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INNOVATION AND ENTREPRENEURSHIP
New innovations as source for competitiveness in Finnish SMEs

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Abstract

This paper analyses the role of innovation in small Finnish entrepreneurial firms. The study is based on a questionnaire survey and semi-structured interviews carried out late 2005. In the light of company cases innovation has been crucial factor for existence of business at the first instance. According to the survey results, identification of market niche and customer needs turns out to be the most important source for innovation among both small and larger companies. Increase in profitability and competitiveness emerge as the most beneficial impacts of innovation in all companies but also new contacts and co-operation arisen in the process of innovative activity are highly valued, especially in micro firms. Despite of importance of an innovation, in small entrepreneurial firms emerge also number of challenges hampering commercialisation of a novel idea. These range from obstacles pioneer company encounters in gaining market credibility and acceptance to lack of business experience in general. The results are expected to give new information about the role of innovations play in competitiveness of small entrepreneurial firms in Finland.

Keywords: Innovative SMEs, entrepreneurship, competitiveness

1. Introduction

The point of departure of this study is that innovations in a form of a new product, process or service are an important factor in providing competitive advantage for SMEs. Continuous creation and recognition of new ideas and opportunities are common characteristics for innovation activity and entrepreneurship. At the best, innovation facilitates SMEs to overcome resource restrictions needed for growth.

This paper analyses the role of innovation in small Finnish companies. More specifically our focus is on specific characteristics related to origin of innovation in small entrepreneurial firms and contribution of innovation to firm success. Study is based on a survey targeting 220 Finnish companies having introduced an innovation to market in 1999-2004. Besides to survey also semi-structured interviews were carried out among 70 Finnish innovative SMEs. Both survey and interviews were implemented in the late 2005. The interviewed companies had developed and launched a new product or process to market similar to survey sample. A clear majority of companies has been established originally on a basis of a novel idea developed by innovator to whom own firm has been a way to turn idea into a revenue bringing commodity.

In the following, a short definition for the key concepts of innovation, entrepreneurship and their inter-relationship is provided. Thereafter data and methodology used are presented. Rest of the paper focuses to report results of analysis starting from origin of innovations in small entrepreneurial firms and proceeding then to benefits and impacts of innovation to firm. Also challenges of innovativeness faced across innovation process are discussed before the concluding chapter.

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2. Theoretical background

This paper is based on an assumption that innovation and entrepreneurship are closely related to each other. As phenomena both are characterised by a group of common attributes — uncertainty, risk-taking but also recognition of new market opportunities, endurance to face challenges and strive for success.

Innovation, as we understand it here, is a novel product, process or service developed and commercialised by a company. Principally, continuum of innovation spans from incremental improvements new to firm to radical invention new to global market. Often innovation activities are translated or seen more or less as synonymous with R&D. This view is, however, too narrow particularly if we look at smaller companies or companies operating in fields not known to be particularly R&D intensive. In addition, often product development carried out in small and medium sized firms is tightly intertwined with the business as a whole, and thus consequently less formalized in organizational terms (i.e. having neither separate nor official R&D departments). We would rather like to follow here the definition given by Harrison and Sullivan (2000, 40) to innovation process: “all firms have their own approach and method for developing new or innovative ideas that create value. For many technology companies the innovation process is an R&D activity; service companies, on the other hand, often have a creativity department; still others rely on their employees in the field to produce innovative ideas”.

According to Acs and Audretsch (1990, 39-40), two distinct views concerning “the relative advantages of large- and small-firm innovative activity” has emerged in theoretical and empirical literature. Evolvment of Schumpeter’s thinking succinctly describes the two positions. Early Schumpeter emphasised the role of small firms and entrepreneurs in renewal of industries through creative destruction – small firms motivated by competition are seen as the most conducive to economic dynamics. However, late Schumpeter stressed the unique attributes of large enterprises (in form of resources and market presence) to utilise innovative opportunities.

A close relationship between innovation and entrepreneurship becomes clear if we take a look on definition given for the latter by Shane (2003, 10). According to Shane, “entrepreneurship is an activity that involves discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organising, markets, processes, and raw materials through organizing efforts that previously had not existed”. This definition fits particularly to research focusing on a specific instance of entrepreneurship that is the founding of a new business and self employment.

