Types of innovation, sources of information and performance in entrepreneurial SMEs

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Abstract

Purpose – The purpose of this paper is to examine the information sourcing practices of small- to medium-sized enterprises (SMEs) associated with the development of different types of innovation (product/process/market/organizational). The relationship between different types of innovation and firms' performance is also to be examined.

Design/methodology/approach – The paper is based on a quantitative study of a sample of SMEs located in the Northern Savo region in Finland. The entrepreneurs completed a questionnaire pertaining to, for example, whether their firms had introduced novel innovations and what were the sources of information behind these innovations.

Findings – The introduction of novel product and market innovations appears to be associated with the use of more or less freely accessible information sources. The findings also indicate that the introduction of novel product, process and market innovations is positively associated with firms' growth. None of the types of innovation studied was found to have a positive relationship with firms' profitability.

Research limitations/implications – As the analysis was based on self-reported data provided by the entrepreneurs of SMEs, the authors had to rely on their judgment regarding the novelty of the innovations they had introduced. Moreover, as the study was conducted in a single region with its idiosyncratic features, the generalizability of the findings to other regional contexts remains somewhat ambiguous.

Practical implications – The study suggests a need to re-evaluate the innovation-related services available to firms in the regional innovation system. The findings also imply the need for entrepreneurs and their firms to upgrade their competences in order to enhance their innovation and networking capabilities.

Originality/value – Relatively modest amounts of research have addressed the information sourcing practices of SMEs in relation to different types of innovation, both in terms of the object of change and the extent of change. The paper addresses this.

Keywords Small to medium-sized enterprises, Innovation, Information management, Company performance, Finland

Paper type Research paper

1. Introduction

It has become commonplace to argue that in the contemporary "knowledge-based economy" (e.g. Cooke and Leydesdorff, 2006; OECD, 1996), characterized by both accelerating pace of change and increasing complexity and uncertainty, the ability of firms to adapt in their external environment and to remain competitive is closely

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related to their capacity to innovate and continuously upgrade and renew their knowledge bases, products and structures (Johannessen *et al.*, 1999). As Nonaka (1991, 96) puts it, "in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge". From the point-of-view of an individual entrepreneur, the knowledge-based economy is a mixed blessing: more and more information is freely available, but the decision regarding what information should be utilized and what should be ignored has become more complicated.

As it is now widely appreciated, in turbulent market economies, innovation is the elixir of life for firms, regardless of their size or other attributes. Growth, success and survival, all depend on the ability of firms' to innovate on a continual basis. By the same token, knowledge is understood as the main ingredient in the concoction of innovation. The prerequisite of every innovation is either the generation of new knowledge or, alternatively, and more typically, the combination of existing pieces of knowledge in novel, "entrepreneurial" ways (Schumpeter, 1934; Drucker, 1985). But what are the initial sources of innovative ideas and from where does the knowledge used in firms' innovation processes originate? In order to shed some light on these questions, this paper provides empirical evidence of the relationship between different information sources and the introduction of different types of innovation in entrepreneurial small to medium-sized firms (SMEs) located in a Finnish region of Northern Savo. The paper also addresses the question whether the introduction of different types of innovation is associated with the performance of firms.

Since "innovation" may refer to very different kinds of "newness" regarding products, production methods and technologies, markets, and organizational configurations, among other things, it is reasonable to assume that the sources of useful information may vary between different types of innovation. This possibility has been, however, recognized only fairly recently (e.g. Tödtling; *et al.*, 2009; Freel and de Jong, 2009). Moreover, as innovations are usually – and sometimes even uncritically – associated with enhanced performance and success of firms, we also aimed to find out, whether the introduction of different types of innovation is actually related to the performance of firms in terms of growth and profitability. Thus, our principal research questions may be formulated in the following manner:

RQ1. What are the important sources of ideas, information and complementary assets that contribute to the creation of different types of innovation – product, process, market, and organizational – in entrepreneurial SMEs?

RQ2. Is the introduction of different types of innovation associated with the growth and profitability of entrepreneurial SMEs?

As the crucial importance of innovations has now been explicitly recognized, innovation scholars have been apt to delve into the nature of the process where new information is acquired and converted to innovations. The existing studies on the phenomenon of innovation can be categorized in many ways. Our decision is to approach the issue from four different perspectives. First, we have the "innovative individual", who, following Schumpeter (1934) is usually read as the "innovative entrepreneur". Second, we may consider the firm (organization) as the focal level of analysis. This is the level of analysis typically employed in business and innovation management studies. Considering the process of innovation, these two aforementioned micro level approaches may be labelled as "internal", or "introvert" as the main focus is

on factors internal to a firm. Third, the network school on innovation (e.g. Håkansson, 1987; Håkansson and Snehota, 1989), emerging from the mid-1980s onward, emphasizes the importance of external relationships, especially with other firms, in acquiring critical inputs required to undertake innovation processes. Finally, we have the now so popular systems of innovation (SI) approach, initiated by Lundvall (1988, 1992), Freeman (1987), and Nelson (1993), among others, which shares many common elements with the network approach but places far more emphasis on the holistic and ubiquitous nature of innovation, as well as on the complex web of interactions and on the institutional environment guiding and facilitating the actions and interactions of economic agents. Regarding the nature of innovation processes, the meso level approaches of networks and innovation systems may be labelled as "external", or "extrovert", as they emphasize the importance of cooperation with other actors, rather than the self-sufficiency of individual entrepreneurs and firms. The notions of networking and systemic innovation reflect the now well recognized fact that firms, in general, do not innovate in isolation from the surrounding world, an idea that actually would not had received appreciable endorsement only some time ago. As Edquist (2005, 18) puts it, "…twenty-five years ago it would have been natural to exclude the interactions between organizations as a determinant of innovation processes".

The remainder of the paper is organized as follows. Section 2 sketches some previous literature on the nature of the innovation process and the knowledge sourcing performed by firms. Owing to considerable space limitations, an exhaustive account of existing literature is way beyond the scope of this paper, but the most relevant contributions to the issue currently at stake will be presented as possible. In this section, the research hypotheses are also presented. Section 3 introduces the data and the research methodology used in this study. In section 4 the results of statistical analysis are presented. Finally, the last section provides concluding remarks as well as propositions for further research and discusses possible theoretical and practical implications of the study.

2. Theoretical background and research hypotheses

2.1 Defining innovation

What counts as an innovation? As no universally shared conceptualization or operationalization exists (Amara and Landry, 2005), we briefly sketch some issues related to the definitions and taxonomies of innovation. The common attribute attached to an innovation is, of course, "newness". But, as we occupy the filled-with-knowledge kind of world as we do, the question becomes: new to whom or new in what way (see, e.g. the discussion in Johannessen *et al.*, 2001)? Hence, there is simply no objective way to distinguish innovation from non-innovation as innovations come in many shapes, shades and degrees. Without too much contemplation, for anyone familiar with innovation studies, two archetypical ways of differentiating between types of innovation easily come up. First, we have the taxonomy, already suggested by Schumpeter (1934), where we differentiate the types of innovation on the basis of the object of change, speaking of, for example, product, process, market and organizational innovations. Second, we may try to make a difference between innovations on the basis of their "newness" or "radicalness", i.e. based on the extent of change. According to this view, radical innovations are those more or less revolutionary amendments, which, in very exceptional cases though, may even serve

as the trigger for completely new technological trajectories (Dosi, 1982; Utterback, 1994). Along these lines, in this paper we adopt the definition of innovation suggested by OECD (2005). According to this view, we may have four different kinds of objects of change, i.e. product, process, market or organizational innovations. Additionally, the extent of change associated with innovation may be depicted in terms of complete newness or significant improvement.

"What counts as innovation" also depends on the status and background of the respondent. As Massa and Testa (2008) remark, academics and entrepreneurs, for example, may interpret innovation in a very dissimilar manner: while academics usually stress scientific novelty, for entrepreneurs, on the other hand, "innovation is anything that makes money" (Massa and Testa, 2008, p. 396; cf. Freel, 2005, p. 128). The differing views researchers may have from those whose actions they are trying to scrutinize, or even to influence, is not the monopoly of innovation scholars, however, but is quite commonplace in all fields of social sciences. Of course, the diverging views of innovation not only serve as a potential barrier to more fruitful dialogue between academics and entrepreneurs but may also be a source of bias in innovation studies. For example, Jensen *et al.* (2007) note that of the new innovations firms reported they had introduced, three fourths were already known on the national as well as on the international markets. Amara and Landry (2005) stress the need to treat innovations differently based on their degree of novelty, because, as they note, more and more firms can be nowadays labeled as innovative in some meaning of the word.

2.2 Micro-view on knowledge and innovation: the innovative firm

Pavitt (2005) argues that at the level of the firm, innovation processes can be divided into three overlapping sub-processes:

(1) cognitive, i.e. how firms generate and maintain the know-how to conduct their tasks;

(2) organizational, i.e. how firms operate internally or in collaboration with other firms and organizations; and

(3) economic, i.e. how firms establish internal incentives to ensure innovation proceeds quickly and in the desired direction.

Furthermore, as Pavitt (2005) posits, innovation processes are contingent, that is to say, they exhibit notable differences according, e.g. to sector, field of knowledge, size of firm, corporate strategy and prior experience, type of innovation, historical period and country.

