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THE SWEDISH PARADOX REVISITED – WHY CANNOT SWEDISH SMES INNOVATE?

A literature review on Swedish SMEs' inability to innovate

Bachelor Thesis

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“You can’t call it an innovation unless you take it to the market and turn it into money”

- Bengt Järrehult

ABSTRACT

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Title

The Swedish Paradox Revisited – Why cannot Swedish SMEs innovate?

Keywords

Swedish paradox, innovation, firm performance, SME, financing, management, marketing, labour, external information

Aim and Purpose

The aim of this study is to examine Swedish SMEs' inability to innovate against a framework of four barriers to innovation as presented by Mark S. Freel; Financing, Management and Marketing, Skilled Labour, and External Information and Linkages. Furthermore, the thesis will determine whether or not the four factors combined are useful in explaining the low innovation intensity of Swedish SMEs.

Method

The study seeks to answer the questions at issue by means of a literature study. It comprises research conducted on Swedish SMEs which is then evaluated towards the four-factor framework, using international research. This thesis relies exclusively on previously conducted research and no new data is presented.

Results and Conclusion

The research has found that Financing, and External Information and Linkages are to be considered major barriers to innovation for Swedish SMEs. Management and Marketing, and Skilled Labour are to be considered less prominent barriers however. This leads to the conclusion that the framework of the four factors presented by Freel is not very useful in describing the low innovation intensity of Swedish SMEs.

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1 INTRODUCTION

1.1 THE SWEDISH PARADOX

Sweden is an ineffective country when it comes to investing in innovations, according to the Swedish Paradox. The paradox states that while Sweden spends a significant amount of money on Research and Development (R&D), the efforts do not produce sufficient economic return (Ejeremo & Kander, 2006) (Bitard, Edquist, Hommen, & Rickne, 2008). There is however no consensus on the validity of this paradox, especially with the European Commission recently releasing a report claiming the Nordic country as the EU's no.1 innovation leader (Hollanders & Es-Sadki, 2013).

The Swedish Paradox is actually three-fold (Ejeremo & Kander, 2006), and revolves around:

1. Relatively low output of high-tech products.
2. Relatively low export of high-tech products.
3. A general inefficiency in terms of transforming R&D expenditures into productivity and growth.

The paradox was first noted in the beginning of the 90's, and addressed as a Swedish one in 1996 (Ejeremo & Kander, 2006). Regarding the first issue described above, the study observed a low amount of highly R&D intensive products in the manufacturing sector compared to other OECD countries despite the high quantity of R&D (Bitard, Edquist, Hommen & Rickne, 2008).

The second part examined the high level of R&D in Sweden and its relation to Swedish subsidiaries in foreign countries, claiming a low share of export of R&D-intensive products.

The third part concerned a more general level, stating that long term growth as well as the paradox both indicates structural weaknesses in the Swedish economy (Andersson, Asplund, & Henrekson, 2002). It was concluded that Sweden faced critical challenges in a number of areas in the national innovation system.

Since then, these topics have been widely discussed. Ejeremo & Kander (2006) argues that "in a strict sense there is no reason to talk of a Swedish paradox, once we look at the theoretical underpinnings of such an idea" and continues to dissect the paradox claiming that a proportional relation between R&D and growth should not be expected.

1.1.1 Innovation

There seems to be a significant reward to innovative companies. Some states that innovative organisations can significantly outperform other companies (Atuahene-Gima, 1996), while other research emphasises there is no direct link between innovativeness and better performance (Hoffman et al., 1998).

Still, the rewards of innovation are not without effort, neither are they very easily defined. For even though being generally considered as profitable, it is difficult to transform inventions into innovations, e.g. commercialising R&D intensive research (Ejeremo & Kander, 2009). Tidd (2001) defines innovation as either a new product introduced to the market, or improvements in a manufacturing process while the European Commission measures the concept of innovation on a national aggregated level using 25 variables including R&D expenditure, patent applications and level of education (Hollanders & Es-Sadki, 2013).

1.1.2 Small and Medium-sized Enterprises

There are a few ways of defining what Small and Medium-Sized Enterprises (SMEs) are. The European Commission defines an SME as being either a micro, small, or medium-sized company¹ based on headcount and turnover/balance sheet (European Commission, 2005). However like in most scientific reports, this study will use only staff headcount and defines an SME as having <250 employees.

It has been shown that most of the Swedish R&D expenditure is concentrated to a few large organisations, which “prevents innovative behaviour and start-ups of small businesses” (Ejeremo & Kander, 2006). Indeed, Sweden is often ranked highly regarding both R&D intensity and innovation intensity². There exists an important exception however – SMEs. That SMEs spend less on innovation compared to large enterprises (LEs) is no surprise, but the difference between these two categories is much larger than should be expected when comparing to other countries (Bitard, Edquist, Hommen & Rickne, 2008).

1.2 PROBLEM DISCUSSION

Whereas a large amount of research has been conducted about the Swedish paradox in general, ranging from measures of input (R&D) and output (growth and profitability); to examining the theoretical possibility of such a concept; much emphasis has been made to the aggregated level of the paradox.

¹ Based on number of employees definitions according to the European Commission are Micro <10, small 10-50 and Medium 50-250.

² A wider concept containing acquisition of e.g. machinery, knowledge, training, preparations for innovations and product introduction.

As earlier described, innovation is neither an easy task or very easily defined. There are problems with the fact that R&D is highly concentrated to LEs, e.g. a possible explanation for the limited spill over effects of innovations in Sweden (Ejerme & Kander, 2009). This creates an issue where the near-to-market innovations are adversely affected, as such innovations are generally done by SMEs (Freel, 2000). Increased SME innovation can thus be argued to be vital both to Swedish competitiveness and to explain the Swedish paradox.

Furthermore it seems much of the research done on barriers to innovation for SMEs is segmented, and no clear consensus exists. Therefore, to better understand the paradox, the steps necessary for SMEs to turn R&D into growth have to be thoroughly scrutinised. A brief conclusion on international research is that most agree that the smaller size of an SME allows some benefits, which are mainly related to behaviour, and at the same time carries some disadvantages, barriers mostly related to resources. Exactly how though, is of great debate (Freel 2000).

Freel (2000) proposed a framework comprised of four factors that he argues explain the main obstacles to SME innovation. All the issues found to be of major importance could by the framework be categorised into four areas: (1) Finance; (2) Management and Marketing; (3) Skilled Labour; and (4) External Information and Linkages. These four factors are comprised of multiple sub-factors examining certain details of the factors. A more in-depth explanation of Freel's (2000) framework is covered in the theoretical framework.

1.3 PURPOSE OF THE STUDY

This report will outline to what extent each of the four barriers to innovation presented by Freel (2000) are faced by Swedish SMEs, and evaluate whether or not this framework is useful in explaining Swedish SMEs inability to innovate.

2 METHOD

2.1 THESIS OVERVIEW

Essentially, this report aims to outline if Swedish SME's innovative ability is constrained by each of the four factors presented by Freel (2000) through a literature study. Furthermore it will be analysed whether the framework of these four factors is useful in explaining Swedish SMEs' inability to innovate.

