital chose the Finnish Cleantech Cluster as third best in the world. (LADEC homepage 2014)

3.4.1 Organization

LADEC has built a network between education, research, business and public sectors. The focus is on helping companies in Lahti region, but there are also some activities like Cleantech venture day where LADEC operates nationally and helps all cleantech companies in Finland. LADEC is a partner in several international projects such as GreenXpo and TransBaltic Extension. GreenXpo stands for “Professional promotion of eco-innovation knowledge through an integrated expertise platform for policy makers, SMEs and the public in view of boosting the Green Economy”. It is a support action co-funded by the European Commission’s 7th Framework Program.

3.4.2 Vision

LADEC’s objective is to support and help start-ups, new profitable businesses using incubator and accelerator programs and developing existing companies in order to attract more international investments and more business to move to their region providing employment in the Lahti region.

3.4.3 Stakeholders and financing

The Lahti region with the four cities Lahti, Hollola, Nastola and Orimattila municipalities is the main stakeholder who finances LADEC. The main owner is the City of Lahti (74 percent) and the other owners are towns and municipalities, business industries, companies, universities and institutions of higher education in Päijät-Häme. The board members represent business, universities and other institutions of higher education as well the public sector. The board of directors acts as a steering group for the Lahti Region Centres of Expertise in Environmental Technology and Housing.

3.4.4 Selection

The incubator is not exclusively for cleantech businesses, however it has many cleantech firms since this is a focus area for LADEC and even the city itself promotes cleantech strategies. In order to have a successful area and be able to take care of regional development and make the area valuable, companies must fit into one of the following categories:

- BioEnergy/BioMaterials
- CleanWeb/Sustainable IT
- Food/Urban Agriculture

- Green Building
- Lighting/Energy Efficiency
- Energy Storage/Smart Grid
- Solar & Wind Energy
- Transportation
- Waste Management
- Water (Resource recovery, energy, treatment, etc.)

According to LADEC's business developer cleantech should be defined broadly, i.e. not only include environmental technologies such as renewable energies, waste management solutions, or water clarification systems. For example firms that manage to decrease pollution, or use less water or less energy could also be considered as cleantech. In LADEC there is also a focus on design manufacturing and decreasing waste.

In 2013 LACED changed their focus from idea to the leading group. Before that, the focus was on the idea and the team was secondary: the entrepreneur got help with starting a company, getting a patent for his/her idea and to get money from funders, which resulted in many companies being established with limited human resources. After applying the "Protomo method" (see below), LADEC found a way to bring people to ideas and now they demand at least two people who have a role in the development of that idea to start a business and get funding. The method for evaluating business ideas is the well-known NABC model in which N stands for Need, A for approach to that need, B for benefits of approaches concerning the need & C for competition.

3.4.5 Support

LADEC provides companies with both hard and soft support. Here there are offices, conference and meeting facilities available for hire and workshop facilities and exhibitions. LADEC helps companies depending on which stage they are in and their needs and demands through different programs and phases.

Start-up counselling and services

Counselling is free of charge. Start-ups have the possibility to use an extensive network of experts within LADEC who are familiar with different areas of business. Following services can be provided:

- Help with evaluating and developing business idea and business plan
- Financial calculations, finding funding options, advice on writing different funding applications, investor meetings
- Selecting a suitable company form, selecting business premises, joining projects,
- Clarifying permit and registration issues,
- Drafting a marketing plan

Protomo

Services are not called incubator any more. In 2009 the Protomo system was established in the Tampere area. Protomo is a new business development service (incubator) in Finland that helps skilled people develop ideas or competences. During the Protomo process individuals from different sectors gather, meet and find each other in order to build an entrepreneurial team. If necessary, new members can be invited to join so that the team broadens its expertise. Then LADEC helps with starting a company. The result is more creative companies coming out and helps making career opportunities for new graduates or for anyone interested in becoming an entrepreneur. Here there are teams working on ideas.

Accelerator

An accelerator helps companies aiming to grow move forward and to enter global markets faster by giving them information and skills they need. During this phase a service strategy based on customers' needs is created and put into practice; a schedule with the goals and deadlines is made. Another important help companies get during the accelerator phase in LADEC is evaluating the financing needed during early stages of growth and help in finding funding and securing their finance. Important sources of financing are The Centre for Economic Development, Transport and the Environment (ELY Centre), Tekes, Finnvera, trusts and institutions investing risk capital, as well as angel investors.

Sales Booster

LADEC helps companies with understanding the clients and their role in business development. They go to potential real clients and evaluate their needs and create a value from the clients' side in order to be able to start sales immediately after the start of the company. According Nina Harjula, development manager with focus on cleantech at LADEC and the founder of the global cleantech association GCCA⁶, there are a lot of technologies and solutions out there but they can't find funding since they are often very risky and it takes a long time to get cleantech innovations to be commercial.

Since LADEC has learned that funding is the biggest problem for cleantech start-ups, it focuses on Venture capital networks and internalization for such start-ups and tries to find investors and match them with the cleantech companies. Considering this, LADEC organizes a lot of projects and seminars and several events per months on matters like reducing cost in water and energy by using new cleantech solution. Most of them are free of charge and funded by different projects.

Cleantech Venture Day

Cleantech Venture Day is an event for investors and companies where the companies pitch for investors. The Cleantech Venture Day event has a fee that is less for smaller companies and start-ups looking for investors than big companies and investors.

Nordic innovation accelerator (NIA)

⁶ GCCA stands for global cleantech cluster association which is a non-profit organization that link cleantech clusters around the world so that companies can find new markets and innovations can get faster to the market in order to drive sustainable regional economic development, on a global scale and making local clusters, global.

LADEC hosts the Nordic Innovation Accelerator, which provides companies with access to top corporate partners and investors to faster bring their product to real markets and help the company's growth and international expansion. The model is based on the Veolia Innovation Accelerator, to support green growth around the world by promoting the development and deployment of leading clean technologies in partnership with entrepreneurs.

The Nordic Innovation Accelerator (NIA) posts different environmental challenges received from Veolia and encourage Acceleration members to come with solutions. Each submitted solution will be evaluated and in the end the challenge owner will invite selected applicants to interviews and negotiations. The NIA Innovation Tool attracted proposals from 54 companies in response to a waste logistic challenge recently.

Even though roles and legislations about the use of material and energy, water and waste management are very restricted for companies in Finland in general, which makes for a good market for clean tech companies, Lahti still has set up their own goals when it comes to impact on pollution, reduce waste and emissions. This also makes Lahti an attractive choice for cleantech companies.

3.5 Case 3 - Green Garage - Germany

The case study in Germany was Green Garage (GG), which is the first incubator in Germany that exclusively targets climate innovations. It was started on the 24th of April 2013 in Berlin as a part of the European network Climate KIC (see www.climate-kic.org) and is located on the low-carbon EUREF (European Energy Forum) Campus. Climate-KIC is a non-profit association and Europe's largest public-private innovation partnership that drives innovation in climate change to address the challenge of climate change. Green Garage is an example of an environmentally friendly building being heated by biogas and having solar cells on the roof.

Climate KIC has an accelerator program for entrepreneurs and Green Garage is the building (an old garage that has been restored with original doors) where the accelerator program is run and it is an inspiring colocation place where a lot of people come together just to be together and across discipline in this charismatic meeting place. The GG has two parts: the garage for start-ups and a workshop room.

3.5.1 Organization

With a fast growing number of start-ups supported in Berlin, Climate-KIC Germany decided to provide an incubator facility specialized on climate-related start-ups as part of its service. That is how a former industrial site reconstructed and remodelled for business, research and education purposes on the EUREF Campus became the Green Garage incubator.

The EUREF campus with its sustainable solutions is a unique centre for innovation and future projects in Europe. Surrounded by parks, green areas and heritage-protected buildings, it focuses on energy saving building development (Climate KIC homepage 2014). The campus hosts a variety of clean-energy related companies and organisations, and forms the largest climate-innovation campus in Berlin (Climate KIC homepage 2014). The Green Garage has supported 42 start-ups since 2011.

3.5.2 Vision

The goal of the program is to bring climate entrepreneurs with climate-related ideas from the idea stage to the investment stage in about 12-18 months.

During the program the idea should be transformed into a commercially viable business. The program supports getting in contact with potential customers and investors, accelerating the business, developing products and services, and finding the first client.