In literature, the importance of factors internal to a firm is stressed particularly in the resource-based view of the firm and in the evolutionary theory of the firm. The resource-based view of the firm, originally proposed by Penrose (1959), perceives a firm as a constellation of resources (Wernerfelt, 1984) and emphasizes the essential importance of firm's unique and inimitable resources and competences as the sources of sustainable competitive advantage. The evolutionary theory of the firm (Nelson and Winter, 1982) also takes the heterogeneity of firms' competences and resources as one of its fundamental starting points. Thus, the notion of the representative firm of mainstream economics is abandoned. Likewise the resource-based view, the evolutionary approach stresses the significance of firm's unique technological

resources and knowledge-based competencies, accumulated over time, which are not easily imitated by other firms.

While the organization-level analysis of innovation-related activities and resources has traditionally been conducted in large firms (particularly in the field of business management), recently also small firms and their entrepreneurs have received growing attention (see, e.g. Alvarez and Busenitz, 2001), as the role of SMEs as innovators has been appreciated more widely. As already pointed out, we cannot expect to find only one way firms may organize their innovation procedures but this is dependent on many variables. Some of the most important ones are firm size and model of governance. Of course, several other factors also play an important role – such as the industry or technology intensity of the firm – but in our study we are mainly interested in the size of the firm (small to medium-sized) and model of governance (entrepreneurial/owner-managed). From our point-of-view, the issue has been explained quite eloquently by Bougrain and Haudeville (2002, p. 738) when they profess that "in fact, what distinguishes SMEs in comparison with large companies is not in that they have a lower turnover or a smaller size. The crucial point is that they are usually managed by their owners".

In owner-managed SMEs power and decision-making are concentrated in the entrepreneur. Commonly, the owner-managers tend to be less amenable to others' advice and are reluctant to delegate decision-making to others, which easily leads to reduced innovativeness. Also, strategic decisions are often framed within the constraints of family and individual goals, rather than maximization of firm potential, which might encourage entrepreneurs to reject changes due to their concomitant conflict (Dyer and Handler, 1994; Dobbs and Hamilton, 2007). In small entrepreneurial firms, the entrepreneur may be the only gatekeeper between the firm and potential innovation sources that matters. In this case, innovativeness may translate into the innovativeness of the entrepreneur rather than the innovativeness of the firm. As an illustration of the pivotal role of the entrepreneur, North and Smallbone (2000) report that for 85 percent of the firms in their study, the owner-managers of the firms played a central role in the initiation and development of innovations and in many cases they were the only persons involved in the innovation process.

When assessing the innovation potential of a firm, one may fall victim to the bias of overestimating the importance of firm's internal R&D intensity. Although carrying out in-house R&D is important in order to strengthen the firm's innovation performance (Cohen and Levinthal, 1990), R&D is by no means the guarantee or the imperative of success: R&D intensity is not an absolute measure (if a measure at all) of a firm's prospects for innovation and enhanced performance. From the viewpoint of innovativeness, more important than conducting pure R&D may be the existence of skilled and technically qualified workforce and also its continuous training. Here, alongside with the capability to provide workers with adequate training, also the firm's ability to attract highly qualified labor force will become one of its core competencies (Bougrain and Haudeville, 2002). As Freel (2005, p. 132) explicates the matter, "firm-level technological advancement (i.e. innovation) must be viewed in terms of the acquisition of, and not simply the presence of, competences". From the theoretical starting points discussed above the first research hypothesis concerning the internal capabilities of firms is formulated as follows:

H1. The existence and development of different internal competences within a firm is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

Measuring the importance of internal information sources. The entrepreneur's assessment of the importance of different internal factors of the firm (know-how, educational events, initiatives from employees, etc.) is used as a measure of their importance as a source of innovation-related information (see Table I).

As already indicated earlier, firms – especially the smaller ones – generally cannot rely solely on their internal knowledge and competences in their innovation processes but are forced to seek for complementary information from their environment. The notion of absorptive capacity (Cohen and Levinthal, 1990; for empirical evidence see also Caloghirou *et al.*, 2004; Cassiman and Veugelers, 2006; Nieto and Quevedo, 2005; Santamaria *et al.*, 2009; Vega-Jurado *et al.*, 2008; Veugelers, 1997) is what firmly amalgamates the innovative firm with its surrounding environment. In contrast with the transaction-cost theory (Williamson, 1985), the postulate underpinning the notion of absorptive capacity is that firms must possess adequate internal knowledge and capabilities, often but not necessarily always attained through in-house R&D, to get access to and gain from externally generated knowledge: the "make or buy" calculation of transaction-cost economics loses its relevance as in-house R&D and external information are not substitutes but complements. In the literature, the notion of networks has been a popular concept for analyzing firms' strategies for external knowledge acquisition. More recently, the concept of systems of innovation has been introduced as a broad theoretical framework for understanding the complex and distributed nature of contemporary innovation processes. In the following, these concepts and their contributions are briefly discussed.

2.3 Meso level perspective: networks and innovation systems

During the past two decades or so, a considerable shift has taken place with respect to the underpinnings of innovation studies. Today, innovation is widely seen as the offspring of interactive efforts between diverse actors, rather than resulting solely from the internal operations and capabilities of individual firms. In the literature, a plethora of concepts, models and approaches have been suggested to capture the nature of interactive innovation processes. Of these concepts, we are focusing here on the network approach and the systems of innovation (SI) concept, as their advantage over many of the related concepts is that in regard to innovation processes, they are more precise in terms of the relationships and actors involved (cf. Tödtling *et al.*, 2009). The network approach and the SI concept thus explicitly stress the importance of relations between innovative firms and other firms and organizations, instead of leaning on somewhat loose assumptions about the existence of some kind of innovation-generative "culture", "climate", "milieu", or whatever, which is a typical starting point in many of the related approaches, such as "learning regions" or "innovative milieus".

The concepts of networks and networking appear to be more relevant today than ever before, though they are not complete newcomers in the field of science. The network perspective has been applied in the field of organization studies for decades, and in recent years it has become increasingly popular as a way of analyzing the interplay of firms' internal operations and external relations (e.g. Nohria and Eccles,

Variable	Description	Scale of measurement
Dependent variables		
Product innovation	Dummy variable measuring the introduction of product innovations during the period 2002-2006	1 = Innovation 0 = Otherwise
Process innovation	Dummy variable measuring the introduction of process innovations during the period 2002-2006	1 = Innovation 0 = Otherwise
Market innovation	Dummy variable measuring the introduction of market innovations during the period 2002-2006	1 = Innovation 0 = Otherwise
Organizational innovation	Dummy variable measuring the introduction of organizational innovations during the period 2002-2006	1 = Innovation 0 = Otherwise
Independent variables		
INTERNAL[a]	Sum-variable measuring the importance of factors internal to the firm for innovation Know-how of the firm Educational events for employees Initiatives from employees Organization of work (teamwork, job rotation, etc.) Organized communication in the firm Spontaneous communication in the firm Social events and shared free time activities	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
NETWORK[a]	Sum-variable measuring the importance of different network relations for innovation Customers Suppliers and subcontractors Competitors Sales and delivery organizations Business service firms and consultants Accounting companies Banks Firms in the same industry Firms in other industries Firms in the neighborhood Firms located in regional centers Firms located elsewhere in Finland Firms located abroad	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
REGKNOW[a]	Sum-variable measuring the importance of regional knowledge organizations for innovation University of Kuopio Savonia University of Applied Sciences Organizations of vocational education Research institutes VTT (Technical Research Center of Finland)	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
REGSUPP[a]	Sum-variable measuring the importance of regional support organizations for innovation Regional association of entrepreneurs Jobs and Society (local office) Local technology center (Teknia ltd.) Local association of entrepreneurs City office of business and industry Local business development organizations Business incubators Employment and Economic Development Center (regional office)	Five-point Likert-scale (1 = Insignificant to 5 = Very important)

Table I.
Description of the variables used in this study

(*continued*)

Variable	Description	Scale of measurement
FINANCIAL[a]	Sum-variable measuring the importance of financial organizations for innovation Tekes (The Finnish Funding Agency for Technology and Innovation) Sitra (The Finnish Innovation Fund) SME Foundation The Foundation for Finnish Inventions Finnvera (a public financial organization) The Regional Council of Northern Savo	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
NATSUPP[a]	Sum-variable measuring the importance of national support organizations for innovation EK (The Confederation of Finnish Industries) Finpro (national expert network for internationalization) The Federation of Finnish Enterprises Chamber of Commerce Industrial associations	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
DIFFEXT[a]	Sum-variable measuring the importance of different external sources of information for innovation Exhibitions, fairs Internet Media Professional literature Educational meetings Entrepreneur friends Participation in development projects	Five-point Likert-scale (1 = Insignificant to 5 = Very important)
GROWTH[b]	Categorical variable measuring the entrepreneur's assessment of the positive impact of innovation on the firm's growth	0 = Strong impact 1 = Weak impact
PROFIT[b]	Categorical variable measuring the entrepreneur's assessment of the positive impact of innovation on the firm's profitability	0 = Strong impact 1 = Weak impact

Notes: [a] More than one question was used to construct the variable, the items composing the sum-variable are indicated in italics; [b] In the questionnaire, a five-point scale (1 = null, 2 = weak, 3 = quite weak, 4 = quite strong, 5 = very strong) was used to inquire about the entrepreneur's assessment of the positive impact of innovation on the firm's growth/profitability. For analysis, the responses were coded into a categorical variable with two values: 0 = strong impact on growth/profitability (options 4 and 5) and 1 = weak impact on growth/profitability (options 1, 2 and 3), as better models were obtained considering the relationship between innovation and growth/profitability

Table I.