Through providing a thorough research on internationally renowned articles on each of the four factors as a barrier to innovation, the first part of the study is to build a theoretical framework to provide a solid academic foundation towards which we can evaluate the situation for Swedish SMEs.

Then, by examining research on the Swedish market, the empirical findings is produced. This chapter aims to evaluate the factors in the same way as is done in the theoretical framework, but on the Swedish market alone.

The Theoretical Framework and Empirical Findings will provide an academic foundation which allows for analysis and reaching insights as to what distinguishes the barriers facing Swedish SMEs compared to those faced internationally. This provides the basis for analysing how useful the framework is in explaining Swedish SMEs' inability to innovate. To complement the aforementioned foundation interviews are conducted with relevant professionals to provide further evidence of the validity of the findings.

2.2 RESEARCH APPROACH

2.2.1 Literature Review

A literature study allows for an effective step in getting a broad understanding of a body of knowledge and achieves to help researchers understand in what areas research has been focused and not (Levy & Ellis, 2006). Thus, a literature study is often (1) a first step in identifying a purpose of a study (e.g. a thesis) or; (2) by means of an overview article contribute to the academic society by combining results from a number of different studies achieving a sum greater than its individual parts (Soerensen, 2004). This study relies on previously conducted research and therefore no new data is presented.

The framework presented by Freel (2000) examines multiple factors, each one containing multiple sub-factors that is probably best approached with different, and perhaps even multiple, methods. For instance, Finance as a main factor consists of sub-factors such as

supply and demand constraints; and bank assessment of loan applications. For each of these individual sub-factors different methods would be most suitable in gathering data and laying the foundation for analysis.

Given this multitude of different methods in how to approach and best scrutinise different factors and sub-factors it is argued that the purpose of this study is best met by a literature study as it is able to account for multiple viewpoints in how the four factor framework affect the innovativeness of Swedish SMEs.

2.2.2 Interviews

To complement the literature review, relevant professionals are selected for interviews. For the interviews to be relevant, respondents have to be selected systematically according to the purpose (Holme & Solvang, 1997). As the purpose of these interviews is to verify the results and practical impact of the literature review, respondents chosen have to be highly involved in the problems faced by Swedish innovative SMEs.

Two main options can then be considered available; to interview either SME managers or professionals of organisations working with SMEs, preferably in the field of innovation. As the latter organisations could be argued to frequently be in contact with the relevant barriers through their customers/partners, more so than a few SME managers would, such organisations are chosen. Arguably, this approach minimises bias and will thus better reflect the actual barriers faced by Swedish innovative SMEs.

The definition of SMEs allows for a broad range of enterprises, from start-ups to hundred million SEK revenue enterprises, which could all face different barriers to innovation. It is important that this is taken into account when selecting respondents. There exist a broad range of organisations involved in innovation support in western Sweden, many specialised in different sectors. Three of these organisations were selected due to their focus on SMEs of different sizes – Chalmers Innovation, Business Region Göteborg, and Almi Väst.

Chalmers Innovation specialises in high-technology ideas and start-ups, helping entrepreneurs in the process of turning ideas into products and successful enterprises aimed at the global market. This organisation represents only Micro and Small Enterprises. Mr Andrzej Brud, CEO of Chalmers Innovation was chosen as respondent.

Business Region Göteborg (BRG) works to strengthen the trade and industry in western Sweden. Their service to SMEs covers areas such as business development, helping (international) businesses establish in the region, and innovation. Working with over 600 SMEs in all sectors, BRG is considered to represent SMEs of all sizes. Mr Lars Lennartsson, Business Developer at BRG was chosen as respondent.

Almi (parent company of Almi Väst) is a national state-owned organisation divided into regional entities, each aiming to create growth in the region through means of financing as well as counselling to SMEs in all sectors. The organisation's objective is to turn innovative ideas into successful businesses for increased competitiveness and growth. Almi represents all sizes of SMEs. Ms Christina Aspestedt, regional manager of Almi Väst was chosen as respondent.

The interviews is carried out by starting with an open-ended question regarding what barriers to SME innovation the respondents consider the most prominent, followed by specific questions about each of the factors according to the framework. The initial open-ended question allows the respondents to present their view on barriers to innovation, without affecting answers by revealing the factors this study has found to be of importance. The interview protocol can be found in appendix 7.

2.3 RESEARCH STRATEGY

2.3.1 Research Protocol

First, a research protocol is formulated. This is essentially to outline what is to be done and in what order, and ultimately aims to minimize bias before actually starting the literature search (Simons, 2011). It contains methods for how to conduct the search of literature, selection, extraction of information, and analysis. Outlined below is the research protocol in full (2.3.2 – 2.3.9).

2.3.2 Literature Search

There are three main options to conduct a literature study, where a domain-based strategy is the most used by researchers in creating an overview article or entering a new area of research. The strategy to be used should be based on the researcher's "experience with and knowledge of the area of research" (Sorensen, 2004). The domain-based strategy has been chosen for this study since it allows for many factors to be scrutinised completely.

The domain-based strategy is centred on using keywords to search databases, a list of journals and/or a library database. The disadvantages of the chosen consists strategy primarily of the time required and the discipline needed in categorising and analysing the literature.

Other mentioned strategies available include a trusted-review strategy (reviewing highly trusted sources only) and snow-balling strategy (the least structured strategy of these, performed by searching backwards by sources referenced only) (Soerensen, 2004). A mix of these strategies is also an alternative. These other strategies have not been systematically

used in this study, however when appropriate they have been used in conjunction with the primary strategy³.

2.3.3 Keywords

The literature search in this study begins with formulating a number of keywords to be searched for in a database. These keywords aim to find literature associated with the purpose of the study. The usage of broad keywords brings a wide foundation of literature while more narrow keywords provide an opportunity to find more unique information. When searching for keywords in databases for this study both broad and narrow keywords have been used.

Also, alongside keywords, a source for inspiration and further depth is given from “bibliographic mining” and searching for specific authors mentioned in the selected literature. These steps is performed over numerous of times since different e.g. keywords and/or authors is found to be of importance along the process.

Keywords used in this study are found in Appendix 5.

2.3.4 Sources

Since this study is carried out at Gothenburg University, the local library is used to a large extent. Multiple databases is available, each with a slightly different set of its own sources. But as a whole the chosen sources includes journals, e-journals, newspapers, books, e-books, doctoral theses, reports, articles and other electronically published literature from both Sweden as well as from internationally available sources.

The following sources for searching literature are used:

- Summon
- GUNDA
- GUP
- GUPEA
- LIBRIS
- EBSCO Host (Business Source Premier)
- Google Scholar

A more in depth description of sources is provided in Appendix 6.

³ For instance, when a studied article references an important article it is allowed to be considered for our study.

2.3.5 Study Selection

To decide whether literature should be included in the study, at least one of the following criteria need to be fulfilled: The research addresses:

1. any sub-factor in framework; or
2. a relation to the main factors in framework.