3.5.3 Stakeholders and financing

Climate KIC manages and runs the Green Garage. One of the key stakeholders is the owner of the building, which is EUREF AG behind the EUREF campus. As mentioned above the Green Garage was part of the renovation of an old industrial site on the EUREF campus.

3.5.4 Staff

At the time being a full time incubator manager, business coaches who help start-ups and the head of the entrepreneurship program in Germany are working at GG. There are also students helping with administration and academic programs.

3.5.5 Evaluation

The Green Garage opens up market opportunities for small businesses and start-up companies with climate change innovations. According to the incubator's manager reduction of carbon and climate impact is the necessary factor in considering a company being clean. It is a strict requirement for firms admitted to GG that the idea of the entrepreneur has a connection to either preventing climate change or adapting to it.

3.5.6 Selection

Each start-up first gets accepted into the Berlin incubation program. Since a lot of start-ups and applications with new sustainable ideas are coming to GG in order to get a chance to get accepted to the accelerator program, start-ups need to go through two stages of application. They apply both through a written application and also a presentation to a jury including both Climate KIC members and external experts like investors, entrepreneurs, and academics working with entrepreneurship. The most important and the common core review criteria for evaluating accelerator proposals/pitches are:

- Climate impact
- Team
- Scalable business model
- Competitive advantage and/or innovativeness

Obviously potential customers, market and potential success of the business, the leading group's references, ages and experiences are vital to picking the most promising idea and team to let the best pitch enter the acceleration program.

3.5.7 Support

The incubator provide promising start-ups at early stages with the tools, opportunities and network (integration into the Europe-wide Climate-KIC network), help with promoting their entrepreneurial skills and funding to develop their ideas into commercial success.

Hard support

Like most incubators GG provides entrepreneurs with modern working space, meeting and conference rooms as well as high-tech-videoconference facilities. GG inhabits up to six start-up companies in 280 square meters as well as space for workshops and seminars for up to 60 people. Some financing/grants are also provided by GG to the tenants.

Soft support

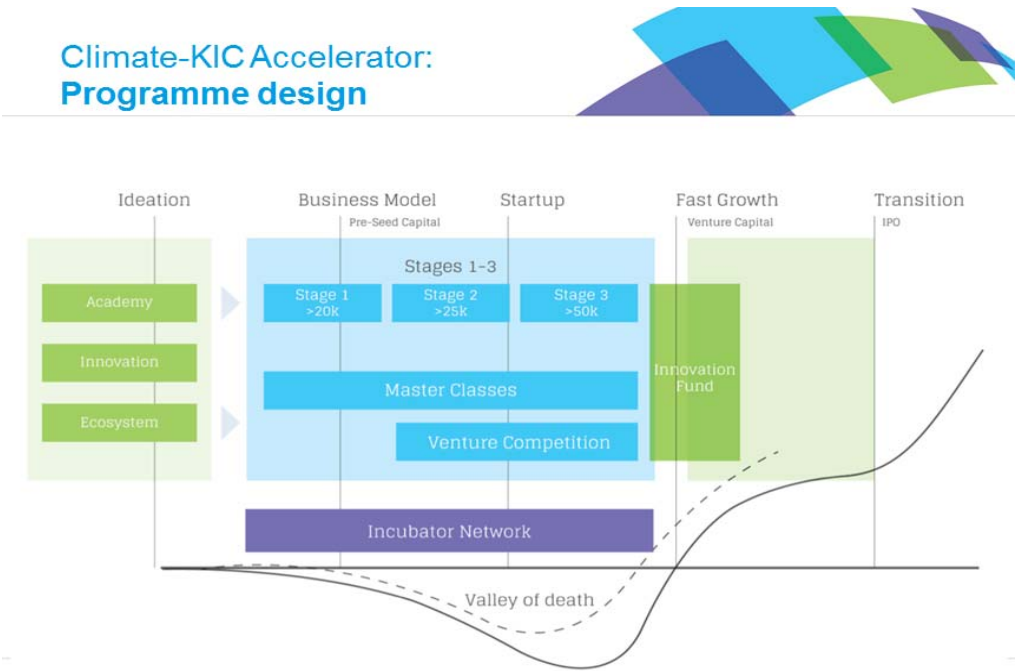
GG offers business coaching and master classes on topics such as sales and business modelling and help to develop entrepreneurial skills: from business model generation, team building, to negotiating and closing sales deals.

3.5.8 Accelerator program

Start-ups go through an 18-month program with three stages (see figure 1). In the first 6 months they create their business model by having access to business coaches, master classes and up to 20,000 euro. Afterward in order to verify the business model they meet at least 50 potential clients while they still have access to business coaches, master classes and the possibility to participate in venture competitions. During this second 6 months they develop their comprehensive business plan, financial model and customer research and can get up to 25,000 € from the incubator. During the last stage, which is also 6 months, firms can sign up a launching customer and use pitch training sessions, master classes and their coach to get ready to meet the potential investors.

In the first stage the focus is on finding the right business model, and learning business fundamentals. Stage two focuses on validation and verification of the business model, and stage three is about finding investment or capital and protecting the idea. During all three stages the start-up gets funding through a scholarship from the accelerator and they have access to business coaches, training, workshops, seminars and master classes. They can even participate in a Europe-wide competition for Climate KIC start-ups. Entrepreneurs have to pitch each state to get to the other one, and not all teams go through the whole program. There is also an alumni phase afterward where start-ups have the possibility to stay in the loop, keep in touch with GG, get invited to workshops and connect to other partners, but without any funding.

Figure 1: Climate-KIC Accelerator program design



Source: Climate KIC homepage, 2014

Start-ups can also get support from acceleration services, participate in workshops and use prototyping space at GG. The incubator also provides commercial market opportunities for climate change innovations and brings ideas to the market. They also have the possibility to participate in workshops and climate-related events. The incubator holds 6-8 master classes each year and each master class is a two-day intensive program starting with a networking dinner. The average number of places is fifty and participation is free of charge.

The Green Garage has changed their activity a lot over time, creating and adding new activities, using very flexible people on entrepreneurial teams that run the accelerator program who are willing to try and experience new solutions and sharing it with each other. Entrepreneurs applying to GG are already very motivated about creating a low carb business and with their idealistic way of thinking they are willing to change and do something better and work toward climate friendly goal. There is also a big market potential for example when it comes to renewable energy technologies that make it easier for GG to get a lot of application with new sustainable ideas.

According to GG’s manager public policy can work on both aspects of demand and supply in order to guide the society toward a more sustainable one. Climate KIC is a supply initiative trying to support entrepreneurs with new ideas to supply them to the market. Laws supporting sustainable business ideas by the state that work on the demand side by encouraging or discouraging technologies can lead to the ideal world where sustainable businesses are run by people who do not even care about sustainability.

3.6 Conclusions

Our main conclusions reveal that the studied incubators have a profound interest in supporting sustainability-oriented start-up enterprises, but that their approaches vary. Those incubators that receive too few applications from sustainability-oriented start-ups widen their selection criteria to include other kinds of start-ups, contrary to their starting mission and seemingly necessary in order to utilise their available resources. Those incubators that received more applications than needed to achieve full occupancy were able to maintain rigorous selection criteria for sustainability-oriented enterprises. Thus, the selection criteria of sustainability-oriented incubators depends on the number of applications they receive (critical mass), which in its own turn depends on the environment.

The support these three incubators offer, however, is similar to the support given by any conventional incubator, particularly when selection is focused on the entrepreneur instead of the idea. However, the networks and competences available in these sustainability-oriented incubators mean that when tenants require specific support related to sustainability ideas, this competence is available, either in-house or through incubator networks that include actors such as universities, technology clusters, investors, and sponsors.

4 The Green Entrepreneurship Training Program – A Short Case Study

The following case study is an example of how entrepreneurship and new business development can be stimulated by providing hands-on entrepreneurship training programs.

4.1 Background

The Entrepreneurship and New Business Development Program (ENP) started at Linköping University in 1994. The model for the program was developed at the Centre for Innovation and Entrepreneurship (CIE) and the network for business in Linköping (SMIL). The program has evolved and spread across Sweden. Since 1994, the ENP involved more than 1,500 participants and generated 500 new businesses. When the program started, it was a step in developing a more comprehensive activity portfolio of technology and knowledge-intensive companies that spun off from the University of Linköping.