In order to accept that innovation has today increasingly important role in firm’s growth and survival, it becomes crucial to identify the sources from which innovative ideas springs. This is well in line with Shane’s (ibid.) view that the entrepreneurial process originates from the perception of the existence of opportunities, or situations in which resources are converted into profitable business. Traditionally it has been acknowledged in the innovation literature that customer need or technological advancement are the primary factors behind new combinations of resources, i.e. innovations (c.f. Dodgson & Rothwell 1994, 33-50; Kline & Rosenberg 1986, 275-305; Dosi 1982). More nuanced models, such as the chain-linked model, account for wider diversity in the sources of an innovation (Kline & Rosenberg 1986). New combinations can be seen as a response to changes and/or emerging opportunities. Following Schumpeter (1934, 66), novel combinations may take form as new products or services, new geographical markets, new raw materials, new methods of production and new ways of organising. Shane (2003) emphasises a key role that alert entrepreneur plays in discovery of emerging opportunities, and development of ideas for how to pursue and launch them to market.

Predominantly the impacts and success of innovation are difficult to pinpoint and measure exactly. In research the success of an innovation is commonly approached at the firm level, i.e. increase in market share, profitability, productivity or technical novelty (Palmberg 2006; Niininen & Saarinen 2000). The above mentioned measures cannot though alone explain the value of innovation to the innovative firm. Innovation activity is such a multidimensional phenomenon that economic or technical attributes reveal only partially its effects.

In this paper our aim is to find out where innovative ideas come from and how they evolve in small Finnish companies. Another question raised here touches upon impacts of innovation on firm performance and survival.

3. Data and methodology

The data we use in this study originates from the Finnish innovation data, Sfinno®, which at the moment contains information of nearly 4000 innovations. The data on innovations is gathered using literature based innovation output method, which means that innovations are identified from trade and technical journals (Palmberg et al. 2000; Pentikäinen et al. 2002). All innovations in a database are developed and commercialised by Finnish companies. The data used in this study is based on the preliminary results of fourth updating of innovations from period 1999-2004. Data was collected by electronic questionnaire called Zef Tool® during autumn 2005. The respondents were able to rate significance of claim in a segment of line from 0 till 100. An invitation to participate into Sfinno® study was sent overall to 220 respondents of whom 37.7% completed the extensive questionnaire. The fourth updating is currently in process, and data used in this study will be complemented in the near future.

In the Sfinno® database an innovation has been defined as “invention that has been commercialised on the market by a business firm or the equivalent” (see, OECD Oslo Manual 2005). Each innovation contains information of the commercialising firm. This information includes entry, exit, geographical location, turnover, number of employees, patents, and industrial classification (SIC) according to the main industrial sector of the firm. An innovative firm has been defined “as a firm, which has developed and commercialised a new product – an innovation” (OECD Oslo Manual 2005).

Companies in sample were divided into groups according to number of employees. The significances of answers were simply summarised and divided by number of responses. The respondents were able to leave questions unanswered if the claim had not materialised, or was not valid for an innovation in question. In addition, the Sfinno® survey asked the respondents to indicate the years of major phases in the innovation’s development cycle, including the year of basic idea, first prototype, commercialisation, break-even point and first exports. The year of basic idea is considered to indicate the year when the first initiative for development of an innovation was voiced. The year of commercialisation marks the year when innovation entered market on a larger scale rather than a time when a mere prototype was introduced. In this context, the development time of an innovation is defined as a time it takes from basic idea to commercialisation.

In addition, we have selected company cases of describing companies’ innovation processes to support our Sfinno® data analysis. These 29 cases were selected from the total amount of 70 in order to get representative sample, and in which either one of the authors or both had attended. Cases were selected using the same criterion as in survey sample – companies had developed and commercialised an innovation. Suitable companies were contacted in advance by telephone in order to set time and place for an interview. Semi-structured interviews were conducted in pairs in order to ensure reliability.

4. Results and analysis

4.1 Descriptive statistics

The sample constituted of Finnish companies that have developed and commercialised an innovation. The studied companies were divided into three distinct groups according to their size measured by number of employees. The sample splits into two relatively same sized groups, the companies having 1-9 employees and companies having 50 and above workers, as can be observed from table 1.

The average company age at the time of commercialisation of innovation was significantly smaller in companies employing less than 50 employees than in larger firms with over 50 workers, naturally the smallest firms being the youngest. Companies are often established in order to take forward the development and commercialisation of an innovator’s idea - to make an idea into an innovation. It might be that an innovation is brought to the market at the same year that company is established. The number zero indicating the company age at commercialisation refers either to fast innovation process, or commercialisation of an innovation developed prior to establishment of firm.