These two criteria is considered to include any literature addressing the issues found in the framework as well as possible sub-factors. To further narrow the amount of literature and to more easily find relevant literature, a more extended set of keywords is used to address different sub-levels of innovativeness in Swedish SMEs - e.g. specific sub-factors as mentioned by Freel (2000).

The selection of literature is performed by first reading both titles and abstracts in the list of search results to get a basic understanding of the specific literature. If it is deemed to fulfil any of the two criteria by any means the full text version is saved for data extraction later.

Since this step allows for much literature to be processed and used for data extraction, no specific information regarding literature and reason not to select it is given. This as such information would not provide any significant benefits.

2.3.6 Data Extraction

Initially, an overview of the literature is gathered including: author, purpose, method, population/sample and result. This is more thorough than the previously conducted study selection and facilitates better support for deciding whether to include the literature in the empirical findings and analysis.

The literature is then read in full and a final decision is taken on its place in the study. The above described gathered information is given in Appendix 1-4.

2.3.7 Quality Appraisal

A number of factors are considered when evaluating if the studies are qualitative enough to be included in the study. The literature should preferably have been peer reviewed; therefore Bachelor and Master theses are excluded from the study. Furthermore size and/or relevance of population/sample, methods used, and relevance of the purpose of the literature, are evaluated. Apart from these individual elements a general analysis is also considered for how the literature is applicable to Sweden, SME innovation, and our study as a whole.

2.3.8 Table Framework

In line with Simons' (2001) recommendation, to allow for an easy overview of the selected material and to provide an effortless summary of the studies and research papers used, a table is made for each factor. In these tables all studies of the Swedish market is listed, and the essence of each study is produced, and categorised into Purpose, Population/Sample, Method, Result, and Comment. The table will facilitate an unbiased analysis, where the comment column is for general observations on the studies that should be taken into consideration during analysis. The tables can be found in Appendix 1-4.

2.3.9 Analysis

The extracted data in the theoretical framework and empirical findings is analysed and compared to each other according to: results, reasoning, conclusions, and extent of a barrier to innovation.

As it is difficult in advance to set up any strict and narrow questions to be answered and analysed because of the wide variety of information available, only three areas of analysis are solid beforehand – (1) consistency of results, (2) differences, and (3) explanations.

(1) *Consistency of results* answers whether results differ or is consistent between the theoretical framework and the empirical findings. (2) *Differences* aims to give insight in what ways the results differ if it does. The last question to be answered is whether any obvious (3) *explanation* to such an inconsistency exists between different studies (for instance sample size, method, etc). This limits the analysis to the information found in the reviewed literature.

The interviews conducted with market professionals aim to validate the findings as well as providing an insight to any deviation between the Theoretical Framework and Empirical findings.

Consistency of results between international research, national research and the interviews is the main factor evaluating whether specific factors should be regarded as a barrier to innovation or not.

2.4 CRITICISM

2.4.1 Validity

Eriksson and Wiedersheim-Paul (2001) defines validity as measuring what is of relevance to the study – essentially measuring or studying what is intended. Furthermore, a distinction is made between qualitative and quantitative approach. While numbers achieves accuracy in a

quantitative approach, a qualitative approach requires a systematic and detailed description of data collection and processing.

Being a literature review, this study is highly dependent on previously conducted research, thus possibly limiting what research questions can be answered.

To mitigate the aforementioned validity issue, the literature review is accompanied by a number of interviews so as to provide further evidence of how applicable these findings are in practice.

2.4.2 Reliability

Reliability is defined by Eriksson and Wiedersheim-Paul (2001) as measuring correctly. In quantitative research this equals reproducibility. Using a qualitative approach however, reliability should be treated in a way similar to validity – a systematic and detailed description is required.

The data collection is arguably easily reproduced through a detailed description of the steps taken to acquire the data. However, the results would be likely to change eventually as more research is carried out and become available.

The respondents selected for interviews are all senior professionals of organisations working with innovative SMEs, and the respondents have worked in this field for an extended period of time. This approach was chosen to minimise interview bias.

The selection of respondents for the interviews covers only opinions of organisations in western Sweden. As a region with different industries compared to other regions, the results of the interviews could be argued not to be generalisable for the country as a whole.

3 THEORETICAL FRAMEWORK

3.1 FINANCING

Securing financing is often referred to by firms as a real obstacle, and according to North, Smallbone, & Vickers (2001) “[it] is a key issue to be addressed”. The effectiveness of funding efforts is likely to benefit from governmental intervention and support, however the government response could likely be varying from facilitating bank loans to finding equity partners. Either way, governmental support is likely to mitigate financing difficulties (North, Smallbone, & Vickers, 2001). This especially in Europe where many innovative firms have support from various schemes aimed at helping start-ups (Walsh, Niosi, & Mustar, 1995).

It has been shown that when evaluating innovative companies’ eligibility for financing, bank officers put significant weight on a few criteria while somewhat neglecting other. Particularly financial factors such as gearing, asset information (both that of the firm and the entrepreneur), and income generation is of primary concern to the bank managers. Soft, intangible assets, such as managerial training, skills and technical knowledge, tend to be of less importance. In addition to this, different managers within the banks have not shown to be very consistent in assessing the firms (Deakins & Hussain, 1994). As much as this represents potentially lost business for banks – the trouble for innovators in SMEs to receive financing could in the longer run render missed business opportunities, according to Deakins & Hussain (1994).

Freel (2000) refers to literature on the subject and states that there is some debate on the issue. It seems that whereas many innovators state the difficulties in securing venture finance, few have actually tried and many prefer to acquire funds internally to retain independence from venture capitalists. This arguably creates a paradox of its own, where the immediate earnings is not enough to finance major future breakthroughs.

3.2 MANAGEMENT AND MARKETING

SMEs often lack skills in management and marketing, especially since technical entrepreneurs’ main concern is about the technical aspects (Freel, 1998). Oakey (1991) argues that the lack of marketing skills partly stems from a lack of human and financial resources, a result of earlier expensive cycles (including R&D). This, the author argues, can often be seen through over reliance on mouth-to-mouth sales. The same author argues in a subsequent article (Oakey, 1997) that not only is the current level of managerial skills an issue, but SMEs also face difficulties in training and recruiting skilled managers because of cost as well as the risk of skilled managers leaving for competitors.

The problem is perhaps more obvious with companies which stems from the academic world as academic and scientific entrepreneurs often lack business know-how (Dickson, Lawton-Smith, & Coles, 1995). However, it has been shown that this applies generally, as poor innovation performance of SMEs can be attributed to poor skills in management and marketing (Moore, 1995).

3.3 SKILLED LABOUR

Education and training seems to be of paramount importance to innovation, and competitiveness, of SMEs. In fact, so much that the European Union funds training for regions with a skills shortage to provide managers and employees with skills needed to increase competitiveness (Macdonald, Assimakopoulus, & Anderson, 2007). The importance of skilled labour is most important during early product development stages, and it has been shown that SMEs which report high innovative output also have “a higher proportion of staff who are technically-skilled” by Adams (1982).