In 2006 a new entrant was formed, AgroÖst, working for rural enterprise growth and development within the green industry of the counties Östergötland, Örebro and Södermanland. AgroÖst Research and Development Corporation is a wholly owned subsidiary of the non-profit AgroÖst. The purpose is to promote business development related to the green industries in eastern Sweden. One of the areas that AgroÖst desired to work on was entrepreneurship and entrepreneurial regional growth. Consequently, AgroÖst chose to invest in entrepreneurship programs for emerging growth firms within the green industry in the counties of Östergötland, Örebro and Södermanland. In this process of developing a program aimed towards stimulating entrepreneurship within green industries it involved Linköping University through the Centre for Innovation and Entrepreneurship (CIE).

4.1.1 The initiation and development of ENP for “Green Industries”

The first program started in 2008 and has since been an important step in developing a supportive process for individuals with ideas within the green industries on terms similar to those previously offered to entrepreneurs with connections to the University of Linköping. Today it is also in line with Linköping University's strategy and falls under the “third mission” that aims to “further develop and strengthen the interaction with the community” and “contribute to community development based on knowledge.” Any internal support for financing this type of action was not carried out at the University of Linköping as the program was funded entirely by external funding.

During the period 2009-2013 six programs were carried out. In total, 83 individuals with 73 different projects participated in all the programs. Of these projects, as 50 projects resulted in new businesses or new business areas and nine projects were still in the concept phase at the end of the program. During the program a total of 14 projects forfeited the program. In all cases, these ones surrendering did so because of changed circumstances for the participants. These changed conditions were, for example, work-, family- or health-related.

Table 2: Examples of businesses that have participated within the program

| Venture | Business activities |
|-----------------------------------|--|
| Give it | Web shop for 'regional' emotional experiences. |
| Tolefors gård | Production of biodiesel from used cooking oil and animal fat. |
| Calluna Utbildning /Natur-centrum | Using nature as a source of inspiration for educational and pedagogical development. |
| Kolsbro Häst och fritid | Horse riding, riding lessons, and tourism. |
| Basunda gårdsslakteri | Farm slaughterhouse for stress-free slaughter. |
| Boställets vedugnsbageri | Homemade bread, cafe, catering. |
| RC Gräv och konsult | Mechanical excavating. |
| ClearView | Imports of mosquito net doors. |
| Nykils Industriresurs | Subcontracting in CNC technology. |
| Brunneby ved | Firewood cutting with associated product. |

4.2 Contents and execution

The contents of the program have consisted of three components: coaching, workshops and mentoring. The participants are coached by an entrepreneur with years of business experience (which does not have to be specifically in related green industries). The coaching is controlled and set by the program directors in a joint dialogue with the aim to drive the process of development of the project plan ahead in time.

During the program, participants meet together to practically work with entrepreneurship in a workshop format. The subjects on which the projects all work together in these workshops are e.g. businessman ship, communications, and business planning, marketing as well as sales practice. In addition to coaching and workshops, projects are also included in smaller groups, a mentoring group that is assigned to a mentor. This mentor is similar to the coach – an experienced entrepreneur with practical experience of building companies. Program management does not manage mentor groups. It is the participating projects that control what they want to immerse himself or herself in, in discussion with the mentor.

The program contains of a number of workshops where key areas are business development and entrepreneurship. Typically, each workshop lasts approximately 4-6 hours. In the program, the following workshops are included:

- Selection of the idea of exploitation
- The Business Platform and the requirements to achieve it
- The Business Plan's structure and content, early business development
- "Soft factors" of entrepreneurship - self-awareness and motivation

- Marketing and Business Intelligence
- Practical finances
- Presentation skills and rhetoric
- Use of the Internet as a tool
- Practical accounting, finances and capital
- Growth, organizational issues and management issues
- Conclusion and presentations

Experienced entrepreneurs or business-oriented academics hold each workshop. These entrepreneurs have a background in different industries and businesses and have local connections.

4.2.1 Target groups and recruitment

The primary target group for the entrepreneurship program is people working in the green industry. To participate in the program, each participant must have an idea and a clear desire to start a new business or diversifying an existing business. The ideas can be within sectors such as e.g. energy, environment, agriculture, food, horticulture, pets, hunting, fishing or the entertainment industry. The program is also open for those who already have a business, intending to develop a new business or spin off of their own business and can usefully complement e.g. an existing agricultural business. It is of great importance that the participants have a genuine commitment and actually have time to fully take part in the program.

Participants must apply for the program and those who are applying are interviewed by the program directors. As mentioned previously participant commitment and drive are prioritized rather than the idea and formal background. The program puts the individual (the entrepreneur or the entrepreneurial team) before the idea.

There is considerable variation in participants' ideas, such as e.g. developing their farm in general to reach new types of customers, increasing the utilization of existing activities, product branding and to adding value to an existing product for an 'old' customers. The majority of the participants are over 25 years old and generally have extensive work experience. During the six programs that have been carried out, 35 men and 48 women have participated.

4.2.2 Program funding

There is no fee to join the program and this is a decision that remains from the original program. The reason is that the participants in most cases cannot afford the required fee to cover the program's actual costs. The program therefore entirely external funded. The total cost of carrying out an average ENP program is approximately 400-500 thousand SEK. Normally 10-20 participants are offered a place in the program, representing about 10-15 ideas (businesses). When starting the program the participants pay a deposit of 500 SEK per idea/project. This deposit is refunded when the program is finished (if the participant fulfils the pre-agreed criteria regarding participation). The reason behind the deposit is to ensure the participant's intention to fully participate and complete the program.

4.2.3 Feedback from participants

After a finished program a basic evaluation is carried out. Here are some quotes from those who have participated in the program:

"The formidable ability to have the standpoint that I do not know anything about my business, completely rethinking business issues, has given the idea a great boost forward."

"To receive both positive and negative feedback, to be questioned - excellent!!!"

"This program has let us advance within our project, given it structure it and given us a perspective on how it would work I reality."

"Being given inspiration, a nudge forward and a blueprint for next step of the project – well structured and a great learning process."

4.3 Conclusions

ENP provide skills and give inspiration to the 'engaged' participant. To that, the program structure and process is designed in a way, which is intended to support the building of networks amongst the different participants and projects. As an entrepreneur (owner manager), one is often feel alone in the daily business operation. A meeting arena, which ENP in fact is, will facilitate networking and learning between people who are in similar working situation and enhance break down of barriers of mutual business development and future co-operation.

5 Incubator Survey – Sweden, Finland, Germany

5.1 Introduction

A survey study was conducted within this work package in order to be able to provide an overview of how incubators in the three countries integrate sustainability issues.

5.1.1 Methods

A web-based survey consisting of 26 questions was sent out via e-mail in June and July 2014 to previously identified incubators in Sweden, Finland and Germany. As far as we know the survey reached all active incubators in these three countries – this has been verified by local research teams and through contact with national associations for incubators. Response rates are presented in table 3.

The survey questions covered three main topics, namely basic information about the respondent and the incubator, intake and assessment of incubator tenants, and support for incubator tenants. Sustainability was defined in the following way in the survey: (i) Reduced negative environmental or social impact, (ii) Environmentally or socially sustainable business concept, (iii) Sustainability or environmental expertise such as: sustainable design, environmental performance assessment, green marketing.

Table 3: SHIFT incubator survey response rates.

| | Germany | Finland | Sweden |
|---------------------------------|----------------|----------------|---------------|
| Total amount of incubators | 300 | 16 | 44 |
| Amount of responding incubators | 65 | 11 | 20 |
| Response rate | 22 % | 69 % | 45 % |

5.2 Results

Results from the survey are presented in the following table and graphs. From our data we can observe that the responding incubators consider regional or national economic development to be their most relevant aim. Sustainability was considered as either “relevant” or “less relevant” by most respondents, with profit being less relevant or not relevant to their operations. Most respondents are open towards companies from a variety of industries. When respondents do state that they have a specific industry focus, the most common is a focus on IT & telecommunication.

Table 4: Sample characteristics (absolute amount of responses for each alternative).