1992). Networks can provide many types of value to their members, e.g. by allowing them an access to intangible social assets embedded within the network (Watson, 2007). While the concept of networks has been firmly established in the literature, research on the relationship between networks and innovation is a more recent area of scientific inquiry (Powell and Grodal, 2005). With respect to their innovative activity, firms collaborate for various reasons: to reduce the cost of technological development or market entry, to reduce risk of development or market entry, to achieve scale economies in production, and to reduce the time taken to develop and commercialize new products (Tidd *et al.*, 2002). Previous research has emphasized particularly the importance of vertical network relationships with suppliers and customers as an important source of innovation-related inputs (Von Hippel, 1988; Lundvall, 1992) but

sometimes also horizontal relationships with competitors are of importance in this respect (Hamel *et al.*, 1989).

In general, it can be argued that networking is beneficial for the overall performance of firms in terms of survival, growth, and innovativeness (Håkansson, 1989; Utterback, 1994; Gemünden *et al.*, 1996; Littunen, 2000; Littunen and Virtanen, 2009), although the establishment of network relations should not be seen as an automatic success recipe (Alm and McKelvey, 2000; Freel, 2000). But is there an optimal network structure or an ideal number of network relations to be built up? Apparently, the answer to both of these questions is "no" (e.g. Gemünden and Heydebreck, 1995; see also Håkansson, 1989); rather, the optimality, if such a term is to be used, of network intensity and range, is contingent on time and place. This argument has been empirically validated, e.g. by Lechner and Dowling (2003) who found that external relations are founded to serve diverse objectives and that each firm has an unique relational mix which changes along the development path of the firm. Regarding firm's success and growth, both weak and strong ties are important as they fulfill different functions: "Strong ties add to depth, weak ties to diversity. Strong ties lead to routines, weak ties open the door to new options" (Lechner and Dowling, 2003, p. 20). The authors posit that the most successful companies begin by developing strong ties to get the maximum out of external relationships and then develop weak ties in order to gain diversity. From the above discussion on networks, we draw the following hypothesis:

H2. Information acquired through the different network relations of firms is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

Measuring the importance of network relations. The entrepreneur's assessment of the importance of different network relations of the firm (with customers, suppliers, competitors, etc.) is used as a measure of their importance as a source of innovation-related information (see Table I).

Other firms, such as suppliers, customers and competitors, are not the only potential sources of information inputs in the innovation process of a firm. While the network approach on innovation mainly emphasizes the relationships between business firms, the SI approach takes a broader perspective and attempts to capture all the important factors that influence the generation, utilization and diffusion of economically useful knowledge (Lundvall, 1992; Edquist, 1997). Within SIs, the creation, selection and transformation of knowledge takes place within a complex matrix of interactions between different actors (firms, universities and other research organizations, educational organizations, financial organizations, public support organizations, etc.) and within a diverse economic, institutional, social, political, cultural, and geographical context.

While the SI concept originates from national level analysis (Lundvall, 1988; Freeman, 1987; Nelson, 1993), more recently it has been applied also in analyses on the regional dimension of innovative activities (e.g. Cooke, 1992; Cooke *et al.*, 1997). In fact, many scholars have argued that it is primarily the regional (or, more generally, sub-national) level which is the most relevant in order to understand the process of innovation and, concomitantly, technological change and advancement in the economy (e.g. Howells, 1999; Tödtling and Kaufmann, 1999; Malmberg and Maskell, 2006). The frequently mentioned explanations for the importance of the region as the focal level of

innovation activities are the localized and "sticky" nature of technological knowledge (Antonelli and Quéré, 2002; Asheim and Isaksen, 2002) and the importance of spatial proximity in sharing and exchanging this knowledge. But, as Boschma (2005) explicates, geographical or spatial proximity is only one of the many dimensions of proximity (spatial, institutional, social, organizational, and cognitive), and probably not even the most critical one. Of course, spatial proximity does play an important role in promoting the other types of proximity, as they all influence each other.

As already noted, in addition to firm-to-firm relationships, the SI approach emphasizes the role of various public sector organizations as contributors to the innovation processes of firms. During the past years, the public sector has also been more active in developing and providing different kinds of innovation-related services for firms. Especially the smaller firms whose internal resources and networking capabilities are limited may benefit from the services and knowledge provided by the regional support organizations. However, in many small and remote regions the capabilities of regional authorities to offer sufficient and sophisticated innovation-related services may be limited. Therefore, for the firms located in these regions, the different nationally initiated public support instruments may also be of importance. On the basis of the above discussion drawn from the SI literature, we formulate the following hypotheses concerning the contribution of external information sources to firms' innovation process:

H3a. Information acquired from the regional educational and research organizations is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

H3b. Information acquired from the regional public support organizations is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

H3c. Information acquired from the national and regional financial organizations is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

H3d. Information acquired from the national support organizations is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

Measuring the importance of system-level factors. The entrepreneur's assessment of the importance of different support organizations (research organizations, regional and national support organizations, financial organizations, etc.) is used as a measure of their importance as a source of innovation-related information (see Table I).

2.4 Other external sources of information

In addition to other firms and organizations in the private and public sectors, there are multiple other external sources of information that firms may screen for ideas for innovation, many of which are generally accessible to anyone. Some typical examples are the Internet and other media, commercial exhibitions and fairs, scientific and professional literature, trade journals, educational events, and so forth. Sometimes, these kinds of information sources are well known by the entrepreneur: for example, participating in commercial and technological fairs is a part of the everyday business

for many entrepreneurs. Sometimes, however, the potential sources of useful information are less obvious and their accessibility is at least partially dependent on the background, education and existing knowledge of the entrepreneur, a typical example being scientific publications.

The characteristics of the external environment of a firm affect, at least to some extent, the variety of potential external information sources screened and utilized by the firm. Especially the firms located in peripheral and rural areas are often forced to rely on the generally available information sources due to the lack of relevant local network partners and the inadequateness of public support instruments (cf. North and Smallbone, 2000). On the other hand, the use of multiple information sources is often beneficial for firms' innovativeness, due, for example, potential complementarities and synergies between various knowledge sources (Bigliardi and Dormio, 2009; Amara and Landry, 2005; Trippl *et al.*, 2009). Being aware of the variety of potential information sources is important and the systematic search for innovation inputs enhances the firms' innovative potential (Fiet *et al.*, 2007; Julien *et al.*, 1999). Following the discussion above, we present the following as an additional hypothesis concerning the contribution of external information sources to firms' innovation activities:

H4. Information acquired from different more or less freely accessible external sources is positively associated with the introduction of different types of innovation (product/process/market/organizational) in SMEs.

Measuring the importance of generally accessible information sources. The entrepreneur's assessment of the importance of different generally accessible information sources (fairs, media, internet, etc.) is used as a measure of their importance as a source of innovation-related information (see Table I).

2.5 Innovation and firm performance

The ultimate reason for firms to engage in innovation activities is to gain benefit, i.e. the expected positive impact of innovations on firms' success (Dosi, 1988). This aspect is explicitly included also in OECD's (2005, 101) firm-level definition of innovation: "Innovation in firms refers to planned changes in a firm's activities with a view to improving the firm's performance". Here, we will review some literature focused on the connection between innovation and SME performance in order to find out whether a general picture on the issue emerges.

Before proceeding, a word of caution regarding the interpretation of research findings in innovation-performance studies is in order. As is well known, several studies have illustrated the positive relationship between innovation and the performance of firms (e.g. Crépon *et al.*, 1998). However, as Freel and Robson (2004, p. 562) remark "in many [cross-sectional] studies it is not clear to what extent the observed relationships between innovation and firm performance are merely joint associations to a third unidentified variable(s) rather than truly explanatory". In all cross-sectional studies, "issues of causality (or "proof") are impossible to resolve unambiguously. That is, irrespective of our findings, we cannot know in any objective sense if innovators were more likely to grow, or if growing firms were more likely to innovate". Similarly, Dobbs and Hamilton (2007) remind that cross-sectional studies may be able to identify some of the consequents of small firms' growth in a specific period but these consequents are not necessarily the causes of growth. Longitudinal

studies, on the other hand, are better suited to analyze, e.g. the direction between relationships, but neither are they without their problems. As Nås and Leppälahti (1997) remark, a notorious problem with longitudinal statistical analyses such as enterprise panels is attrition – which leads to missing data and possibly biased results.

When reviewing the existing literature on innovation-performance relationship more broadly than is possible to depict here, no clear consensus seems to emerge. As Dobbs and Hamilton (2007) have argued, knowledge development regarding small firms' growth and performance "appears fragmented rather than cumulative" (cf. Shepherd and Wiklund, 2009). One fundamental reason behind this state of affairs is, without doubt, the heterogeneous nature of the phenomenon under investigation. As Macpherson and Holt (2007) remark, small firm growth tends to be situated, complex and idiosyncratic by nature. Yet, to attain a some kind of a general picture concerning the relationship between innovation and firm performance, we may follow Nås and Leppälahti (1997, p. 1) when they state that "one important point about innovation is that it is not costless: It requires the creation of tangible and intangible assets which increase production costs; from this perspective, innovating firms will not necessarily be more profitable, but they will be more likely to survive and grow". On the basis of the above discussion, we draw our final two hypotheses concerning the relationship between innovation and firm performance:

H5. The growth of SMEs is positively associated with the introduction of different types of innovation (product/process/market/organizational.

H6. The profitability of SMEs is not positively associated with the introduction of different types of innovation (product/process/market/organizational).

Measuring the relationship between innovation and the growth and profitability of firms. The entrepreneurs' assessment of the impact of innovations on their firms' growth and profitability is used to measure this association (see Table I).