However, SMEs tend not to take full advantage of the labour market, employing few graduates. There is evidence this is caused by a perceived inability to retain skilled graduates, much due to their ambitious career plans as well as SMEs’ inability to compete with larger corporations’ salaries and job security (Jones & Tilley, 2003) (Bosworth, 1989).

A very significant and recurring finding is how closely linked innovativeness and internal training is. It can be argued that on-the-job training and innovation are closely linked in a modern economy (see for instance (Freel M. S., 2005) who considers previously conducted research as well as cementing the findings through own research).

Scott et al. (1996) focused on the manufacturing sector, and recognises three challenges faced in the shortage of skilled labour for SMEs, arguing that the most significant one is the uncertainty about and unwillingness to ask for outside help. He further states that it is not a universal problem, as it is much less troublesome in Italy and Germany with both countries having invested in industrial park, mitigating problems. The UK, on the other hand, tends to have somewhat isolated small and medium-sized manufacturing enterprises (SMMEs).

3.4 EXTERNAL INFORMATION AND LINKAGES

Information is of great importance for effective decision-making, and External Information and Linkages has been shown to be of significant importance for SMEs’ innovation performance. For instance Lybaert (1998) found a positive relation between the use of external information and performance of SMEs. Particularly, information about competitors

and R&D seemed to be of importance, so much that the author states that “we are convinced that the findings are generalizable”.

Cohen & Levinthal (1990) proved that firms in general are affected by their operating environment and that they can learn from their environment. To benefit from this however firms must first actively develop absorption capacity⁴, which in turn is a result of existing knowledge within the organisation. Essentially, the capacity to benefit from the environment comes at a cost (Cohen & Levinthal, 1990).

A major benefit of external linkages is that collaborating will complement the in-house expertise, which would make the SME less dependent on its own skills. SMEs do however prefer to co-operate with other SMEs rather than with larger corporations due to management problems for the SME. Again, it seems the benefits of external linkages do come at a cost (Rothwell & Dodgson, 1991).

External Information and Linkages are of particular importance to SMEs because they are unable to reach economies of scale and thus reap the benefits associated with internal resources and skills, and through studying several leading hi-tech SMEs Dodgson & Rothwell (1989) found that the most successful firms were actively pursuing the creation of external linkages.

As pointed out by Hoffman et al. (1998), perhaps contrary to popular belief, rural SMEs tend to be more innovative than their urban counterparts, whilst also being less frequent users of external information.

⁴ the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends

4 EMPIRICAL FINDINGS

4.1 FINANCING

4.1.1 Literature Review

Berggren, Olofsson & Silver (2000) argues that “most entrepreneurs” actively avoid external financing to retain ownership control of the firm, and delays investments until it is for certain that funds can be harnessed from within the firm. Their study shows that “[c]ontrol aversion⁵ may turn out to pose a long term problem for the firm as it prevents a working relationship with external financiers”. This can be seen in the light of empirical research showing that only 4% of Swedish SMEs rely mainly on external financing to fund innovation, with almost half of those SMEs perceiving a lack of internal or external financing a major barrier to innovation (Vinnova & SEB, 2007).

Whereas it is most common that financing difficulties in seen as an issue mainly coming from cash suppliers’ willingness to supply funds, Cressy & Olofsson (1997) considers demand as well as supply, and concludes that the main constraint is the demand of cash. They, much like Berggren, Olofsson & Silver (2000) relates this primarily to control aversion but also notes that relinquishing some control is actually positively conceived by younger SMEs - as the added expertise could be beneficial. Thus, the results are not conclusive on whether there is actually a significant supply constraint on funds for SMEs, however it seems clear that the SMEs themselves are not always satisfied with equity terms provided to them by venture capitalists.

The National Innovation System (NIS) of Sweden offers several types of government funded loans to innovative SMEs and entrepreneurs, and Svensson (2012) has done a study on the performance of two kinds of government financing. He focuses on loans given in the R&D phase of a project, and loans during the commercialisation phase. He notices an abnormality in the very low success rate of early government financing, whereas projects financed with loans provided on a later stage of the project performed on par with other types of private financing. The low success rate is mainly attributed to overly favourable loan terms. One conclusion that can be drawn from this is that projects do not necessarily perform worse on government funding but rather the loans need to be given on suitable terms, as the SMEs themselves perceive government funding positively (Svensson, 2012).

⁵ Control aversion here refers to firms’ unwillingness to relinquish control in exchange for external funds.

In addition to the role played by the government, banks play a major role in supplying funds to Swedish firms. The banks tend to focus on financial values and measures which shifts risk from the bank to the borrower. Furthermore there is a bias towards older firms which already have stable finances, whereas other loan applicants will have to provide collateral, shifting risk towards the owners (Bruns & Fletcher, 2008). This also suggests that there is a supply constraint on cash for firms which prefer bank financing.

4.1.2 Interviews

Financing was mentioned as a barrier by all three respondents during the initial open-ended question and all considered it to be to a major obstacle. Mr Lennartsson deemed financing from banks as problematic while Mr Brud spoke more of bureaucratic problems for the early first stages in a start-up process when searching for public funds, stating that money exist but terms and the many different sources for this kind of financing is a real obstacle for start-ups. Another issue agreed on by these two respondents is the difficulty of obtaining funds from venture capitalists, however Mr Brud relates this to capitalists' reliance on maturity of the SME, whereas Mr Lennartsson relates it to SMEs' control aversion.

Ms Aspestedt, like Mr Brud, perceive the structure to receive state-funding as complex. Furthermore she argues that banks cannot offer the kind of funding often required, and like Mr Lennartsson she relates this to the banks' focus on securities to lend money.

4.2 MANAGEMENT AND MARKETING

4.2.1 Literature review

Ylinenpää (1998) states that there is a perceived misfit between market demand and supply for innovative SMEs in Sweden, and the misfit seems to be related to uncertainty about what the market want, and how much it is willing to pay for a new product. Ylinenpää (1998) goes on however arguing that this might be a real problem as much as merely a perceived problem, and that more research is needed to arrive at conclusions.

Heydebreck (2000) states how hi-tech firms, often University research spin-offs, must generally market their products internationally - something many managers lack experience of. This is confirmed by Vinnova & SEB (2007), finding that about half of innovative SMEs are actively exporting goods or services. The issues of managerial competence in marketing have been effectively mitigated by the Swedish Teknopol approach, a programme run by the government agency Nutek providing support to the most successful technological entrepreneurs. The programme helps to encourage managers of technological firms to take advantage of innovation expertise by both formally and informally connecting managers with

expertise which allows trust to be built between managers and experts, lowering the barrier for managers to use the expertise available. Heydebreck (2000) suggests that certain parts of the programme should be offered on a wider scale, focusing on (1) holistic, idea-to-commercialisation service; (2) need orientation; and (3) increased transparency of the services offered.

In addition to marketing Nordman & Tolstoy (2011) analyses the personal relationships with foreign customers and finds a significant positive impact on innovation performance. They stress that for SMEs to innovate successfully they cannot always allocate large financial resources to innovation, hence personal relationships can substitute financial resources. These results should be seen in relation to the findings by Vinnova & SEB (2007), where a lack of time is seen as the single most important barrier to innovation by the SMEs themselves.