Another indicator for the duration of innovation process is the development time that is taken from the first thought of an innovative idea to be developed into process or product to be commercialised on market. The average development time in micro firms is 2.8 years whereas larger companies spent slightly more time for development. The interviews carried out imply that the restricted available resources lengthen innovation process in several companies in which innovation is developed mainly by cash-flow. As can be seen from table 1, development time of an innovation in studied companies ranged from 1 to 17 years.

Table 1. Descriptive statistics of sample.

		1-9	10-49	50+
	n=	32	17	33
Age at commercialisation		5,4	7,2	47,3
	<i>Min</i>	0	0	2
	<i>Max</i>	16	29	121
Development time in years		2,8	4,1	3,6
	<i>Min</i>	0	0	1
	<i>Max</i>	9	17	10
R&D project no of internal participants		3,1	6,2	6,7
R&D project no of external participants		3,0	2,5	10,1
<i>Minimum R&D project size</i>		2	2	1
<i>Maximum R&D project size</i>		30	35	100
Patent applied		37,5 %	47,1 %	24,2 %

As could be assumed, the R&D project size measured by participants in the development of innovation is smaller in micro firms than in larger firms. On average an innovation development process in micro firms requires 6.1 participants of which half comes outside the innovative firm. Co-operation with external partners in innovation development is relatively important for companies in all size classes. However, companies with personnel 10-49 employees seem to rely more on internal knowledge and know-how than smaller and larger companies.

Patenting has often been pointed out to be extremely expensive and resource demanding. It could be assumed that this relates more to small than large firms. Interestingly, our study shows small micro companies to be active in patenting taking their scarce resources into account. Besides being expensive, patenting also provides positive effects to company, such as protects from copying and increases company's esteem.

Existing literature shows that size of firm in itself does not explain which enterprises engage in innovation activities. Similarly, the size of innovating firm does not explain outcome of such an activity. For instance industry specific factors have an affect on large and small companies propensity to contribute to innovation - industry matter, technology matters, history matters as Freeman and Soete remark (1999, 229). Instead of these restraints literature provides a number of explanations for small companies' engagement in innovation.

Following Acs and Audretsch (1990, 39-40), a tentative list about pros and cons for innovation in small firms can be compiled: 1) innovative activity requires often high costs which in small firms are restrained by available resources; 2) innovation/product development is risky investment and small firms engaging in innovation activities make themselves vulnerable by investing a large proportion of their resources in a single project; 3) small firms with low levels of bureaucratic constraints and flat management structures can provide a fertile ground for innovative activity and intra-company knowledge flows (opportunities, market needs etc.) when compared to larger firms; 4) many innovations relate to rather focused niche market which attract interest of an individual entrepreneur rather than large corporations.

4.2 Origin of innovation

Innovative ideas are identified to be driven by two main factors – market demand or technology push (cf. Freeman and Soete 1999, 200). Either one of these two main streams is often identified as initiating factor for innovative ideas. As Fig 1 clarifies, our results support this common view. Factors rising from demand are clearly the most significant initiator in innovation process in each company size class. Especially micro companies that are in the focus of our study seem to utilise market opportunities. Ideas originating from scientific sources are also important in all size classes, however, more significant in larger companies than in small.

The initiating factors presented in Fig 1 were classified into five categories. Under competition has been grouped sources relating to firms competitors, i.e. intensification of price competition and threat posed by rival innovation. Issues related to market demand are realisation of market niche, customer demand as well as public procurement. New scientific breakthrough, new technologies, and public research or technology programme are classified under science & technology class. The fourth group constitutes of regulative factors such as environmental factors; official regulations,

legislation and standards; and availability of licence. Furthermore, the respondents were able to indicate another source in the other category. The respondents were given a possibility to denote the importance of a certain source for the start of development of an innovation in the scale of no significance to great significance. Therefore an innovation may have several significant sources. The same applies to benefits and impacts of an innovation introduced in section 4.3.