3. Data and research methodology

3.1 Sample and data

The primary data for this study were gathered in 2006 via a postal questionnaire among the SMEs located in the Northern Savo region in Eastern Finland, approximately 400 kilometers away from the Finnish metropolitan area. As a sample frame for constructing the database, we used the register of SMEs in the region that was offered by Suomen Asiakastieto, the leading business and credit information company in Finland. In this register, the latest financial statements data of 95 000 Finnish firms and groups are on one CD. The questionnaire was sent to 1,282 entrepreneurs of SMEs located in the Northern Savo region. All respondents were informed of the purpose of the questionnaire by a letter of introduction and the firms invited to sampling were contacted by a letter or telephone. Questionnaires were returned, 264 of which could be used for the analysis. This study reached a rather satisfactory return rate of 21 percent.

The subject firms of the study were mostly small, about 62 percent with fewer than ten employees (i.e. micro-firms), and strongly dependent on the work contribution of the entrepreneur and that of his or her family. This kind of a starting point was of great importance for the study since, as we aspired, the affiliation between the entrepreneur and the firm was strong. The strategic decisions of the firm, including the innovation

strategy, were specified by the entrepreneur. The firms typically founded in Finland are of the traditional small type. However, also the entrepreneurs of small firms have become increasingly aware of the need to operate their personal and business networks more strategically, for example, by creating more diverse and weak ties in order to be able to cope with complex, globalized markets (Johannisson, 1998). Although the capability to successfully manage innovative activities and related external relations is sometimes associated with sophisticated skills acquired through formal education, technical and vocational qualifications are often more important with this respect (Gray, 2006). Over 58 percent of the entrepreneurs participating in this study had not been educated beyond elementary school. However, about 57 percent of the entrepreneurs had been educated in vocational school. Only 6 percent of the entrepreneurs had no vocational training at all.

3.2 Variables and measures

3.2.1 Dependent variable. The dependent variable used in this study is the introduction of an innovation (product, process, market, or organizational) by a firm (see Table I). The purpose of the study is to identify the set of innovators and the set of non-innovators in the sample group and to find out the factors that differentiate the firms between these two groups. At this point, it should be stressed that simply asking whether a firm has introduced an innovation in the past few years will probably not yield very reliable results. A more fine-grained scale is needed in order to reveal the degree of novelty of the innovation and to differentiate innovators from non-innovators more reliably (cf. Amara and Landry, 2005). Thus, we started by asking whether the firms had introduced of implemented completely new or radically improved innovations during the four-year period (2002-2006) prior to the data collection, or whether there were only incremental modifications on the existing products, processes, etc. or no innovation at all. In order to delve into this matter, in our questionnaire we used a five-point scale where 1 denoted "completely new", 2 = "radical modification or improvement", 3 = "modification of the existing", 4 = "minor alteration", and 5 = "no modifications". Of these options, 1 and 2 were considered as "innovation", and 3, 4, and 5 as "no innovation". We believe that this procedure allowed us to quite correctly distinguish innovators from non-innovators in the sample group. In our view, the option 3 serves as a kind of a "left-over category": it is easy and safe to choose by the entrepreneurs who had actually not generated any genuine innovations but who did not want to appear as gotten into a rut in their operation. We have a strong reason to assume that many of the respondents had actually chosen the option 3 on the grounds explained above. To illustrate this argument, in the case of product innovations as much as 38.9 percent of the respondents chose the option 3 from the five alternatives, whereas the total share of innovators (i.e. responses to options 1 and 2 combined) in the sample was only 34.4 percent. Following this procedure, we created a dummy coded dichotomous dependent variable where firms were given a 1 if they had introduced genuine innovations in the past four years; otherwise, they were given a 0.

3.2.2 Independent variables related to the introduction of innovations. The primary objective of this paper is to analyze the relationship between different information sources (internal and external to a firm) and the introduction of different types of innovation. On a five-point Likert-scale, the respondents were asked to evaluate the importance of a total of 51 information sources for the introduction of innovation in

their firms. Of these information source variables, a total of seven sum-variables were created, each of which are individually associated with one of the research hypotheses presented above. The independent variables used in the models are explained in Table I.

Our secondary interest was to find out whether the introduction of innovations was associated with firms' performance in terms of growth and profitability. Thus, we asked the entrepreneurs of the firms to give their assessment of the impact of innovations on the growth and profitability of their firms. In the questionnaire, a five-point scale (1 = null, 2 = weak, 3 = quite weak, 4 = quite strong, 5 = very strong) was used to inquire about the entrepreneur's assessment of the positive impact of innovation on the firm's growth and profitability. For analysis, the responses were coded into a categorical variable with two values: 0 = strong impact on growth/profitability (responses to options 4 and 5) and 1 = weak impact on growth/profitability (responses to options 1, 2, and 3), as better models were obtained considering the relationship between innovation and growth/profitability.

3.3 Method of analysis

The purpose of the analysis was to uncover the factors that discriminate between the firms belonging to the innovator and non-innovator groups. Logistic regression analysis was used as a statistical technique in locating differences between those firms who had introduced genuine innovations and those firms who had not. As a statistical method we chose logistic regression analysis because it captures synergistic relationships between variables but does not require as restrictive assumptions as, e.g. discriminant analysis. With logistic regression we also avoided one noteworthy impediment identified by Davidsson and Wiklund (2000), who state that using current variables to predict past processes breaks with the principle that the cause must precede the effect. Considering the analysis, a caveat should be noted. Even though logistic regression analysis is able to reveal the relationship or association between variables, with cross-sectional data we are unable to proof the existence of a causal relationship or its direction, even when retrospective reporting is employed: it is only possible to state the existence of statistical associations, or the lack of such (Freel and Robson, 2004).

4. Findings

In our study, we have preliminarily presumed that the different information sources associated with the introduction of innovations in firms will vary according to the type of innovation in question. This is why the model was formed separately for the introduction of product, process, market, and organizational innovation. Table II presents the results concerning product innovation in firms. The estimated model was highly significant (Chi-square = 0.000) and explained the location of the observations in the examined groups rather well. Logistic regression model classified correctly 74.6 percent of all the observations. The high classification rate of the model was mostly based on the successful grouping of the other firms (= without new product innovation, 85.8 percent), although the firms with new product innovation were also classified quite satisfactorily. The statistically significant variables ($p < 0.07$) in the model were: the national support organizations (= NATSUPP), the different generally accessible external sources of information (= DIFFEXT), and the growth of firms (= GROWTH).

Table II.
A logistic regression model explaining the importance of factors related to product innovation in SMEs

Variables	Coefficient	Standard error	Significance
INTERNAL	0.395	0.256	0.123
NETWORK	0.183	0.214	0.393
REGKNOW	0.493	0.398	0.215
REGSUPP	−0.588	0.605	0.331
FINANCIAL	0.409	0.621	0.511
NATSUPP	−0.798	0.432	0.064*
DIFFEXT	0.736	0.340	0.030*
GROWTH	−1.004	0.460	0.029*
PROFIT	0.128	0.458	0.780
Constant	−2.807	1.280	0.028*

Notes: *Significant at the $p < 0.07$ level. Partial classification rates: firms with new product innovation (%) = 55.6; other firms (%) = 85.8; model of Chi-square = 0.000; $n = 169$; df = 9; total classification rates (%) = 74.6; dependent variable: introduction of an innovation by a firm: 0 = No innovation, 1 = Innovation)

According to the results, different external sources of information, such as fairs, exhibitions, media, Iinternet, etc. which in principle are freely accessible to anyone, are positively associated with the introduction of novel product innovations in firms (*H4* supported). On one hand, this finding is anticipated as it supports the view of the benefits resulting from the use of multiple information sources (Amara and Landry, 2005; Freel, 2000). On the other hand, however, it is somewhat surprising that DIFFEXT was the only information-related variable associated with the introduction of novel product innovation in firms. To speculate a bit, the finding may be indicative of the absence of suitable network partners and innovation support services in the region, which forces firms to rely on the generally available information sources (cf. North and Smallbone, 2000). A further explanation could also be the incapability of firms to collaborate with each other and with regional public support organizations (cf. Tödtling and Kaufmann, 1999, Tödtling and Kaufmann, 2001). However, as our data do not allow a more detailed investigation of this issue, the propositions presented above should be treated with caution, requiring further empirical validation.

Interestingly, and in contrast with several previous studies (e.g. Vega-Jurado *et al.*, 2008), the different factors internal to firms were not found as significant in the model (*H1* rejected). This finding is in sharp contrast with much of the existing literature stressing the importance of firms' internal factors and competences as the source of ideas and information utilized in their innovation processes. For example, North and Smallbone (2000) discovered that the majority of innovations in SMEs are generated by relying on the internal sources of ideas and expertise, without any direct contribution from outside the firm. Similarly, Sternberg and Arndt (2001) argue that although the characteristics of the external environment can have an influence on the innovative behaviour of firms, they can never be more important than the firms' internal competences. In the case of non-innovative firms, the information acquired from the different national support organizations was associated with their product-related innovation activities. The results also underpin the general finding of previous studies on firm performance, namely that the introduction of new product innovations is

positively associated with the growth of firms (e.g. Crépon *et al.* 1998; Morone and Testa, 2008; Wolff and Pett, 2006) but not with their profitability (Nås and Leppälahti, 1997) (*H5* and *H6* supported). To avoid ambiguity in the interpretation of the results, it is in order to note that in all models, the results concerning the relation between innovation and growth/profitability are to be interpreted in a way that negative coefficient is associated with the innovator group and positive coefficient with the non-innovator group. This is because in this study, growth and profitability are categorical variables and the statistical program used automatically recodes categorical variables, which reverses the sign of the coefficient.

A logistic regression analysis was also run to compare the sources of information associated with firms' process innovation. The model was highly significant (Chi-square = 0.000) and also fairly accurate in predicting the type of a firm in the examined groups (see Table III). The statistically significant variables in the model were: the different regional and national financial organizations (= FINANCIAL) and the growth of firms (= GROWTH). Concerning firms' profitability, no relationship with process innovation was discovered.