4.2.2 Interviews

The respondents were divided in their views of the role of Management and Marketing as a barrier to innovation with Ms Aspestedt claiming it to be of less importance, and Mr Lennartsson claiming both marketing and management to be of major importance for long-term success. Ms Aspestedt's view has some support from Mr Brud who considers it a minor barrier. He does, however, support the existence of a barrier which in his opinion is mostly related to entrepreneurs not appreciating the importance of sales operations to acquire customers and understanding their preferences.

4.3 SKILLED LABOUR

4.3.1 Literature review

Ylinenpää (1998) considers previously conducted studies and finds that domestic employment legislation causes problems in some countries including Sweden. The reason was mainly because of the LIFO⁶ principle which means that the date of employment determined who would have to leave the company in case of layoffs, rather than by competence. But, as further reasoned by Ylinenpää (1998), one among other still not excluded possibilities, especially for small non-innovative firms, is that the LIFO-legislation merely serves as a "legitimate excuse for a fact that a status-quo position is perceived as satisfactory".

A theoretical benefit to Sweden's competitiveness would be the highly educated workforce. Asheim, Coenen, & Svensson-Henning (2003) confirm this through a number of case

⁶ Last in, first out

studies, and state the importance of regional education establishments. They find that the benefits come from the supply of graduates as well as the higher education offered. As is further outlined in 4.4 External Information and Linkages, they also argue for the impact of these regional Universities in the innovativeness of local SME clusters, and claims that the main catalyst in these agglomerates is a good supply of human capital. These findings are echoed by Vinnova, finding that only 18% perceive a lack of competent staff as a major barrier to innovation. However, more than half of SMEs consider it a barrier of some sort (Vinnova, SEB, 2007).

Another report by the Swedish government agency Vinnova studied internal training in the Swedish National Health System, and arrived at the conclusion that internal training led to personal development in all cases, and innovative behaviour in some (Vinnova, 2012). The report goes on to state that the traditional Swedish “triangle”⁷ is insufficient, and what is needed is really workplace learning. Furthermore, to gain the benefits of innovative behaviour at the workplace it is of major importance that the management shows support for the training and thus facilitates benefits from the training.

4.3.2 Interviews

Mr Brud contrasts the other respondents by claiming Skilled Labour is not a barrier to innovation, pointing mainly to the skills of graduates as a facilitating factor in mitigating the barrier. Ms Aspestedt and Mr Lennartsson however both refer to companies’ own viewpoints when claiming that a shortage of skilled labour is a real barrier faced by SMEs today.

4.4 EXTERNAL INFORMATION AND LINKAGES

4.4.1 Literature review

There seems to be a relationship between innovation performance and managing external information in Sweden. Frishammar & Hörte (2005) finds that scanning the technological sector for information creates significant increase in performance, however simply scanning competitors, clients and suppliers would rather lead to a decrease in innovation capability. The study also concludes that it is managing the external information that is of importance, rather than just possessing it.

Karlsson and Olsson (1998) showed that there is indeed a relation between the external environment in Sweden and product innovation. They further broke it down into SMEs and LEs and perhaps surprisingly realised that LEs are positively affected by the external

⁷ The triangle is based on higher education and research, which is to facilitate the top of the triangle: innovation.

environment, whereas the SMEs actually shows a negative (but non-significant) correlation. They find that SMEs seem to thrive outside urban areas, which they also cement by comparing their results to previously conducted studies. They further state that using Universities and customers as information channels doesn't affect innovation performance even though the SMEs themselves by some degree states Universities to be of importance for innovative performance.

Belotti & Tunälv (1999) echoed as well as contrasted the previously mentioned findings by proving that a significant group of SMMEs have an information-attaining strategy that is focused on the local environment (mainly Universities and consultants), and that their innovation index is significantly higher than the average. It is argued that this might be because of the many smaller universities outside the core regions.

Belotti & Tunälv (1999) further argues that all Swedish SMEs needs to privately develop in-house capacity to innovate, and in doing this an external network is highly facilitating. It seems however to be less important what the network consists of, the network is facilitating in itself. These findings are backed by Asheim, Coenen, & Svensson-Henning's (2003) case studies which states that regional networks are very important, partly because they improve the knowledge within the SMEs, and partly because they facilitate labour mobility between firms within the cluster.

MacGregor (2004) conducted a study on what type of companies tend to network in Sweden, and contrasted this to popular scientific views. In line with previous findings is that SMEs with fewer employees tend to network more, and those with a large supplier networks tend to network less, presumably because they can form networks of their own with suppliers. A finding by the aforementioned author which contrasts the previous studies however, is that in Sweden the companies run by educated CEOs network less. These findings are also somewhat at odds with empirical research done by Vinnova (2007), finding that larger SMEs co-operate slightly less with both customers and suppliers than smaller SMEs do.

When asking companies for what they would like public support for in order to facilitate innovation, almost 40 % claims that financial support to co-operate with Universities or research institutes is of major importance. Furthermore some 62% are interested in cooperating with Universities or research institutes, and the most significant factor to facilitate this is considered to be improved networks and improved information (Vinnova, SEB, 2007).

4.4.2 Interviews

Mr Lennartsson argues for the importance for Swedish SMEs to exchange information with international companies, as adequate competence cannot always be found in the local

region. He is however resistant to call it a barrier faced generally by SMEs. Both Ms Aspestedt and Mr Brud points out that a major problem faced by SMEs is gathering information about financing and applying for funds – the process is considered quite menial and time consuming. Mr Brud argues that it can even be considered a barrier as the sheer amount of time required to successfully apply for funding could be better used elsewhere in the company.

5 ANALYSIS

5.1 FINANCING

The first step in determining whether financing is a barrier or not, is arguably to consider what companies' own viewpoint is. The first takeaway is how companies' control aversion and efforts to keep decision-making within the company create a barrier to financing, rather than there being a low supply of funds. Whereas the study outlining this connection considers SMEs in general the findings have been supported by a major study on innovative SMEs (Vinnova, SEB, 2007), as well as confirmed by the interviewees, and should therefore be seen as a solid foundation for conclusions. Control aversion is not universal however, as some perceive the added expertise from external equity partners positively.

Given Sweden's sizable public sector and the role played by the government, it should be interesting to consider the role the state plays in mitigating these financing difficulties. The problem with equity demand could be assumed to call for greater government intervention, although it has been shown that government efforts have sometimes been misplaced, and that funds without risk lead to more failed projects. The respondents have also pointed out that it is not only a shortage of funds that constitutes the barrier, but also the difficulties of understanding the process to obtain funds and the bureaucracy involved. Therefore it could be a valid policy implication to consider shifting government intervention towards providing funds on terms similar to those on the market, without requiring ownership in the firm. As this would lower the control aversion, it could lead to more firms seeking funds to innovate without the shortcomings affiliated with undemanding loans. This is not without problems however as it could easily distort the market. In addition to this, simplifying the process for obtaining government financing would likely lead to more effective distribution of innovation money as well as allowing companies to spend time on core activities rather than getting caught up in the wheel of bureaucracy.