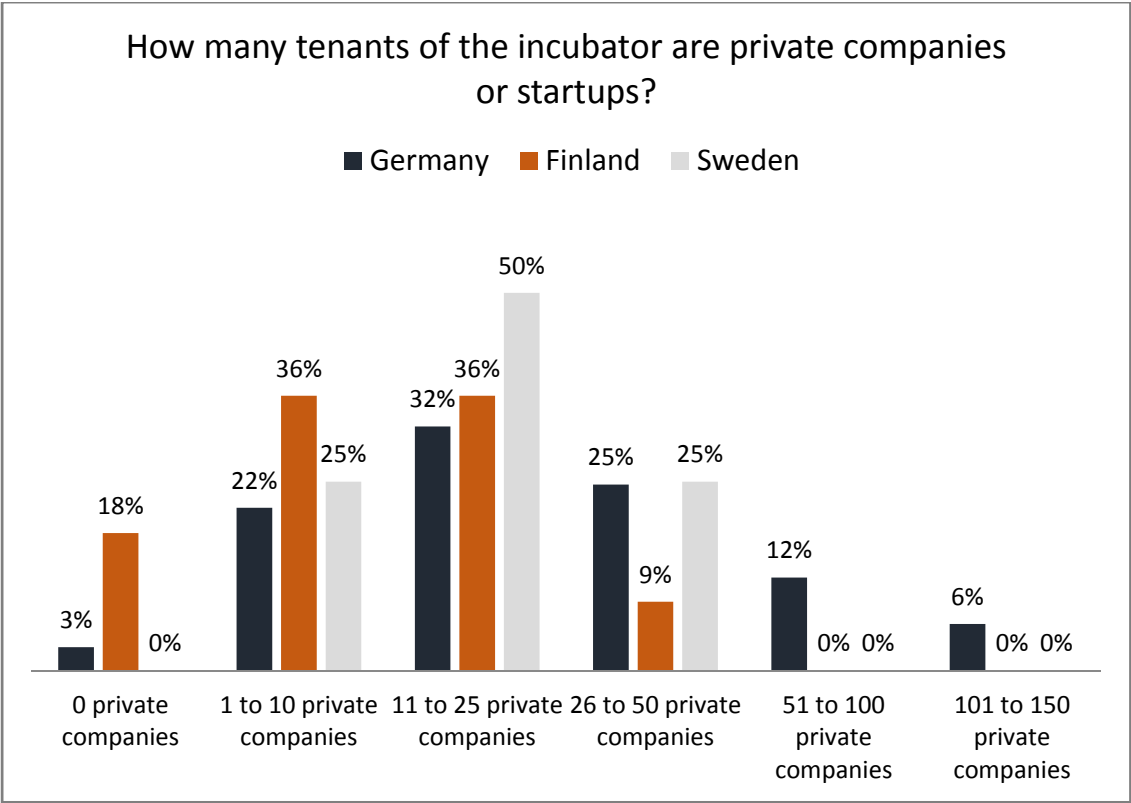
| | | Germany | Finland | Sweden |
|------------------------------|---|---------|---------|--------|
| AIM | How relevant are the following aspects to the main aim of the incubator? | | | |
| | Regional or national economic development (only one alternative possible) | | | |
| | Very relevant | 59 | 10 | 17 |
| | Relevant | 6 | 1 | 3 |
| | Less relevant | 0 | 0 | 0 |
| | Not relevant | 0 | 0 | 0 |
| | Unknown/Prefer not to answer | 0 | 0 | 0 |
| | Sustainability, reduced environmental impact (only one alternative possible) | | | |
| | Very relevant | 10 | 0 | 2 |
| | Relevant | 40 | 3 | 16 |
| | Less relevant | 12 | 5 | 2 |
| | Not relevant | 3 | 2 | 0 |
| | Unknown/Prefer not to answer | 0 | 1 | 0 |
| | Profit (only one alternative possible) | | | |
| | Very relevant | 6 | 1 | 1 |
| Relevant | 18 | 3 | 1 | |
| Less relevant | 29 | 1 | 3 | |
| Not relevant | 11 | 6 | 15 | |
| Unknown/Prefer not to answer | 1 | 0 | 0 | |
| INDUSTRY | Which industry or knowledge area is the incubator specifically aimed at? (several alternatives possible) | | | |
| | No particular industry (all industries) | 35 | 7 | 10 |
| | Biotech, life science | 11 | 1 | 4 |
| | Manufacturing | 14 | 1 | 3 |
| | IT, software, telecommunications | 29 | 2 | 5 |
| | Cleantech, greentech, renewable energy, environmental services | 17 | 2 | 4 |
| | Culture, creative industries, arts | 4 | 1 | 1 |
| | Unknown / Prefer not to answer | 0 | 0 | 0 |
| Other | 20 | 1 | 6 | |
| OWNERSHIP | What entities make up the incubator's ownership? (several alternatives possible) | | | |
| | Private Investors | 9 | 1 | 3 |
| | University | 5 | 3 | 14 |
| | Governmental institution (federal, regional, or local) | 57 | 5 | 16 |
| | Unknown / Prefer not to answer | 0 | 1 | 0 |
| Others | 11 | 4 | 3 | |
| SUPPORT FOR START-UPS | In what way is the incubator engaged in the business development, management, or strategic planning of tenant start-ups? (only one alternative possible) | | | |
| | The incubator directly influences the business development, management or strategic planning of the tenant company | 1 | 0 | 11 |
| | The incubator continuously coaches tenant founders in business development and suchlike | 17 | 9 | 9 |
| | The incubator to a limited extent offers consultancy, advice, or business development assistance | 45 | 2 | 0 |
| | The incubator does not engage in tenants, other than providing office space and office infrastructure | 1 | 0 | 0 |
| | Unknown / Prefer not to answer | 1 | 0 | 0 |
| EMPLOYEES | How many employees are permanently employed by the incubator organization? (given as a number) | | | |
| | None | 1 | 1 | 0 |
| | 1 to 5 | 38 | 9 | 10 |
| | 6 to 10 | 17 | 0 | 7 |
| | 11 to 20 | 7 | 0 | 3 |
| | 21 or more | 2 | 1 | 0 |
| | How many persons are hired by the incubator part-time or temporarily - for instance as experts, mentors, coaches or consultants? (given as a number) | | | |
| | None | 22 | 4 | 1 |
| | 1 to 5 | 27 | 5 | 12 |
| | 6 to 10 | 6 | 0 | 4 |
| | 11 to 20 | 3 | 2 | 1 |
| | 21 or more | 3 | 0 | 2 |
| | Missing answer | 4 | 0 | 0 |

With regard to ownership we observe that governmental institutions are the most common owners of incubators. In Germany there is also some private ownership in nine instances while in Sweden universities play a notable role in the ownership of incubators (in fourteen cases).

We can observe interesting results considering the type of relationship between the incubator and its tenants. In Germany many incubators (45 out of 65 respondents) offer business development assistance and advice only to a limited extent. In Finland 9 out of 11 respondents state that they continuously coach their tenants while in Sweden 11 out of 20 respondents state that they directly influence business development of their tenants. These differences are quite notable and worthy of further exploration.

Regarding the size of the incubator organisation the situations looks relatively similar across the three participating countries. Incubators are mostly small organisations, permanently employing less than 10 individuals. In Sweden the mean number of employees is 6,5; in Germany 5,7 and in Finland 4,0. Furthermore, part-time or temporary employees are often less than 5. The number of employees is reflected in the number of tenants that tend to be quite small as well. As shown in figure 2 a few incubators in Germany and none in Finland and Sweden house more than 50 private companies. The most common size is between 11 and 25 private companies per incubator.

Figure 2: Amount of incubator tenants that are private companies (percentages are shares of respondents within each of the countries that fall within each range).



The data shows that many responding incubators are to either a great or some extent profiled as green. Many incubators also house companies that have green or environmental products or services as their core business. 55 percent of respondents in Finland, 69 percent in Germany and 85 percent in Sweden have at least one such tenant.

Figure 3: Green profiling of incubators (percentages are shares of respondents within each of the countries).