Considering the innovator group, information acquired from different regional and national financial organizations was positively associated with the introduction of process innovations. At a first sight, this might be considered as a somewhat disconcerting finding, as our questions for the firms concerned the important sources of innovation-related information. The finding may be interpreted in two different ways, at least. First, it is possible that financial organizations are actually more versatile innovation partners for firms than is usually presumed. The organizations in the FINANCIAL group (Tekes, Sitra, Finnvera, etc.) are, in fact, as much experts in innovation and technological development as they are potential sources of finance and funding. As they are usually aware of the latest developments in production technologies as well as other technological advancements, such organizations may be valuable sources of information for firms seeking to renew their existing production processes. It should be noticed that banks, which are presumed to act more solely as

Variables	Coefficient	Standard error	Significance
INTERNAL	0.407	0.262	0.120
NETWORK	−0.094	0.216	0.663
REGKNOW	0.427	0.404	0.290
REGSUPP	−0.678	0.568	0.232
FINANCIAL	1.290	0.691	0.062*
NATSUPP	−0.435	0.420	0.300
DIFFEXT	0.408	0.327	0.212
GROWTH	−0.935	0.434	0.031*
PROFIT	−0.166	0.431	0.701
Constant	−2.393	1.231	0.052*

Notes: *Significant at the $p < 0.07$ level. Partial classification rates: firms with new process innovation (%) = 65.9, other firms (%) = 72.6; model of Chi-square = 0.000; $n = 166$; df = 9; total classification rates (%) = 69.3; dependent variable: introduction of an innovation by a firm: 0 = No innovation, 1 = Innovation

Table III.
A logistic regression model explaining the importance of factors related to process innovation in SMEs

financers, were not included in this organizational category. Second, there is the possibility that the respondents in our study considered financial organizations as valuable innovation partners simply because they are an important source of external finance, which is often crucial for developing innovations in small firms with limited financial resources. Furthermore, as the use of financial organizations as information sources was associated with the innovator group, this may serve as evidence that the self-proclaimed innovators have actually engaged in innovation activities, as the creation or implementation of an innovation is often very finance-consuming business for firms (e.g. Symeonidis, 1996). However, this is again somewhat hypothetical, as evidence does exist suggesting that the intensity to seek for external finance in innovation activities does not segregate innovative and non-innovative small firms (e.g. Freel, 1999). Furthermore, the results support the findings from previous studies that process innovations are associated with small firm growth (Morone and Testa, 2008), and that in small firms, profitability is fairly independent of innovation activities (Nås and Leppälahti, 1997).

Regarding market-related innovative activity of the firms, the estimated model was highly significant (Chi-square = 0.000) and also explained the location of the observations in the examined groups rather well. Logistic regression model classified correctly 79.4 percent of all the observations. The high classification rate of the model was mostly based on the successful grouping of the other firms (= without new market innovation, 92.6 percent), although the group of innovators was also classified quite well (Table IV). The statistically significant variables in the model were: the national support organizations (= NATSUPP), the different external sources of information (= DIFFEXT), and the growth of firms (= GROWTH).Different more or less freely accessible external sources of information were found to be related with the introduction of novel market innovations (*H4* supported), as was the case with product innovations. This result implies that novel product and market innovations are closely interrelated. This is actually not a surprising finding, a**s** the introduction of new product innovations is often associated with entering (geographically) new markets

Variables	Coefficient	Standard error	Significance
INTERNAL	0.439	0.288	0.127
NETWORK	0.013	0.222	0.953
REGKNOW	0.154	0.415	0.710
REGSUPP	0.503	0.603	0.404
FINANCIAL	0.816	0.666	0.220
NATSUPP	−1.664	0.526	0.002*
DIFFEXT	0.823	0.366	0.024*
GROWTH	−1.282	0.510	0.012*
PROFIT	−0.040	0.496	0.936
Constant	−3.502	1.447	0.016*

Notes: *Significant at the $p < 0.07$ level. Partial classification rates: firms with new market innovation (%) = 45.8; other firms (%) = 92.6; model of Chi-square = 0.000; $n = 170$; df = 9; total classification rates (%) = 79.4; dependent variable: introduction of an innovation by a firm: 0 = No innovation, 1 = Innovation

Table IV.
A logistic regression model explaining the importance of factors related to market innovation in SMEs

(North and Smallbone, 2000) or reaching new market segments, whereas incremental improvements in products are more associated with improving firm's competitive position in its existing markets. In line with much of the existing literature, the introduction of new market innovations was associated with firms' growth (*H5* supported) but not with their profitability (*H6* supported).

Concerning organizational innovations, the logistic regression model was again highly significant (Chi-square = 0.000) and also fairly accurate in predicting the type of a firm in the examined groups (see Table V). The statistically significant variables in the model were: the different network relations of firms (= NETWORK), the regional educational and research organizations (= REGKNOW), and the national support organizations (= NATSUPP). According to the findings, the firms in the innovator group were more likely to use their different network relations and the regional educational and research organizations as a source of information in developing their organizational innovations (*H2* and *H3a* supported).

In the non-innovative group of firms, the information acquired from the different national support organizations was associated with the introduction of organizational innovations. As this same information source was also recognized as associated with process and market innovations in the non-innovator group, there is a reason to assume that, at least for the firms in this particular region, there is a relatively close fit between the services and information offered by national support organizations and the needs of firms with lower level of innovativeness.

Interestingly, and deviating from the other types of innovation, no relationship between organizational innovations and the growth of firms was discovered (*H5* rejected). In contrast to our finding, Morone and Testa (2008), for example, have shown that organizational innovations are positively related to growth in SMEs. Along with several factors associated with small firm innovation and performance, the relationship between organizational innovation and firm growth requires further clarification. On the other hand, and in line with the other types of innovation, the introduction of organizational innovations was not associated with the profitability of firms (*H6* supported).

Variables	Coefficient	Standard error	Significance
INTERNAL	0.222	0.259	0.393
NETWORK	0.422	0.222	0.058*
REGKNOW	1.023	0.416	0.014*
REGSUPP	0.307	0.550	0.577
FINANCIAL	−0.599	0.624	0.337
NATSUPP	−1.026	0.435	0.018*
DIFFEXT	0.496	0.338	0.142
GROWTH	−0.401	0.462	0.385
PROFIT	−0.357	0.457	0.434
Constant	−2.460	1.281	0.055*

Notes: *Significant at the $p < 0.07$ level. Partial classification rates: firms with new market innovation (%) = 40.7; other firms (%) = 91.0; model of Chi-square = 0.000; $n = 170$; df = 9; total classification rates (%) = 73.5; dependent variable: introduction of an innovation by a firm: 0 = No innovation, 1 = Innovation

Table V.
A logistic regression model explaining the importance of factors related to organizational innovation in SMEs

5. Conclusions

5.1 Discussion

Today, the majority of new jobs are generated by a relatively small group of rapidly growing, innovative SMEs (Storey, 1994). The vast research effort devoted to understanding innovation in SMEs reflects both the importance of the issue and the controversy that still surrounds the nature of the phenomenon (Tether, 1998). This paper contributes to the growing body of literature on the innovative activities and information sourcing practices of small firms in a regional context. Our main objective was to find out whether different sources of information and different cooperative relationships are associated with the introduction of different types of innovation in SMEs. Furthermore, we also analyzed whether the performance of SMEs, in terms of growth and profitability, is related to the introduction of different types of innovation. In general, our findings give support to the recent studies suggesting that the introduction of different types of innovation is indeed associated with the utilization of different kinds of information sources and collaborative relationships (e.g. Bigliardi and Dormio, 2009; Tödtling; *et al.*, 2009; Freel and de Jong, 2009).

Regarding our findings, in the case of product innovations, a positive relationship was found between the use of different freely available external information sources (exhibitions, fairs, internet, media, etc.) and the introduction of novel product innovations. In the case of the introduction of novel process (production methodology/technology) innovations, an association was found with the information acquired from the different financial organizations. What comes to novel market innovations, an association was found between the different freely accessible sources of information and the introduction of novel market innovations, as was the case with product innovations. Actually, this is not a surprising finding, as the introduction of product innovations is often associated with entering (geographically) new markets or reaching new market segments. In the case of organizational innovations, the information acquired through the different network relations of the firms and from the regional educational and research organizations appears to be associated with the introduction of novel innovations. Considering the firms in the non-innovator group, on the other hand, the information acquired from the different national support organizations was found to be related to both product- and market-related innovations, which further supports the view of the relatedness of these two types of innovation. The information acquired from the different national support organizations was also associated with the incremental organizational innovations introduced by the firms in the low-innovativeness group.

Considering the relationship between information sources and the introduction of innovations in firms, perhaps the most unexpected finding was that the different competences internal to firms were not found to be associated with the introduction of different types of innovation. This result is somewhat in contradiction with the massive body of literature suggesting that in order to innovate, and especially to benefit from external information sources, a firm must possess strong internal capabilities and a developed knowledge base (e.g. Cohen and Levinthal, 1990).

Considering the relationship between the performance of firms and innovation, we found that the growth of firms was associated with the introduction of product, process and market innovations. However, no association between firm performance and organizational innovations was revealed. Whether this is actually the case in reality, remains unclear. It is possible, for example, that due to the intangible nature of

organizational innovations, they are not easily associated with firm's growth. Although not identified as important for firms' growth, organizational innovations may indeed have an indirect impact on growth through the other types of innovation.