Just as has been shown in the UK, bank managers in Sweden are biased towards hard information such as financial data when evaluating financing requests, thus neglecting the importance of managerial skills and other 'soft' skills. As it was shown that demand for equity funds was a constraint due to control aversion, it is equally true that supply of loan financing is a barrier as the banks do not evaluate loan requests in an ideal way. This would not only suggest that Swedish banks, like their UK counterparts, have ineffective loan portfolios - but also that there is a major barrier for many Swedish SMEs to attain financing. This barrier arguably causes problems, and more so as it has been shown that government financing

efforts to mitigate these problems, providing loans for R&D with overly favourable terms, has been misplaced.

5.2 MANAGEMENT AND MARKETING

It seems the general conclusion about Swedish SMEs whose innovative activities are based on technological products face the same difficulties as those based abroad - namely lack of skills and experience in fields required to succeed in today's competitive economy. In Sweden this seems to be related mainly to market knowledge, and (international) marketing. Interestingly it seems that government efforts to mitigate these difficulties for some prominent firms have been successful, helping managers through providing a useful network. This suggests that managerial networking and relationship building is perhaps a more important issue to address than the skills of managers as such.

If managers can effectively use advice and expertise from external sources to make up for personal shortcomings in certain fields, then a lack of skills might rather signal strict focus on the SMEs core competence. In light of this it is hard to argue that managerial skills in areas outside their competence is a major barrier to innovation - but rather associated with a lack of linkages and that focus should rather be directed to the challenges faced through a lack of external information and linkages instead. However Mr Brud of Chalmers Innovation who work with hi-tech start-ups did not identify Management and Marketing as a barrier, making it hard to draw any conclusions from the aforementioned study.

We therefore argue that Management and Marketing is to be considered a minor barrier, and that the issues associated with it is are more related to External Information and Linkages.

5.3 SKILLED LABOUR

A somewhat unique issue might be that for Sweden it could be as much an issue to attract graduates, as it is to keep them when the LIFO principle dictates that the most recently employed must leave first in case of layoffs. This could possibly hint towards an increased importance of internal training as 'inapt' employees cannot easily be fired, whereas graduates are often recently employed and will be the first to leave the company in case of layoffs. There is an important exception however as companies with less than 10 employees have an opportunity to exempt two employees from the LIFO principle – providing management with an opportunity to retain key staff. This exception is crucial for many companies according to a survey by the Confederation of Swedish Enterprise (2009) claiming 3 out of 4 micro-sized firms find the exception very important. Hence it can be argued that efforts to mitigate the effects of the LIFO principle have been successful at least

during the crucial start-up phase. During the interviews no respondent mentioned legislation as a barrier to innovation, which further suggests that it is not a very prominent obstacle to SME innovation.

As has been shown in a case study by Vinnova (2012), employees are indeed affected by internal training. This is not without effort however as to gain a positive change in innovative behaviour management support is essential. Internal training can be argued to be of major importance seeing as retaining skilled graduates is troublesome due to the LIFO legislation – essentially companies could be assumed to have to make do with resources within the firm. An important conclusion here was that the performance of internal training is highly dependent on management support, and seeing as a high proportion of the concerned managers perceive innovation as being important for the firm's future (Vinnova, SEB, 2007) this should not be a major issue.

Whereas there has not been so much research done on how difficult it is for SMEs to attract graduates and how their performance is affected by this, Vinnova & SEB's (2007) survey showed that less than a fifth of innovative SMEs perceive lack of competent staff as a major barrier. As this is echoed through case studies it seems that the highly educated population has somewhat mitigated issues associated with skilled labour, and that the many regional Universities has led to increased support for innovative activities in SMEs even outside core regions. These findings are somewhat contrasted by two respondents claiming that SMEs themselves perceive finding competent staff a major barrier.

The main takeaways, then, are two-fold. The first is how intertwined this factor seems to be with other factors. The lack of challenges SMEs face in recruiting graduates can be assumed to be closely related to the many local Universities (which could be argued is more of an issue related to external linkages), and the success of internal training is actually dependent on management attitude. The second is how there is no clear consistency between research and reality as perceived by the respondents, their viewpoints differ both regarding the importance of legislation and companies' own viewpoint.

Ultimately skilled labour should be considered minor barrier, and the problems associated with it is mostly overcome by the highly educated workforce and management appreciation of innovation importance.

5.4 EXTERNAL INFORMATION AND LINKAGES

Both the framework and studies of Swedish SMEs reaches the conclusion that External Information and Linkages is of importance to innovation performance. However, the results differ strongly on what kind of information and linkages are important.

The first viewpoint is how the framework states that external information is important to the innovative firm, however to benefit from it absorptive capacity is needed. Through studies on the Swedish market we find that the same foundation holds, however it is now rather referred to as 'managing' external information. Essentially, innovation performance through External information and Linkages seems to come at a cost to Swedish SMEs.

This is however where the clear similarities between the theoretical framework and our study ends.

One study by Karlsson & Olsson (1998) shows that there is no correlation between external information and innovation performance for Swedish SMEs, however it can be argued that this is due to the perspective of the study as it defines SMEs as <50 employees, whereas most studies define it as <250 employees. This assumption is backed by the fact that other studies find a clear correlation between several types of external information and linkages, and innovation performance⁸. Furthermore, the study claims that scanning competitors creates a decreasing innovative capacity, directly against what is assumed in the theoretical framework.

It also seems that Swedish SMEs are frequent users of external information and are frequently scanning for it, particularly in a regional setting. This could be assumed to be facilitated through the many regional universities. However, research also differs on the topic of who SMEs want to co-operate with. Whereas they seem to prefer other SMEs in the framework, it has been shown in Sweden that an overwhelming majority would rather prefer Universities and research institutes.

An interesting point is how rural SMEs have been shown to be more innovative than their urban counterparts much like the framework. In contrast to the framework however they are frequent users of external information. Again, this hints towards the importance of the regional Universities to facilitating innovative behaviour.

Regarding what type of SMEs are networking in Sweden, it is hard to draw conclusions from MacGregor's (2004) study seeing as the response rate is less than a third, and that the study is based on data from only four minor regions. Furthermore, the study contradicts Vinnova & SEB's (2007) more comprehensive statistics.

⁸ See: Belotti & Tunälv, 1999; and Frishammar & Hörte, 2005.

Importantly, External Information and Linkages have been shown to be a facilitating factor for other barriers. As has been shown earlier in this study; management can use a qualified network to make up for lack of skills in areas such as marketing, and many SMEs claim they wish for more co-operation with Universities and research institutes. Furthermore, as argued by the respondents, if External Information and Linkages is to be considered a barrier to innovation it is mostly related to financing – the bureaucratic system as well as the limited information about funds available.