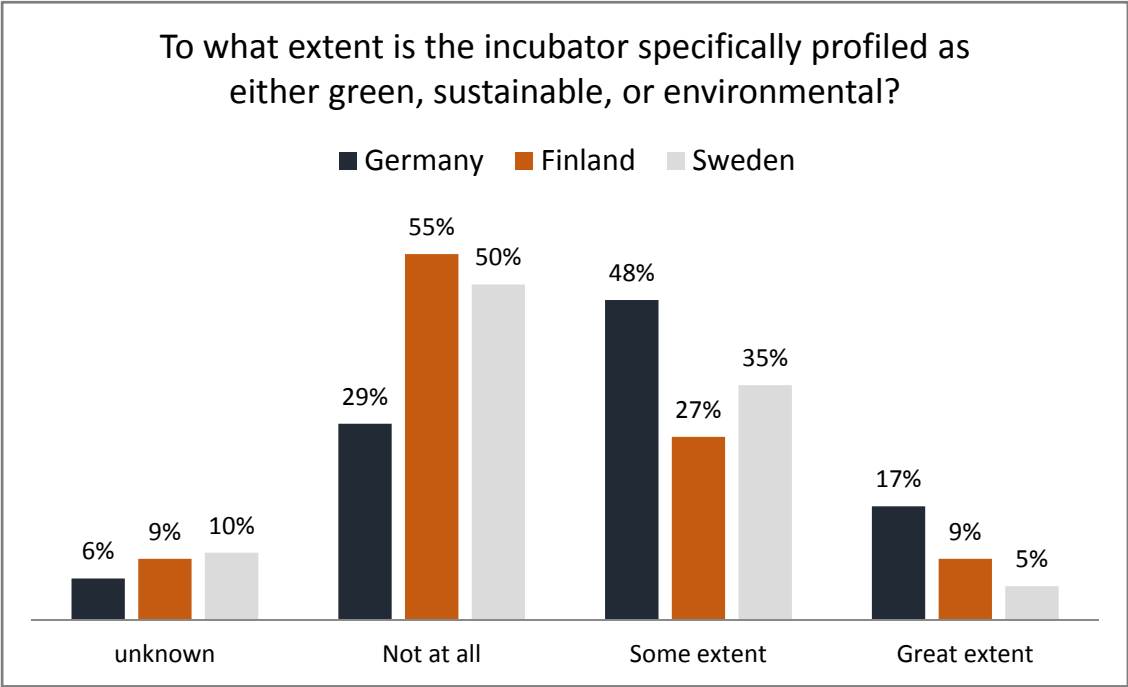
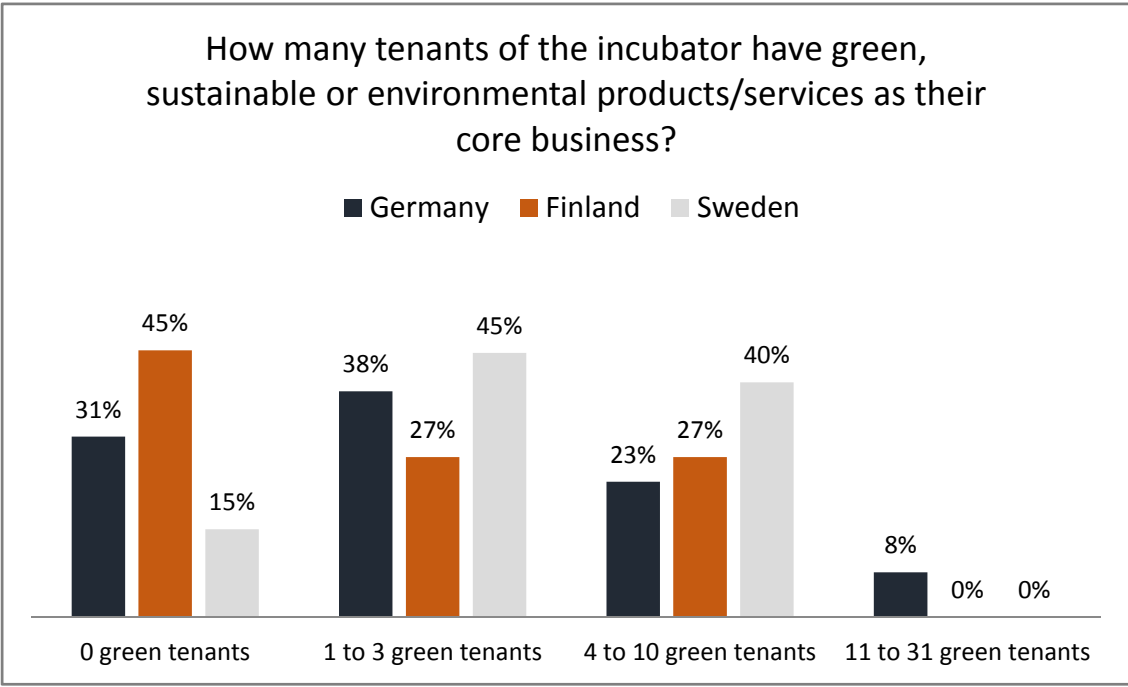


Figure 4: Amount of incubator tenants that are green/sustainable (percentages are shares of respondents within each of the countries that fall within each range).



Regarding selection of tenants we observe that sustainability aspects of potential tenants are not considered as being important when selecting which tenants to accept with the notable exception of 40 percent of Swedish respondents that instead stated that sustainable tenants are preferred. However, it is rather common to apply negative selection criteria, i.e. refuse tenants with adverse environmental impacts.

Figure 5: Application of positive selection criteria relating to sustainability (percentages are shares of respondents within each of the countries).

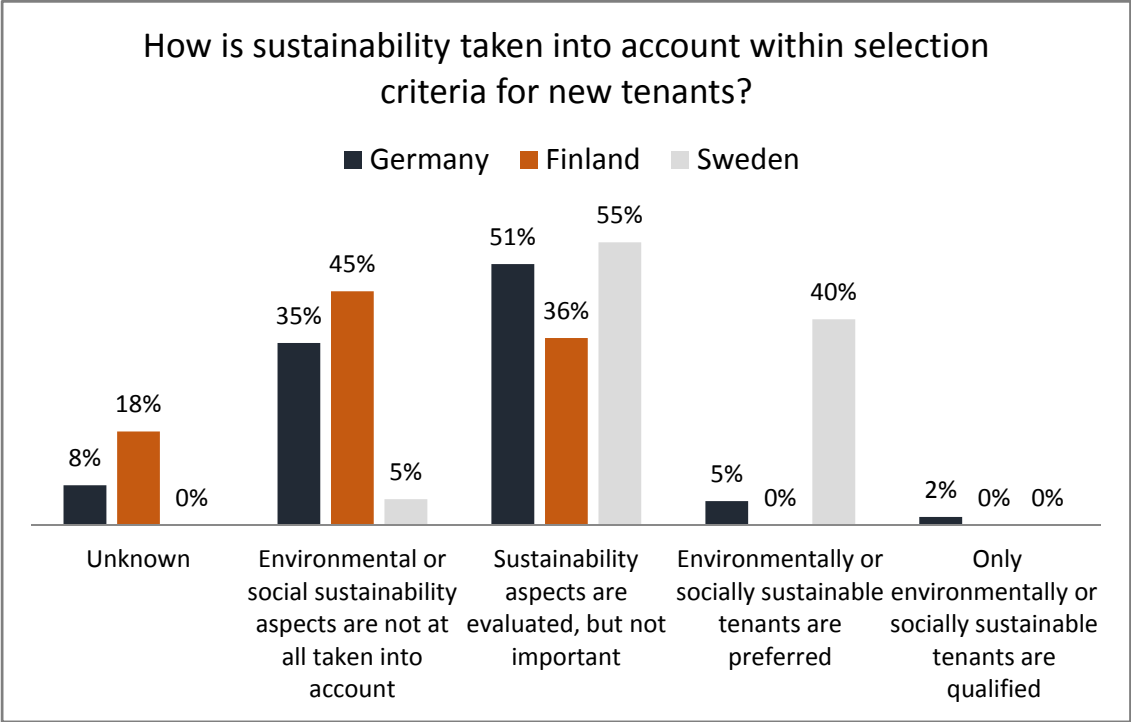
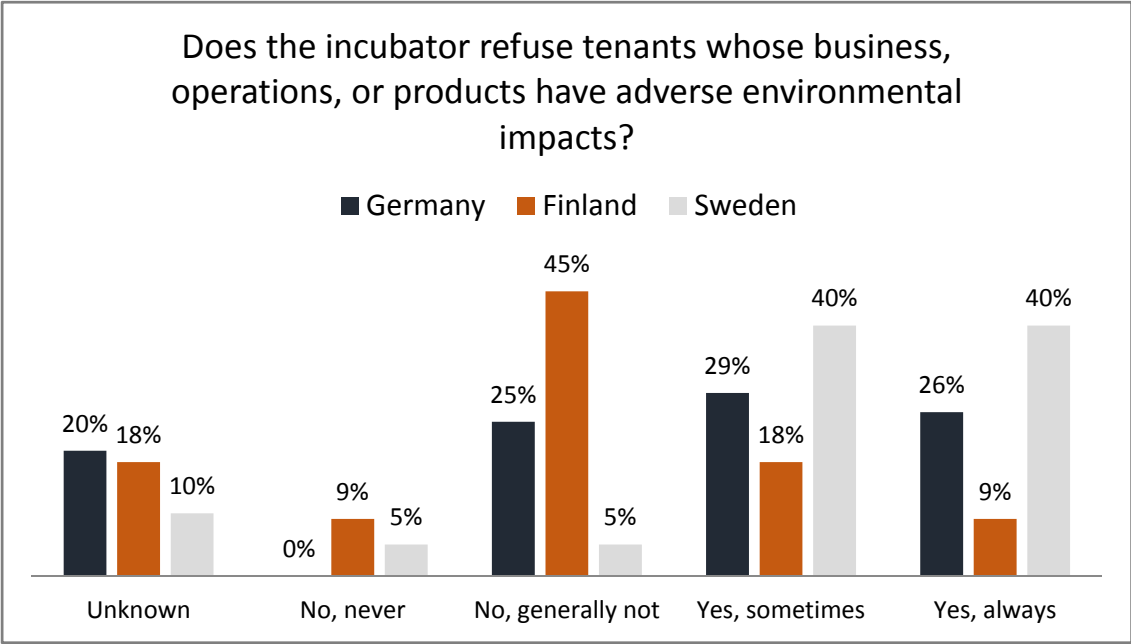