What comes to profitability, the analysis revealed no relationship between the types of innovation investigated and the profitability of firms. This is not an extremely surprising finding, considering the fact that innovation often equals with heavy investments by a firm, returns to which often require quite a long time to realize. In other words, the decision by the entrepreneur to engage in innovation is rather a long-term investment to assure the continuing success and future survival of the firm, rather than a short-term answer to the present-day problems faced by the firm.

5.2 Theoretical and practical implications

Our study renders some support for the previous research on the relationship between innovation and information sourcing in small firms but also contradicts with some existing evidence. First, we found that different types of innovation in SMEs may rely on different information sources. Our results also support the general finding in related studies that the growth of firms is positively associated with the creation of innovations. Our main contribution here was to test separately the relationship between performance and different types of innovation introduced by firms. Of the types of innovation studied, new product, process and market innovations were positively associated with firms' growth while organizational innovations were not. Regarding profitability, our findings are in line with much previous evidence suggesting that, at least in the short-run, profitability and innovation are not positively associated.

In contradiction with several previous studies, first, we did not find the competences of the entrepreneur or those internal to the firm as important contributors in the process of innovation. Second, against the suggestion by the regional systems of innovation literature, different regional support organizations were not classified as important sources of information or partners in collaboration by the entrepreneurs.

For entrepreneurs, perhaps the most significant implication arising from our present study is the need to concentrate on the internal factors and operations of the firm. As our results indicate, entrepreneurs do not consider the different internal factors in their firms (competencies and know-how of the entrepreneur and his staff, personnel initiatives, personnel training, organized and spontaneous communication between units and individuals in the firm, etc.) as important sources of innovation-related ideas and information, more effort should be devoted to improving firms' internal competencies and to removing potential barriers for internal knowledge gathering, sharing and utilization.

From a policy perspective, a few remarks are to be made. As we found no support for the argument, advocated, e.g. by the regional systems of innovation literature, that different regional support organizations play an important collaborative role in the innovation process of firms, a re-evaluation of the services offered by regional support organizations might be useful. Untangling the actual problems and needs of local firms would be a fruitful step to this direction.

5.3 Limitations of the study and challenges for future research

As is the case with all research, there are some issues that have to be taken into account when considering the reliability, significance, and generalizability of the results

obtained. First, we cannot say for sure whether innovations or significant enhancements have actually taken place in the firms. As our analysis was based on self-reported data provided by the owner-managers of SMEs, we have to rely on the judgment of the entrepreneur regarding the newness of the innovation. As discussed earlier, the newness of innovations is much in the eye of the beholder: innovations may have different degrees of significance and uniqueness, depending on who is asked (Freel, 2005; Massa and Testa, 2008). For individual entrepreneurs, estimating the actual degree of newness of their innovations may indeed be problematic (Jensen *et al.*, 2007). In the forthcoming studies, however, the question of the actual degree of novelty of innovations should be taken under closer scrutiny.

Second, on the basis of our data, we are unable to state whether the external information source used, as reported by the entrepreneurs, was the initial source of an innovative idea or just an another place to look for additional insights for developing an innovation. The importance of additionality, with regard to innovation activities should be by no means underestimated or overlooked as innovation is, by its very essence, the result of a process of gathering and combining diverse and dispersed pieces of information by entrepreneurs. Third, our study does not reveal the relative importance of different information sources and collaborative arrangements in terms of continuity and longevity. It is well possible that a single information source was used only once and was still defined as important. However, it is often assumed that firms, especially the smaller ones, will gain most from trust-based long-term collaborative relationships (e.g. Tödtling and Kaufmann, 2001).

Fourth, on the basis of our study, we are unable to answer the question whether the identification of novel ideas by entrepreneurs is the result of systematic search and screening of their external environment (and, of course, within their firms), or have the ideas for innovation emerged "out of the blue", as a result of luck. This is by no means a trivial issue. Fiet *et al.* (2007; see also Fiet and Patel, 2008), for example, stress the superiority of systematic search over Kirznerian entrepreneurial alertness (Kirzner, 1997), both because systematic search discovers more potentialities to innovate and because searching can be, at least to some extent, taught and learned. Fifth, in this study the data were gathered from single informants – the owner-managers of the firms – only. Due to their position in the firm, the entrepreneurs may be biased in their view of the state of affairs in their firms. It is possible that different results would have been obtained if multiple informants had been used. As Nås and Leppälahti (1997) point out, especially qualitative information about the firm and its activities is highly dependent upon who the respondent is, and what function he or she performs in the organization. On the other hand, it was precisely the opinions of the entrepreneurs we were interested in, so we do not consider this limitation as too severe.

Sixth, and related to the previous point, the internal capabilities of the entrepreneur and his/her firm did not turn up as an important determinant of innovations, even if they are usually treated as critical factors affecting the innovation capabilities of firms. Although this issue was already discussed earlier on, we want to emphasize it also as a limitation in our study. Whether this unexpected finding implies that small firms' internal capabilities are, indeed, not very relevant in the process of innovation (at least, not in this case), or whether the entrepreneurs were unable to identify the internal contributions to innovation processes, or whether this is only a consequence of somehow flawed formulation of the questions used in our questionnaire, remains an

open issue. An issue we will tackle in our forthcoming studies. Seventh, sectoral and technological perspectives might have played a role here. In our analysis, we treated the group of SMEs as a homogeneous class and thus did not make a distinction between firms operating in different industrial sectors or technological fields. It is very probable that we would have obtained diverging results if we had classified the firms based on their industry or technological intensity. Finally, the idiosyncratic features of the region without doubt play a role in what comes to the findings. Therefore, we cannot expect that the results would have been identical if the study was conducted in a country or in a region with significantly different characteristics. The fact that regional innovation systems may take a variety of forms, affecting the way innovation processes and collaborative relationships are organized, has already been noted by several authors (e.g. Cooke *et al.*, 2004; Asheim and Isaksen, 2002).

Of course, it would be far too ambiguous and unrealistic to presuppose that each of the aforementioned issues would have been possible to take into account in a single study. Despite the numerous limitations we have identified, we believe that we have shed some minor light regarding the sources of information that contribute to the development of different types of innovation in entrepreneurial SMEs. Moreover, each of the possible limitations presented above pave the way for future research in this important and widely studied, yet still fairly poorly understood issue.

References

Alm, H. and McKelvey, M. (2000), "When and why does cooperation positively or negatively affect innovation? An exploration into turbulent waters", Discussion Paper 39, Centre for Research on Innovation and Competition (CRIC), Manchester, November.

Alvarez, S.A. and Busenitz, L.W. (2001), "The entrepreneurship of resource-based theory", *Journal of Management*, Vol. 27 No. 6, pp. 755-75.

Amara, N. and Landry, R. (2005), "Sources of information as determinants of novelty of innovation in manufacturing firms: evidence from the 1999 Statistics Canada innovation survey", *Technovation*, Vol. 25 No. 3, pp. 245-59.

Antonelli, C. and Quéré, M. (2002), "The governance of interactive learning within innovation systems", *Urban Studies*, Vol. 39 Nos 5-6, pp. 1051-63.

Asheim, B.T. and Isaksen, A. (2002), "Regional innovation systems: the integration of local 'sticky' and global 'ubiquitous' knowledge", *Journal of Technology Transfer*, Vol. 27 No. 1, pp. 77-86.

Bigliardi, B. and Dormio, A.I. (2009), "An empirical investigation of innovation determinants in food machinery enterprises", *European Journal of Innovation Management*, Vol. 12 No. 2, pp. 223-42.

Boschma, R.A. (2005), "Proximity and innovation: a critical assessment", *Regional Studies*, Vol. 39 No. 1, pp. 61-74.

Bougrain, F. and Haudeville, B. (2002), "Innovation, collaboration and SMEs internal research capabilities", *Research Policy*, Vol. 31 No. 5, pp. 735-47.

Caloghirou, Y., Kastelli, I. and Tsakanikas, A. (2004), "Internal capabilities and external knowledge sources: complements or substitutes for innovative performance?", *Technovation*, Vol. 24 No. 1, pp. 29-39.

Cassiman, B. and Veugelers, R. (2006), "In search of complementarity in innovation strategy: internal R&D and external knowledge acquisition", *Management Science*, Vol. 52 No. 1, pp. 68-82.

Cohen, W.M. and Levinthal, D.A. (1990), "Absorptive capacity: a new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35 No. 1, pp. 128-52.

Cooke, P. (1992), "Regional innovation systems: competitive regulation in the new Europe", *Geoforum*, Vol. 23 No. 3, pp. 365-82.

Cooke, P. and Leydesdorff, L. (2006), "Regional development in the knowledge-based economy: the construction of advantage", *Journal of Technology Transfer*, Vol. 31 No. 1, pp. 5-15.

Cooke, P., Gomez Uranga, M. and Etxebarria, G. (1997), "Regional innovation systems: institutional and organisational dimensions", *Research Policy*, Vol. 26 No. 4, pp. 475-91.

Cooke, P., Heidenreich, M. and Braczyk, H-J. (2004), *Regional Innovation Systems: The role of Governance in a Globalized World*, 2nd ed., Routledge, New York, NY.

Crépon, B., Duguet, E. and Mairesse, J. (1998), "Research, innovation and productivity: an econometric analysis at the firm level", *Economics of Innovation and New Technology*, Vol. 7 No. 2, pp. 115-58.

Davidsson, P. and Wiklund, J. (2000), "Conceptual and empirical challenges in the study of firm growth", in Sexton, D.L. and Landström, H. (Eds), *The Blackwell Handbook of Entrepreneurship*, Blackwell, Oxford, pp. 26-44.

Dobbs, M. and Hamilton, R.T. (2007), "Small business growth: recent evidence and new directions", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 13 No. 5, pp. 296-322.