In essence it is hard to consider External Information and Linkages too much of a barrier as it is mostly related to other factors, and that international research on the subject does not describe the Swedish situation very accurately

Given the inconclusive general result of the study, External Information and Linkages by itself could be considered a barrier somewhat mitigated by the role played by the many regional Universities. When considering the importance it bears for other factors as well as companies' own perception however it is easy to argue that it is in fact a major barrier.

5.5 FRAMEWORK RELEVANCE TO SWEDISH SMEs

It seems that the real barrier to innovation in Sweden is financing as it is accurately described by the framework, and all three respondents agree on it being a major barrier.

Research on the Swedish market regarding Financing, and External Information and Linkages is similar to the studies in the theoretical framework, whereas the research conducted on Skilled Labour, and Management and Marketing, have a different focus. In the case of Management and Marketing studies are more focused on external information rather than training of managers as a means of overcoming the barrier, and in the case of Skilled Labour research focus is directed more towards managerial attitude and legislation, rather than graduate recruitment. This could suggest either that the problems faced by Swedish SMEs are not accurately described by the framework, or that the research done has been misdirected.

For the framework to explain Swedish SMEs' inability to innovate then all or most factors need to be useful in describing problems faced.

External Information and Linkages has been shown to positively affect innovation performance, however the research on what information and linkages are beneficial differs between international research and the Swedish market. In addition to this the benefits from the external information comes through how it affects other factors as much as the value of information in itself.

As for the remaining two factors the framework seems to be less accurate in describing them, and the respondents are divided in their opinions.

The importance of internal training seems more related to attitude and support from management, the training as such; and troubles in recruiting skilled graduates is effectively mitigated through the highly educated workforce provided by the many local Universities.

The study further finds that the Management and Marketing barrier, focusing mainly on skills and time, is described accurately by the theoretical framework to some extent, however the means to overcome the barrier seems to lie in external linkages rather than training. This is well aligned with Swedish SMEs' own perception of the situation.

For the framework to be relevant it should arguably present the major barriers to innovation faced by the SMEs, and as is described above this is not the case. Therefore we argue that the framework is not actually very useful in describing the barriers to innovation faced by Swedish SMEs.

6 CONCLUSION & FURTHER RESEARCH

6.1 CONCLUSION

This study has evaluated the barriers facing Swedish SMEs using the framework presented by Freel (2000), namely: Financing, Management and Marketing, Skilled Labour, and External Information and Linkages. Through the means of a literature review the study firstly builds a theoretical framework on international studies, towards which research conducted on the Swedish market and each individual barrier is scrutinised and analysed. Thereafter interviews were conducted with market professionals closely related to innovative SMEs who would have knowledge of issues facing SMEs. Tying up the study is an analysis on the framework's usefulness in describing the barriers to innovation faced by Swedish SMEs.

The research finds that the Financing is major barrier to innovation for Swedish SMEs, which was confirmed by the respondents. The three other factors, Management and Marketing, Skilled Labour and External Information and Linkages are considered less of a problem on the Swedish market. The research further shows that the barrier of Skilled Labour is rather dependent on management attitude and internal training, as much as it is mitigated by the highly educated Swedish workforce. Management and Marketing is considered a minor barrier and rather dependent on external linkages, the study even argues that a lack of marketing skills could rather signal a strict focus on core competences which should not necessarily be considered a weakness. The research done on External Information and Linkages differs somewhat from international research, and the respondents do not consider it a major barrier.

These findings leads us to argue that the framework does not accurately describe the major barriers to innovation faced by Swedish SMEs, and is therefore not very useful in describing the challenges faced.

6.2 SUGGESTIONS FOR FURTHER RESEARCH

Financing was considered to be the main barrier to innovation by all respondents, as well as by research on the Swedish market. The main difference between the respondents' viewpoint and the empirical findings however, was how the respondents saw the process of obtaining funds from governmental organizations as highly cumbersome. This was not much covered in the theoretical framework or in any Swedish research included. Scrutinising the public innovation support systems and providing policy recommendations would therefore be a highly appreciated contribution to existing research on the field.

As the research conducted on Skilled Labour in Sweden is not in line with research done internationally, an appreciated contribution to this research would then be to consider to what extent recruitment of graduates can be considered a barrier to innovation. The same goes for training of managers, compared to using external linkages for improving skill deficiencies in areas such as international marketing.

This study has shown that External Information and Linkages is of importance to the innovativeness of Swedish SMEs, but it is unclear exactly what types of information and linkages are required to turn R&D into profit. Hence, an appreciated contribution would be a thorough dissection of the factor.

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8 APPENDIX 1: FINANCE

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Initiatives to promote commercialization of University knowledge	Rasmussen et al.	Analysing commercialisation initiatives	4 Universities in the Nordic countries	Case study	The Swedish Commercialisation system is similar to that of other Nordic countries	-
Emergence of the Swedish innovation system and the support for regional entrepreneurship: a socioeconomic perspective	Frykfors, Klofsten	Scrutinising the National Innovation System of Sweden	-	Review	Providing a thorough analysis of the NIS	-
National Innovation systems: Finland, Sweden & Australia Compared	Roos et al.	Analysing the differences in NIS, and finding possible policy implications for Australia	Finland, Sweden, Australia	Review	A comparison of two world-leading innovation systems, to a mediocre one	-

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Control Aversion and the search for external financing in Swedish SMEs	Berggren et al.	Identifying what circumstances SMEs affects SMEs willingness to accept external financing	281 Swedish Manufacturing and Service firms, <200 employees	Statistical analysis of survey result	Three types of control aversion are identified as significant, one is not	Considers SMEs in general
Banks' risk assessment of Swedish SMEs	Bruns, Fletcher	Investigating capital owners' willingness to lend money to SMEs	114 Lending officers for Swedish Banks	Statistical analysis of survey result	Identifying what types of information most influences the lending decision	-
The Financial Conditions for Swedish SMEs: Survey and research agenda	Cressy, Olofsson	Investigating constraints for financial supply and demand for Swedish SMEs	285 Swedish SME, <200 employees	Statistical analysis of survey result	Establishing that demand constraints is a more significant phenomenon than supply constraints	-
Innovation performance and Government financing	Svensson	Comparing types of external financing and performance	867 Inventors and SME, <1000 Employees	Statistical analysis of survey result	Establishing the inferiority of "soft" government financing	-
Svenska småföretags syn på innovationer och FoU	Vinnova, SEB	Comprising information on SMEs' view on innovation and R&D	2209 SMEs, <250 employees	Analysis on survey results	Providing statistics on SMEs' view on innovation and R&D	-

9 APPENDIX 2: MANAGEMENT AND MARKETING

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Innovation support for new technology-based firms: the Swedish Teknopol approach	Heydebreck, Peter; Klofsten, Magnus; Maier, Jan C.	Evaluating the Teknopol approach in meeting innovation needs	35 New technology-based firms	In-depth interviews	Policy recommendations	-
Technology innovation in internationalising SMEs	Rovira Nordman, Emilia; Tolstoy, Daniel	Evaluating product flexibility and personal interaction with foreign customers on technology innovation	188 SMEs, 5-250 employees	Linear structural relations analysis	Concluding the benefits to innovation performance of customer relationships	-
Den kompetenta arbetsplatsen	Vinnova	Evaluating organisations' ability to develop and use competence in the workplace	17 case studies on Swedish companies	Case studies	Providing policy recommendations	-
Svenska småföretags syn på innovationer och FoU	Vinnova, SEB	Comprising information on SMEs' view on innovation and R&D	2209 SMEs, <250 employees	Analysis on survey results	Providing statistics on SMEs' view on innovation and R&D	-