Figure 6. Application of negative selection criteria relating to sustainability (percentages are shares of respondents within each of the countries).



When it comes to the “greening” of incubator tenants, we observe that many incubators in Germany and Finland do not encourage their tenants to make their businesses greener (66 percent respectively 64 percent of incubators). Conversely, in Sweden 70 percent of incubators state that they encourage tenants to either improve environmental or social performance or both improve in this area and reduce negative environmental impacts. How this is achieved is however unclear since relatively few Swedish incubators include specific sustainability or environmental expertise in their business development support (35 percent). The corresponding numbers in Germany is 25 percent, and in Finland 27 percent. These numbers correspond more closely to the data on active encouragement for greening in these countries’ incubators.

Figure 7. Greening-type support given to tenants (percentages are shares of respondents within each of the countries).

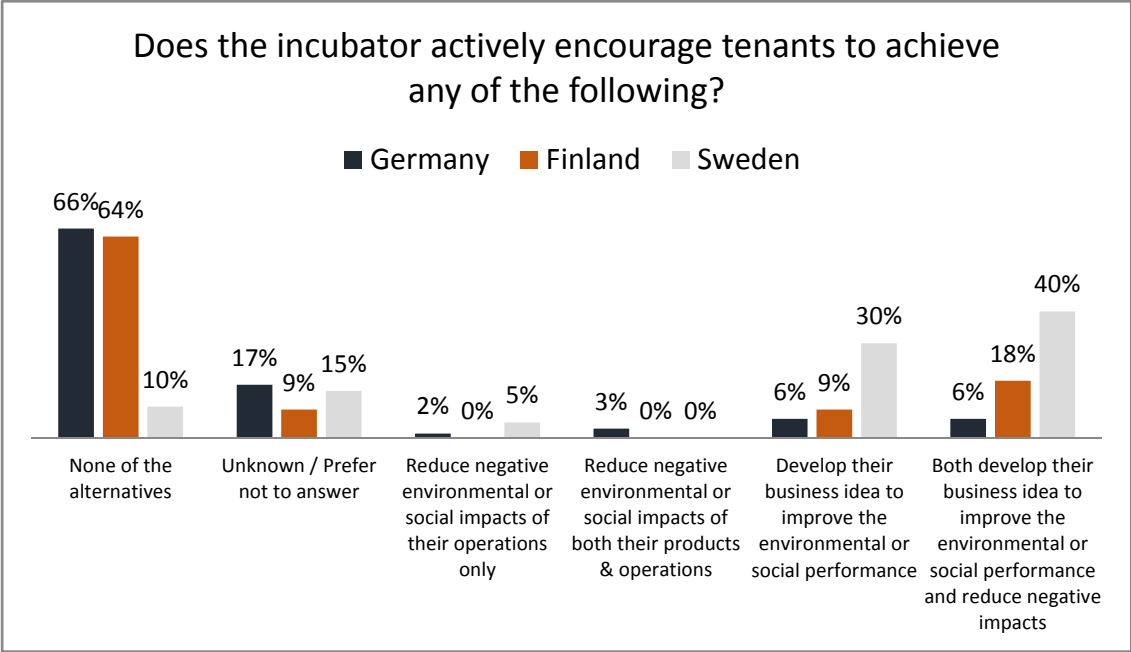
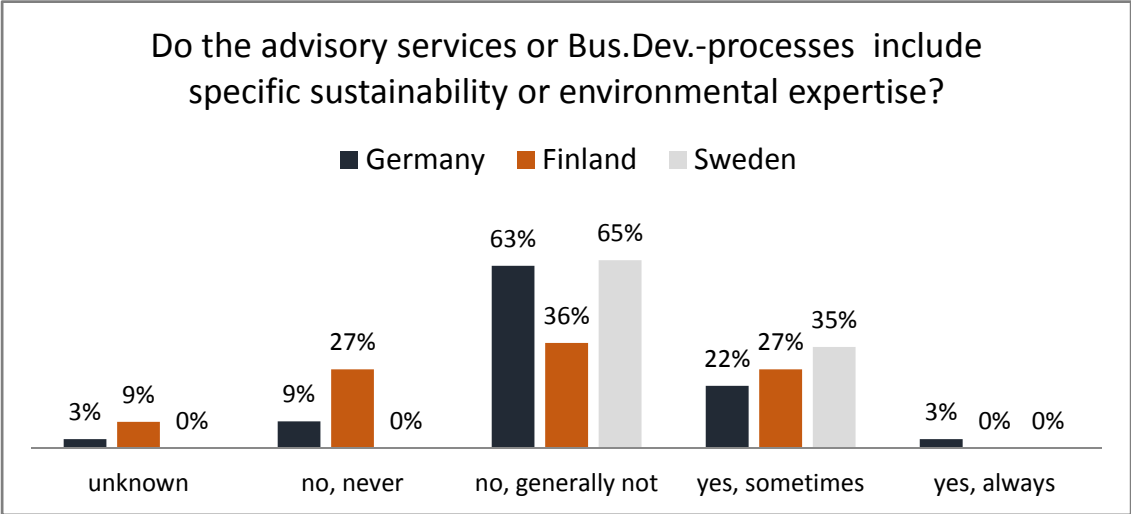


Figure 8. Provision of sustainability-related expertise to tenants (percentages are shares of respondents within each of the countries).



5.3 Conclusions

The survey has shown that a green profile seems to be important for many incubators and that there are some green tenants already within incubators in the three participating countries, Finland, Germany and Sweden. However, when selecting new tenants most incubators do not apply criteria relating to sustainability. This could be due to the characteristics of applicants, i.e. that it is difficult to get tenants when strictly applying such criteria as our case study interviews suggest. This could also be related to the fact that regional or national economic development is the most important aim for overwhelming majority of incubators (as shown in the sample characteristics, see table 4), taking precedence over sustainability concerns.

An encouraging sign is that many incubators state that they would refuse tenants with adverse environmental impacts, implying that economic development should not be accepted when it bears an obvious high environmental cost. When it comes to provision of support to their tenants there are notable differences between the participating countries with the Swedish incubators being on average most actively engaged in their tenants and the German ones on average least actively engaged. Limited engagement offers limited opportunities to contribute to a “greening” of the incubator tenants. A majority of the Swedish incubators state that they provide some kind of active encouragement for greening, however only about half of them include specific sustainability or environmental expertise in their business development processes. A considerably smaller share of incubators in Finland (approximately one fourth) and an even smaller share of the German incubators (approximately one sixth) actively encourage greening.

In conclusion, there seems to be a lot of good intentions regarding sustainability and incubators, but the actual selection and support of tenants still seems to be less than impressive in this regard. We see a possible untapped potential here that could be addressed through e.g. specific searches for potential green tenants or tenants interested in greening of their business, combined with provision of advice and support focused on sustainability, for example environmental performance assessment or sustainable design.