Dosi, G. (1982), "Technological paradigms and technological trajectories", *Research Policy*, Vol. 11 No. 3, pp. 147-62.

Dosi, G. (1988), "Sources, procedures and microeconomic effects of innovation", *Journal of Economic Literature*, Vol. 26 No. 3, pp. 1120-71.

Drucker, P.F. (1985), "The discipline of innovation", *Harvard Business Review*, Vol. 63 No. 3, pp. 67-72.

Dyer, W.G. Jr and Handler, W. (1994), "Entrepreneurship and family business: exploring the connections", *Entrepreneurship Theory and Practice*, Vol. 19 No. 1, pp. 71-84.

Edquist, C. (1997), "Systems of innovation approaches – their emergence and characteristics", in Edquist, C. (Ed.), *Systems of Innovation: Technologies, Institutions and Organizations*, Pinter, London, pp. 1-35.

Edquist, C. (2005), "Systems of innovation: perspectives and challenges", in Fagerberg, J., Mowery, D.C. and Nelson, R.R. (Eds), *The Oxford Handbook of Innovation*, Oxford University Press, Oxford, pp. 181-208.

Fiet, J.O. and Patel, P.C. (2008), "Entrepreneurial discovery as constrained, systematic search", *Small Business Economics*, Vol. 30 No. 3, pp. 215-29.

Fiet, J.O., Norton, W.I. Jr and Clouse, V.G.H. (2007), "Systematic search as a source of technical innovation: an empirical test", *Journal of Engineering and Technology Management*, Vol. 24 No. 4, pp. 329-46.

Freel, M.S. (1999), "The financing of small firm product innovation within the UK", *Technovation*, Vol. 19 No. 12, pp. 707-19.

Freel, M. (2000), "External linkages and product innovation in small manufacturing firms", *Entrepreneurship & Regional Development*, Vol. 12 No. 3, pp. 245-66.

Freel, M.S. (2005), "Patterns of innovation and skills in small firms", *Technovation*, Vol. 25 No. 2, pp. 123-34.

Freel, M. and de Jong, J.P.J. (2009), "Market novelty, competence-seeking and innovation networking", *Technovation*, Vol. 29 No. 12, pp. 873-84.

Freel, M.S. and Robson, P.J.A. (2004), "Small firm innovation, growth and performance", *International Small Business Journal*, Vol. 22 No. 6, pp. 561-75.

Freeman, C. (1987), *Technology and Economic Performance: Lessons from Japan*, Pinter, London.

Gemünden, H.G. and Heydebreck, P. (1995), "The influence of business strategies on technological network activities", *Research Policy*, Vol. 24 No. 6, pp. 831-49.

Gemünden, H.G., Ritter, T. and Heydebreck, P. (1996), "Network configuration and innovation success: an empirical analysis in German high-tech industries", *International Journal of Research in Marketing*, Vol. 13 No. 5, pp. 449-62.

Gray, C. (2006), "Absorptive capacity, knowledge management and innovation in entrepreneurial small firms", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 12 No. 6, pp. 345-60.

Håkansson, H. (Ed.) (1987), *Industrial Technological Development: A Network Approach*, Routledge, London.

Håkansson, H. (1989), *Corporate Technological Behaviour: Cooperation and Networks*, Routledge, London.

Håkansson, H. and Snehota, I. (1989), "No business is an island: the network concept of business strategy", *Scandinavian Journal of Management Studies*, Vol. 5 No. 3, pp. 187-200.

Hamel, G., Doz, Y. and Prahalad, C.K. (1989), "Collaborate with your competitors and win", *Harvard Business Review*, Vol. 67 No. 1, pp. 133-9.

Howells, J.R.L. (1999), "Regional systems of innovation?", in Archibugi, D., Howells, J. and Michie, J. (Eds), *Innovation Policy in a Global Economy*, Cambridge University Press, Cambridge, MA, pp. 67-93.

Jensen, M.B., Johnson, B., Lorenz, E. and Lundvall, B-Å. (2007), "Forms of knowledge and modes of innovation", *Research Policy*, Vol. 6 No. 5, pp. 680-93.

Johannessen, J-A., Olaisen, J. and Olsen, B. (1999), "Managing and organizing innovation in the knowledge economy", *European Journal of Innovation Management*, Vol. 2 No. 3, pp. 116-28.

Johannessen, J-A., Olsen, B. and Lumpkin, G.T. (2001), "Innovation as newness: what is new, how new, and new to whom?", *European Journal of Innovation Management*, Vol. 4 No. 1, pp. 20-31.

Johannisson, B. (1998), "Personal networks in emerging knowledge-based firms: spatial and functional patterns", *Entrepreneurship & Regional Development*, Vol. 10 No. 4, pp. 297-312.

Julien, P-A., Raymond, L., Jacob, R. and Ramangalahy, C. (1999), "Types of technological scanning in manufacturing SMEs: an empirical analysis of patterns and determinants", *Entrepreneurship & Regional Development*, Vol. 11 No. 4, pp. 281-300.

Kirzner, I.M. (1997), "Entrepreneurial discovery and the competitive market process: an Austrian approach", *Journal of Economic Literature*, Vol. 35 No. 1, pp. 60-85.

Lechner, C. and Dowling, M. (2003), "Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms", *Entrepreneurship & Regional Development*, Vol. 15 No. 1, pp. 1-26.

Littunen, H. (2000), "Networks and local environmental characteristics in the survival of new firms", *Small Business Economics*, Vol. 15 No. 1, pp. 59-71.

Littunen, H. and Virtanen, M. (2009), "Differentiating factors of venture growth: from statics to dynamics", *International Journal of Entrepreneurial Behaviour & Research*, Vol. 15 No. 6, pp. 535-54.

Lundvall, B-Å. (1988), "Innovation as an interactive process: from user-producer interaction to the national system of innovation", in Dosi, G., Freeman, C., Nelson, R., Silverberg, G. and Soete, L. (Eds), *Technical Change and Economic Theory*, Pinter, London, pp. 349-69.

Lundvall, B-Å. (Ed.) (1992), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*, Pinter, London.

Macpherson, A. and Holt, R. (2007), "Knowledge, learning and small firm growth: a systematic review of the evidence", *Research Policy*, Vol. 36 No. 2, pp. 172-92.

Malmberg, A. and Maskell, P. (2006), "Localized learning revisited", *Growth and Change*, Vol. 37 No. 1, pp. 1-18.

Massa, S. and Testa, S. (2008), "Innovation and SMEs: misaligned perspectives and goals among entrepreneurs, academics, and policy makers", *Technovation*, Vol. 28 No. 7, pp. 393-407.

Morone, P. and Testa, G. (2008), "Firms growth, size and innovation: an investigation into the Italian manufacturing sector", *Economics of Innovation and New Technology*, Vol. 17 No. 4, pp. 311-29.

Nås, S.O. and Leppälahti, A. (1997), "Innovation, firm profitability and growth", Report R-01/1997, Studies in Technology, Innovation and Economic Policy (STEP), Oslo, May.

Nelson, R.R. (Ed.) (1993), *National Innovation Systems: A Comparative Analysis*, Oxford University Press, Oxford.

Nelson, R.R. and Winter, S.G. (1982), *An Evolutionary Theory of Economic Change*, Belknap Press of Harvard University Press, Cambridge, MA.

Nieto, M. and Quevedo, P. (2005), "Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort", *Technovation*, Vol. 25 No. 10, pp. 1141-57.

Nohria, N. and Eccles, R.G. (1992), "Face-to face: making network organizations work", in Nohria, N. and Eccles, R.G. (Eds), *Networks and Organizations: Structure, Form, and Action*, Harvard Business School Press, Boston, MA, pp. 288-308.

Nonaka, I. (1991), "The knowledge-creating company", *Harvard Business Review*, Vol. 69 No. 6, pp. 96-104.

North, D. and Smallbone, D. (2000), "Innovative activity in SMEs and rural economic development: some evidence from England", *European Planning Studies*, Vol. 8 No. 1, pp. 87-106.

OECD (1996), *The Knowledge-Based Economy: Science, Technology and Industry Outlook*, OECD, Paris.

OECD (2005), *The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual*, 3rd ed., OECD, Paris.

Pavitt, K. (2005), "Innovation processes", in Fagerberg, J., Mowery, D.C. and Nelson, R.R. (Eds), *The Oxford Handbook of Innovation*, Oxford University Press, Oxford, pp. 86-114.

Penrose, E. (1959), *The Theory of the Growth of the Firm*, John Wiley, New York, NY.

Powell, W.W. and Grodal, S. (2005), "Networks of innovators", in Fagerberg, J., Mowery, D.C. and Nelson, R.R. (Eds), *The Oxford Handbook of Innovation*, Oxford University Press, Oxford, pp. 56-85.

Santamaría, L., Nieto, M.J. and Barge-Gil, A. (2009), "Beyond formal R&D: taking advantage of other sources of innovation in low- and medium-technology industries", *Research Policy*, Vol. 38 No. 3, pp. 507-17.

Schumpeter, J.A. (1934), *The Theory of Economic Development*, Harvard University Press, Cambridge, MA.

Shepherd, D. and Wiklund, D. (2009), "Are we comparing apples with apples or apples with oranges?Appropriateness of knowledge accumulation across growth studies", *Entrepreneurship Theory & Practice*, Vol. 33 No. 1, pp. 105-23.

Sternberg, R. and Arndt, O. (2001), "The firm or the region: what determines the innovation behavior of European firms?", *Economic Geography*, Vol. 77 No. 4, pp. 364-82.