10 APPENDIX 3: SKILLED LABOUR

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Nordic SMEs and Regional Innovation Systems	Asheim, Coenen, and Svensson-Henning	Examining if access to innovation support is needed for SMEs in Nordic regional clusters	Nordic regional clusters and innovation system	Case studies	Providing policy recommendations	The individual case studies are conducted in all Nordic countries
Den kompetenta arbetsplatsen	Vinnova	Examining conditions to develop and use competence in innovation	17 case studies on Swedish companies	Literature review	Providing policy recommendations	-
Ylinenpää	Measures to overcome barriers to innovation in Sweden – fits and misfits	Identifying barriers to innovation in Sweden	-	Literature review	Combining results from different studies	-
Svenska småföretags syn på innovationer och FoU	Vinnova, SEB	Comprising information on SMEs' view on innovation and R&D	2209 SMEs, <250 employees	Analysis on survey results	Providing statistics on SMEs' view on innovation and R&D	-

11 APPENDIX 4: EXTERNAL INFORMATION AND LINKAGES

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Nordic SMEs and Regional Innovation Systems	Asheim, Coenen, and Svensson-Henning	Examining if access to innovation support is needed for SMEs in Nordic regional clusters	Nordic regional clusters and innovation system	Case studies	Providing policy recommendations	The individual case studies are conducted in all Nordic countries
Acquisition of technological knowledge in small and medium-sized manufacturing companies in Sweden	Belotti, Tunälv	Describing sources used by SMEs to obtain scientific knowledge	509 Manufacturing SMEs, 20-200 employees	Survey	Six strategies for accessing technical knowledge are identified	-

Title	Author	Purpose	Population/Sample	Method	Result	Comment
Managing External Information in Manufacturing Firms: The Impact on Innovation Performance	Frishammar, Hörte	Determining if organizations that excel at managing external information are better at innovation	206 Medium sized Manufacturing firms, 175-2500 employees.	Statistical analysis of survey result	Establishing a positive relationship between scanning for external information and innovation	Uses only “medium-sized” firms, which are classified as 175-2500 employees
Product innovation in small and large enterprises	Karlsson, Olsson	Determining how the external environment affects the early stages of product development	270 LE (employees>50) and SME (employees<50) from six Swedish counties.	Statistical analysis of survey result	Establishing the difference in importance of the regional environment for LEs and SMEs	Classifying LEs as 50+ employees.
Factors associated with formal networking in regional small business: some findings from a study of Swedish SMEs	MacGregor	Determining what factors are important when deciding to collaborate within networks	339 SME from four regional areas in Sweden.	Statistical analysis of survey result	Establishing what factors cause SMEs to network	Low response rate (28.9%)
Svenska småföretags syn på innovationer och FoU	Vinnova, SEB	Comprising information on SMEs' view on innovation and R&D	2209 SMEs, <250 employees	Analysis on survey results	Providing statistics on SMEs' view on innovation and R&D	-

12 APPENDIX 5: KEYWORDS

The keywords used in the search queries is based around Freel's (2000) framework, factors and sub-factors found to be evaluated. Also subjects found to be linked to these in the Swedish context is added for a more Swedish-oriented approach. The keywords are searched for in all sources listed in Appendix 6.

In addition to the English language, a set of keywords translated into Swedish is used to cover research conducted in Swedish.

12.1 ENGLISH KEYWORDS

(sweden OR swedish) is used in all queries. In addition:

innovation

innovative

finance

management

marketing

competence

skilled labour

education

external information

external linkages

information

linkages

graduates

Another term is afterwards added to be used in combination with above stated keywords to further narrow the results:

(sme OR "small firms")

12.2 SWEDISH KEYWORDS

(sverige OR svenska) is used in all queries. In addition:

innovation

finans

finansiering

management

kompetens

kunskap

utbildning

extern information

information

Another term is afterwards added to be used in combination with above stated keywords:

(sme OR små OR "små företag")

12.3 AUTHORS

Upon finding a particularly prominent study, the author is singled out and their last name in combination with other keywords are searched for. These authors are:

Ejeremo, Olof.

Freel, Mark S.

Schön, Lennart.

Ylinenpää, Håkan.

13 APPENDIX 6: SOURCES

The following sources are used to search for literature:

1. Summon
2. GUNDA
3. GUP
4. GUPEA
5. LIBRIS
6. EBSCO Host (Business Source Premier)
7. Google Scholar

Summon

Summon is a search service available at Gothenburg University. It contains e-journals, databases, GUNDA, GUP and GUPEA. Summon is recommended to use at the beginning of a broader search process as it includes many sources. But as more specialised searches is needed, subject divided databases should be used according to the library's guidelines (www.ub.gu.se/sok/summon/om.xml).

www.ub.gu.se/sok/summon

GUNDA

GUNDA is a database of the Gothenburg University Library containing journals, newspapers, books, doctoral theses, reports, e-books, and audio recordings (www.ub.gu.se/sok/bocker).

www.ub.gu.se/sok/bocker/

GUP

GUP records all material published by authors in Gothenburg University such as articles, books reports since 2004. This information is also available to search engines, e.g. Google (gup.ub.gu.se/about).

gup.ub.gu.se/

GUPEA

GUPEA is used by Gothenburg University for e-publishing theses, as well as other research publications (www.ub.gu.se/publicera/epublicering).

gupea.ub.gu.se/

LIBRIS

LIBRIS is a shared directory for Swedish university and research libraries including books, journals, articles, and electronically published literature

(librishelp.libris.kb.se/help/about_libris_swe.jsp?redirected=true&pref_is_set=&textsize=&con

trast=&language=se).

www.ub.gu.se/sok/bocker/

EBSCO Host (Business Source Premier)

Business Source Premier is a popular source for articles containing more than 2200 journals (www.ebscohost.com/academic/business-source-premier).

www.ebscohost.com/academic/business-source-premier

14 APPENDIX 7: INTERVIEW PROTOCOL

1. Which, in your opinion, are the most prominent barriers to innovation in Swedish SMEs?
2. Do you consider financing to be a barrier to innovation in Swedish SMEs?
 - a. To what extent?
 - b. What type of financial problems?
3. Do you consider management and marketing to be a barrier to innovation in Swedish SMEs?
 - c. To what extent?
 - d. What type of financial problems?
4. Do you consider skilled labour to be a barrier to innovation in Swedish SMEs?
 - e. To what extent?
 - f. What type of financial problems?
5. Do you consider external information and linkages to be a barrier to innovation in Swedish SMEs?
 - g. To what extent?
 - h. What type of financial problems?