6 Concluding discussion

In this study of incubators in Germany, Finland and Sweden we have found that on average incubators show a lot of interest in acting as catalysts for sustainable development. That could mean both supporting already sustainability-oriented firms, and also developing conventional firms in a more sustainable direction. Some incubators with a strategy of recruiting only sustainability-oriented firms face difficulties in finding enough firms in their surroundings so that these could carry their operations. Peripheral areas with low density of firms seem to have more difficulties with recruitment than big city locations (e.g. Berlin where the Green Garage incubator is situated). Recruitment is also potentially dependent on many other factors, such as the newness of the incubator (where a newly started incubator could attract a pent-up demand from firms), timing in general (e.g. societal trends, media attention), how well known the incubator is, and availability of additional funding.

An interesting complement to the traditional incubator that was described in section three is an entrepreneurship training program. The program admits sustainability-oriented entrepreneurs and firms, that are offered business expertise in combination with coaching, mentoring and networking. Such a program could be an alternative to being located in an incubator, for example in peripheral areas where recruitment could be a challenge for an incubator, but interest in sustainable business is still present. Participating in an entrepreneurship program might also be a preparatory step for an entrepreneur before approaching an incubator so that the limited time spent in an incubator could be used in a more efficient way. Furthermore, such program could also be integrated with other incubator activities and supplement these when developing the businesses.

Based on this study we would like to make three general recommendations for support systems. Firstly, incubators should strive to adapt their recruitment strategies to the local and regional conditions and facilitate sharing of relevant experiences and learning between recruited firms even if they are active in different industries. Entrepreneurs' interest in sustainability could be evaluated during the recruitment process and taken into account besides the business idea/type of industry itself. Secondly, we suggest that some kind of structured and time-limited development program should be offered to all incubator firms. During such program incubator firms should be put in touch with experienced role models, coaches and mentors – both from sustainability-oriented firms and from conventional firms that have developed in terms of sustainability. Thirdly, we recommend incorporating more competence on sustainable business development in all types of incubators. Since sustainability is relevant in almost any industry nowadays this should in some way or form be a natural part of business development, especially in the early phase of a new venture when routines and formalities are still not set.

References

Published sources

- Albino, V., Balice, A. & Dangelico, R. M. (2009). Environmental strategies and green product development: an overview on sustainability-driven companies. *Business Strategy and the Environment*, 18(2), 83-96.
- Bansal, P. & Roth, K. (2000). Why companies go green: a model of ecological responsiveness. *Academy of management journal*, 43(4), 717-736.
- Bergek, A. & Norrman, C. (2008). Incubator best practice: A framework. *Technovation*, 28(1), 20-28.
- Bull, I. & Willard, G. E. (1993). Towards a theory of entrepreneurship. *Journal of Business Venturing*, 8(3), 183-195.
- Carayannis, E. G. & Von Zedtwitz, 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.
- 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.
- Choi, Y. R. & Shepherd, D. A. (2004). Entrepreneurs' decisions to exploit opportunities. *Journal of Management*, 30(3), 377-395.
- Cooper, A. C. & Dunkelberg, W. C. (1986). Entrepreneurship and paths to business ownership. *Strategic management journal*, 7(1), 53-68.
- Ensley, M. D. & Hmieleski, K. M. (2005). A comparative study of new venture top management team composition, dynamics and performance between university-based and independent startups. *Research Policy*, 34(7), 1091-1105.
- Etzkowitz, H. (2002). Incubation of incubators: innovation as a triple helix of university-industry-government networks. *Science and Public Policy*, 29(2), 115-128.
- Etzkowitz, H., de Mello, J. M. C., & Almeida, M. (2005). Towards "meta-innovation" in Brazil: The evolution of the incubator and the emergence of a triple helix. *Research Policy*, 34(4), 411-424.
- Etzkowitz, H. & Klofsten, M. (2005). The innovating region: toward a theory of knowledge-based regional development. *R&D Management*, 35(3), 243-255.
- Fonseca, S. A. & Jabbour, C. J. C. (2012). Assessment of business incubators' green performance: A framework and its application to Brazilian cases. *Technovation*, 32(2), 122-132.
- George, G., Zahra, S. A. & Wood Jr, D. R. (2002). The effects of business–university alliances on innovative output and financial performance: a study of publicly traded biotechnology companies. *Journal of Business Venturing*, 17(6), 577-609.
- Grimaldi, R. & Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 25(2), 111-121.
- Hamdouch, A. & Depret, M. H. (2010). Policy integration strategy and the development of the 'green economy': Foundations and implementation patterns. *Journal of environmental planning and management*, 53(4), 473-490.
- Hansen, M. T., Chesbrough, H. W., Nohria, N. & Sull, D. N. (2000). Networked incubators. *Harvard business review*, 78(5), 74-84.
- Khan, A. M. & Manopichetwattana, V. (1989). Innovative and noninnovative small firms: Types and characteristics. *Management Science*, 35(5), 597-606.

- Kharchenko, V., Gorbenko, A., Sklyar, V. & Phillips, C. (2013, May). Green computing and communications in critical application domains: Challenges and solutions. In *Digital Technologies (DT), 2013 International Conference on* (pp. 191-197). IEEE.
- Lockett, A., Siegel, D., Wright, M. & Ensley, M. D. (2005). The creation of spin-off firms at public research institutions: Managerial and policy implications. *Research Policy*, 34(7), 981-993.
- Markley, D. M. & McNamara, K. T. (1995). Economic and fiscal impacts of a business incubator. *Economic Development Quarterly*, 9(3), 273-278.
- Markman, G. D., Phan, P. H., Balkin, D. B. & Gianiodis, P. T. (2005). Entrepreneurship and university-based technology transfer. *Journal of Business Venturing*, 20(2), 241-263.
- McRobbie, A. (2002). Clubs to companies: Notes on the decline of political culture in speeded up creative worlds. *Cultural studies*, 16(4), 516-531.
- Meyer, M. (2003). Academic entrepreneurs or entrepreneurial academics? Research-based ventures and public support mechanisms. *R&D Management*, 33(2), 107-115.
- Mian, S. A. (1997). Assessing and managing the university technology business incubator: an integrative framework. *Journal of business venturing*, 12(4), 251-285.
- Noci, G. & Verganti, R. (1999). Managing 'green' product innovation in small firms. *R&D Management*, 29(1), 3-15.
- Nowak, M. J. & Grantham, C. E. (2000). The virtual incubator: managing human capital in the software industry. *Research Policy*, 29(2), 125-134.
- Nykqvist, B. & Whitmarsh, L. (2008). A multi-level analysis of sustainable mobility transitions: Niche development in the UK and Sweden. *Technological forecasting and social change*, 75(9), 1373-1387.
- O'Shea, R. P., Allen, T. J., Chevalier, A. & Roche, F. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of US universities. *Research Policy*, 34(7), 994-1009.
- Pena, I. (2002). Intellectual capital and business start-up success. *Journal of intellectual capital*, 3(2), 180-198.
- Porter, M. E. & Van der Linde, C. (1995). Green and competitive: ending the stalemate. *Harvard business review*, 73(5), 120-134.
- Potts, T. (2010). The natural advantage of regions: linking sustainability, innovation, and regional development in Australia. *Journal of Cleaner Production*, 18(8), 713-725.
- Rice, M. P. (2002). Co-production of business assistance in business incubators: An exploratory study. *Journal of Business Venturing*, 17(2), 163-187.
- Rogers, E. M., Takegami, S. & Yin, J. (2001). Lessons learned about technology transfer. *Technovation*, 21(4), 253-261.
- Rothaermel, F. T. & Thursby, M. (2005a). University-incubator firm knowledge flows: assessing their impact on incubator firm performance. *Research Policy*, 34(3), 305-320.
- Rothaermel, F. T. & Thursby, M. (2005b). Incubator firm failure or graduation? The role of university linkages. *Research policy*, 34(7), 1076-1090.
- Sherman, H. & Chappell, D. S. (1998). Methodological challenges in evaluating business incubator outcomes. *Economic Development Quarterly*, 12(4), 313-321.
- Stuart, R. & Abetti, P. A. (1987). Start-up ventures: Towards the prediction of initial success. *Journal of Business Venturing*, 2(3), 215-230.
- Tötterman, H. & Sten, J. (2005). Start-ups business incubation and social capital. *International Small Business Journal*, 23(5), 487-511.

Westhead, P. & Storey, D. J. (1995). Links between higher education institutions and high technology firms. *Omega*, 23(4), 345-360.