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

Symeonidis, G. (1996), "Innovation, firm size and market structure: Schumpeterian Hypotheses and some new themes", Working Paper 161, OECD Economics Department, OECD Publishing, Paris.

Tether, B.S. (1998), "Small and large firms: sources of unequal innovations?", *Research Policy*, Vol. 27 No. 7, pp. 725-45.

Tidd, J., Bessant, J. and Pavitt, K. (2002), "Learning through alliances", in Henry, J. and Mayle, D. (Eds), *Managing Innovation and Change*, 2nd ed., Sage, London, pp. 167-88.

Trippl, M., Tödtling, F. and Lengauer, L. (2009), "Knowledge sourcing beyond buzz and pipelines: evidence from the Vienna software sector", *Economic Geography*, Vol. 85 No. 4, pp. 443-62.

Tödtling, F. and Kaufmann, A. (1999), "Innovation systems in regions of Europe – a comparative perspective", *European Planning Studies*, Vol. 7 No. 6, pp. 699-717.

Tödtling, F. and Kaufmann, A. (2001), "The role of the region for innovation activities of SMEs", *European Urban and Regional Studies*, Vol. 8 No. 3, pp. 203-15.

Tödtling;, F., Lehner, P. and Kaufmann, A. (2009), "Do different types of innovation rely on specific kinds of knowledge interactions?", *Technovation*, Vol. 29 No. 1, pp. 59-71.

Utterback, J.M. (1994), *Mastering the Dynamics of Innovation*, Harvard University Business School Press, Boston, MA.

Vega-Jurado, J., Gutiérrez-Gracia, A., Fernández-de-Lucio, I. and Manjarrés-Henríquez, L. (2008), "The effect of external and internal factors on firms' product innovation", *Research Policy*, Vol. 37 No. 4, pp. 616-32.

Veugelers, R. (1997), "Internal R&D expenditures and external technology sourcing", *Research Policy*, Vol. 26 No. 3, pp. 303-15.

Von Hippel, E. (1988), *Sources of Innovation*, Oxford University Press, Oxford.

Watson, J. (2007), "Modeling the relationship between networking and firm performance", *Journal of Business Venturing*, Vol. 22 No. 6, pp. 852-74.

Wernerfelt, B. (1984), "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5 No. 2, pp. 171-80.

Williamson, O. (1985), *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, The Free Press, New York, NY.

Wolff, J.A. and Pett, T.L. (2006), "Small-firm performance: modeling the role of product and process improvements", *Journal of Small Business Management*, Vol. 44 No. 2, pp. 268-84.

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2. Haim Hilman, Narentheren Kaliappen. 2015. Innovation strategies and performance: are they truly linked?. *World Journal of Entrepreneurship, Management and Sustainable Development* **11**:1, 48-63. [Abstract] [Full Text] [PDF]
3. Hermann Frank, Dietmar Roessl. 2015. Problematization and conceptualization of "entrepreneurial SME Management" as a field of research: overcoming the size-based approach. *Review of Managerial Science* **9**, 225-240. [CrossRef]
4. Dimitrios Kafetzopoulos, Evangelos Psomas. 2015. The impact of innovation capability on the performance of manufacturing companies. *Journal of Manufacturing Technology Management* **26**:1, 104-130. [Abstract] [Full Text] [PDF]
5. Virginie Marie Lefebvre, Hans De Steur, Xavier Gellynck. 2015. External sources for innovation in food SMEs. *British Food Journal* **117**:1, 412-430. [Abstract] [Full Text] [PDF]
6. Hannu Littunen, Sari Rissanen. 2015. Information sources and innovation-linked networking: relations to health and social service enterprises' performance in Finland. *Innovation and Development* **5**, 93-111. [CrossRef]
7. Norsiah Hami, Mohd Razali Muhamad, Zuhriah Ebrahim. 2015. The Impact of Sustainable Manufacturing Practices and Innovation Performance on Economic Sustainability. *Procedia CIRP* **26**, 190-195. [CrossRef]
8. Evelien Lambrecht, Nicole Taragola, Bianka Kühne, Maarten Crivits, Xavier Gellynck. 2015. Networking and innovation within the ornamental plant sector. *Agricultural and Food Economics* **3**, 10. [CrossRef]
9. Hans Löfsten. 2014. Information Structures and Business Performance - Implications for Technology-based Firm's Innovation Performance. *Knowledge and Process Management* **21**:10.1002/kpm.v21.4, 246-259. [CrossRef]
10. Joaquín M. Azagra-Caro, Rafael Pardo, Ruth Rama. 2014. Not searching, but finding: how innovation shapes perceptions about universities and public research organisations. *The Journal of Technology Transfer* **39**, 454-471. [CrossRef]
11. David B. Audretsch, Erik E. Lehmann, Mike Wright. 2014. Technology transfer in a global economy. *The Journal of Technology Transfer* **39**, 301-312. [CrossRef]
12. Franz Tödtling, Markus Grillitsch. 2014. Types of Innovation, Competencies of Firms, and External Knowledge Sourcing—Findings from Selected Sectors and Regions of Europe. *Journal of the Knowledge Economy* **5**, 330-356. [CrossRef]
13. Thuy Hang Do, Tim Mazzarol, Thierry Volery, Sophie Reboud. 2014. Predicting anticipated rent from innovation commercialisation in SMEs. *European Journal of Innovation Management* **17**:2, 183-208. [Abstract] [Full Text] [PDF]
14. GRACIELA CORRAL DE ZUBIELQUI, NOEL J. LINDSAY, ALLAN O'CONNOR. 2014. HOW PRODUCT, OPERATIONS, AND MARKETING SOURCES OF IDEAS INFLUENCE INNOVATION AND ENTREPRENEURIAL PERFORMANCE IN AUSTRALIAN SMEs. *International Journal of Innovation Management* **18**, 1450017. [CrossRef]

15. Minna Saunila, Juhani Ukko, Hannu Rantanen. 2014. Does Innovation Capability Really Matter for the Profitability of SMEs?. *Knowledge and Process Management* **21**:10.1002/kpm.v21.2, 134-142. [CrossRef]
16. Hans Löfsten. 2014. Product innovation processes and the trade-off between product innovation performance and business performance. *European Journal of Innovation Management* **17**:1, 61-84. [Abstract] [Full Text] [PDF]
17. Jerome Denis Donovan, Alex Maritz, Andrew McLellan. 2013. Innovation training within the Australian advanced manufacturing industry. *Journal of Vocational Education & Training* **65**, 256-276. [CrossRef]
18. Murat Atalay, Nilgün Anafarta, Fulya Sarvan. 2013. The Relationship between Innovation and Firm Performance: An Empirical Evidence from Turkish Automotive Supplier Industry. *Procedia - Social and Behavioral Sciences* **75**, 226-235. [CrossRef]
19. Jialin Hardwick, Alistair R. Anderson, Douglas Cruickshank. 2013. Trust formation processes in innovative collaborations. *European Journal of Innovation Management* **16**:1, 4-21. [Abstract] [Full Text] [PDF]
20. Canan Ceylan. 2013. Commitment-based HR practices, different types of innovation activities and firm innovation performance. *The International Journal of Human Resource Management* **24**, 208-226. [CrossRef]
21. Yiannis Nikolaidis, Konstantinos Fouskas, Elias G Carayannis. 2013. Assisting regional policy by rapidly comparing enterprise innovation between regions. *Journal of Innovation and Entrepreneurship* **2**, 16. [CrossRef]
22. Fulya Sarvan, Gözde Gül Başer, Can Deniz Köksal, Eren Durmuş, Onur Dirlik, Murat Atalay, Fulya Almaz. 2012. Network based Determinants of Innovation Performance in Yacht Building Clusters: Findings of the SOBAG Project. *Procedia - Social and Behavioral Sciences* **58**, 830-841. [CrossRef]
23. Johanna Klewitz, Anica Zeyen, Erik G. Hansen. 2012. Intermediaries driving eco-innovation in SMEs: a qualitative investigation. *European Journal of Innovation Management* **15**:4, 442-467. [Abstract] [Full Text] [PDF]
24. Mohammad Yarahmadi, Peter G. Higgins. 2012. Motivations towards environmental innovation. *European Journal of Innovation Management* **15**:4, 400-420. [Abstract] [Full Text] [PDF]
25. Roman Kmieciak, Anna Michna, Anna Meczynska. 2012. Innovativeness, empowerment and IT capability: evidence from SMEs. *Industrial Management & Data Systems* **112**:5, 707-728. [Abstract] [Full Text] [PDF]
26. Miika Varis, Hannu Littunen. 2012. SMEs and Their Peripheral Innovation Environment: Reflections from a Finnish Case. *European Planning Studies* **20**, 547-582. [CrossRef]
27. Andrea Lasagni. 2012. How Can External Relationships Enhance Innovation in SMEs? New Evidence for Europe*. *Journal of Small Business Management* **50**:10.1111/jsbm.2012.50.issue-2, 310-339. [CrossRef]
28. Erik G. Hansen, Johanna Klewitz. 2012. The Role of an SME's Green Strategy in Public-Private Eco-innovation Initiatives: The Case of Ecoprofit. *Journal of Small Business & Entrepreneurship* **25**, 451-477. [CrossRef]
29. Insu Cho, Heejun Park, Jeongil Choi. 2011. The impact of diversity of innovation channels on innovation performance in service firms. *Service Business* **5**, 277-294. [CrossRef]
30. Fulya Sarvan, Eren Durmuş, Can Deniz Köksal, Gözde Gül Başer, Onur Dirlik, Murat Atalay, Fulya Almaz. 2011. Network based determinants of innovation performance in yacht building clusters. *Procedia - Social and Behavioral Sciences* **24**, 1671-1685. [CrossRef]