Unpublished sources

- <http://sisp.se/>
- <http://www.energigarden.se/>
- <http://www.agrovast.se/>
- <http://greentechpark.se/>
- <http://www.greenovate-europe.eu/about/members/lahti>
- <http://www.ladec.fi/en/cleantech>
- <http://www.climate-kic.org/news/green-garage-germanys-first-climate-innovation-start-up-incubator-opens-doors/>
- <http://www.skaraborg.se/>
- <http://www.eurefcampus.de>

Interviews/Personal Communication

GTP

- Ulf Linden: Project manager (2014-02-25)
- Fredrik Nordström: Mayor of Skara (2014-03-06)
- Mats Emilson: Agroväst (tenant) 2014-03
- Andrea Thiger: communication & project manager (2014-03-06)
- Pascal Tshibanda: VD (2014-02-10)

LADEC

- Nina Harjula: Head of development, Cleantech at Lahti Region Development (2014-05-14)
- Mikko Nurminen: Lahti Region Development LADEC Ltd (2014-05-28)

GG

- Aaron Best, Entrepreneurship Program Manager for Climate-KIC in Berlin (2014-04-18)
- Leonie Gros: Acceleration Manager (2014-04)

Appendix 1: Interview guides

Interview guide for incubator managers

- Timeline of important events in the incubator from its start to current date. How is the incubator organized (e.g. virtual, office space, etc.) Which changes in the organisation (idea, activities, and tenants)?
- Could you please describe the process through which the incubator was originally developed? How was the idea born? Who are/were from the start the main driving individuals?
- How many staff does the incubator employ and/or collaborate with, what are their competencies? Does the incubator work on international level?
- Who are the stakeholders (e.g. university, region, bank, state agencies etc.)? (Organisations and individuals within these organisations)
- Who is financing, which percentages of yearly budget come from where?
- What are the goals and measurable outputs of the incubator? What methods do you use to evaluate if the incubator's output meets its goal?
- What kinds of start-ups are eligible for support from the incubator? Does the incubator choose those business plans that already have green thinking as their ambition? Or do they invest on those companies that have the capacity to turn green? Which firms do you say yes/no to? Why?
- What kinds of support are offered to start-ups? (Considering intensity and continuity of the support and who initiates) What benefits do they have access to in the incubator?
- Which systems do you use for evaluate and follow up the start-ups?
- How does the incubator define/select green start-ups? Is the focus on leading group or on the idea? Picking the winner or survival of the fitness?
- How is the incubator working with change, trends and pressures from the stakeholders and external environment?
- Is sustainable business competitive? Do consumers want to pay for it? To what extend and which price? Is it just for the ethical matters or for the quality of life?
- Why should companies be interested in being green beside the ethical motivation? Do they have any other prices like less tax?
- In which branches does green agenda work?
- Is there special policy to promote sustainable consumption and production?
- How large is the number of green jobs offered by green start-ups?
- How does sustainable-oriented entrepreneurship differ from traditional entrepreneurship?
- How can public policy positively influence the incidence of sustainability in entrepreneurship and consequently Eco innovation?

- How does the incubator help with Eco branding, eco profile on the market?
- What type of activities eco-MSMEs do need support on from design service providers?
- What are the behavioural changes required by suppliers, producers and consumers for more sustainable production and consumption, and how are design service providers best positioned to help?

Interview guide for stakeholders

- What's your role, responsibilities and objectives? What did you do before this? How long have you worked in the municipality and how long in the environmental field?
- What is your relationship with the incubator?
- Why did your organization get involved in the incubator?
- Is there any future time limit on your organization's involvement (when & why)?
- How does your organization define sustainability?
- How is the incubator contributing to sustainability?
- What kind of tasks is your organization involved in vis-à-vis the incubator? (Strategic; operative; providing financial support; providing other kinds of resources; attracting financial support from other sources)
- How is your organization involved with firms that leave the incubator?
- What was the goal and mechanisms defined for the incubator from the start?
- What goals should the incubator achieve? How is the future for green tech park?
- How could the incubator been designed differently in order to be more effective? Why?
- How do you work with green development?
- How much influence do you have on choosing entrepreneurs?
- Activities within the incubator (process)
- Monitoring of both the business and financial results in your roll how will you define success for the incubator? What worries you about this project?
- Considering that profitability is the highest rated corporate goal in practice for a business
- What should this incubator accomplish?
- Is sustainable business competitive? Do consumers want to pay for it? To what extent and which price? Is it just for the ethical matters or for the quality of life?
- Why should companies be interested in being green beside the ethical motivation? Do they have any other prices like less tax?
- What is your position towards the incubator's proposals & Goals?

- Since smart policy and regulation can create demand for eco-innovation (which in return helps the incubator reach its goals) what conditions must be in place to scale up the development of new markets for eco-innovation?
- Is there special policy to promote sustainable consumption and production?
- What are the barriers to implementing policies which might be effective in increasing the sustainable consumption?
- Are there are areas that must be changed in order to meet future demands?
- How can public policy positively influence the incidence of sustainability in entrepreneurship and consequently Eco innovation?

Interview guide for tenants

- What is your background?
- Could you please conclude the core business of your company and tell me about who you are.
- How did you come up with the idea?
- Which are your most important and most significant arguments to customers? What makes your organization attractive? Why do people work for you? What inspires the staff (including yourself) and drives you forward?
- What does your market look like today, considering competitors and substantial risk factors? - How do you face your competitors?
- How are you predicting the future? Which differences are you expecting? In what time line? - What goals are you hoping to achieve within the same period of time?
- Why did you choose to run your own company, rather than being employed? Are you personally doing any deeds to drive entrepreneurship or innovation among others? What are the positive and negative sides of being entrepreneur?
- Which are your best leader features?
- What was and are your challenges as an entrepreneur?
- Share your best tip for evaluating risk and prioritizing business threats.
- How is your day at work? Do you have any idol you look up to?
- What plans do you have for expansion?
- How did you finance your company in the beginning?
- Have political decisions had impact on your company? How can policy makers and politicians help you improve better?
- Is your focus more on your product or technology or on the market and customer?
- What are the behavioural changes required by suppliers, producers and consumers for more sustainable production and consumption?

Appendix 2: List of tenants of Green Tech Park

Table 5: Firms that were tenants of GTP in 2014.

| Company | Working area | Start year | Number of employees | Turnover (thousands SEK) |
|---------------------------------------|--|------------|---------------------|--------------------------|
| Agroväst | education Research, development | 1992 | 0-4 | 12 389 |
| AlizonWeb AB | Web Development, Web Design, Programming | 2011 | 1 | 713 |
| Ärligt Talat | Journalism & Information Keeps seminars | 2006 | 1 | |
| DJ Mätteknik | Technical consultants - construction, civil engineering | 2012 | 1 | 1239 |
| Djuretikbyrån | | | | |
| Drivhuset | Business and management consultancy | 2010 | 1-4 | 1 000 - 499 000 |
| Exoro | IT | 2007 | 3 | 2 707 |
| Hylmö Industrikonsult | | | | |
| IN&UT | | | | |
| Ingrid Ullberg | Business development | 1997 | 0 | 200-499 |
| K. Malm | Education, Research & Development | 2001 | 0 | 499 |
| KanEnergi | Consultancy in the energy, climate and environment. | 1997 | 10 - 19 | 11 711 |
| Lokalproducerat i Väst | Consultants - management consultants, business consultants | 2006 | 5-9 | 7078 |
| Mariedals Lantbruk AB | agriculture and forestry, property and asset management | 1972 | 4 | 2 459 |
| Mat från Skaraborg | Meats - retailers Transport agency, Shipping, Forwarding | 2011 | 0 | 1 000 - 499 000 |
| NyföretagarCentrum | Free, personal & confidential counseling to business startup. | 2000 | 0 | 000 - 4999 |
| SBS Discovery Media | Holding companies | 1998 | 0 | - |
| SEI – Stockholm Environment Institute | Technical consultants - energy technology, environmental engineering, plumbing engineering | 1989 | 50-99 | 50 000 - 99 999 |
| SLU Holding | Holding company | 1997 | 5-9 | 8368 |
| Svenska Ägg | Consultants - management consultants, business consultants | 1958 | 0-4 | 7304 |
| Ung Företagsamhet | Education | 1983 | 1-4 | |
| ViBolin Consult | | | | |