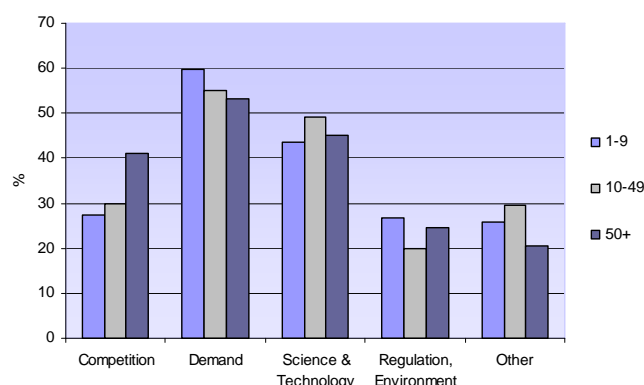


Figure 1. Sources for innovation typified into five categories.

In large companies innovative ideas originates more often from competition compared to small firms. One possible explanation might be their preparedness to face competition which derives from their market position. Especially recently established small firms may lack market knowledge and position compared to older counterparts. The realisation of market niche created the most significant source for innovation in each firm category. Customer needs are also an important source for innovative ideas in micro and large firms employing more than 50 employees. Moreover, the micro firms have been able to utilise the opportunities emerging from public procurement more vastly than larger firms in the sample.

Another commonly stated origin for innovative ideas is the scientific progress either in own firm, or in external sources. The several case studies presenting research institution spin-offs emphasise the science and technology as an elementary source for innovation. The most significant source for micro firms in science and technology class has been the participation to public research and technology programmes. These programmes are designed the way that participants represent several instances, i.e. universities, research organisations and various sized companies enabling knowledge and know-how diffusion and networking. One of the large companies' roles in technology programmes is to act as locomotives. The official legislation, regulations and standards have also been quite significant origin for innovations in each company group. Availability of licences has been important particularly to micro firms.

Further, several cases indicate innovative ideas to origin from innovator's own experience and know-how. Improvement in an existing product, process or service might turn out to be a successful innovation. Innovator's knowledge of industry in general and experience accumulated during the years in particular support entrepreneur to realise market opportunities. This is well in line with Shane's (2003, 45-46) findings from literature from which emerge three factors, prior life experience, social networks and information search that have an influence on gaining early access to information valuable for recognizing entrepreneurial opportunities. Further, two different factors have been proposed to have influence on the ability to recognize opportunities; firstly, absorptive capacity (knowledge about markets and knowledge of how to serve markets), and secondly, cognitive processes (intelligence, perceptive ability, creativity, inclination to see opportunities) (ibid. 50).

4.3 Benefits and impacts to innovative company

This section reveals impacts and benefits innovativeness brings to company. Innovation may be argued to have several kinds of impacts not only commonly thought commercial benefits. The results of our study reveal that micro firms value new contacts and cooperation with other companies as the most significant benefit to company (Fig 2). Also improved profitability and enhanced knowledge and competitiveness through innovation are seen important in micro firms. In general larger companies value the same impacts than micro firms – only on a lesser extent. Differences in perceptions concerning impacts of innovation probably reflect distinct bases of companies; micro firms tend to have only one innovation whereas larger companies may possess an extensive pool of innovations.

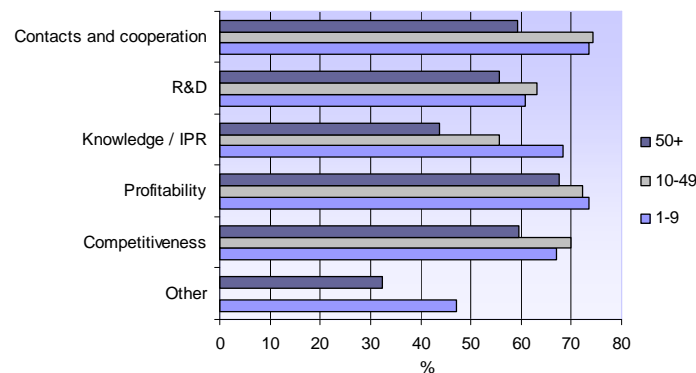


Figure 2. Benefits and impacts of innovation to company.

The benefits and impacts were classified into wider categories similar to origin of innovation introduced in previous section (see more detailed division in Appendix 1). The large companies with more than 50 employees perceive the significance of an innovation to impact commercial value of company. Micro firms, on the other hand, appreciate both commercial benefits and intangible benefits, i.e. improvement in ways of doing and strengthening of knowledge and know-how. Even though the strengthening of knowledge and know-how proved as one of the most important impacts to micro firms, the increase in the number of R&D workers has not though seen that important in micro firms than in larger firms. A likely explanation is that in micro firms the division of labour rarely is determined to the extent than in larger companies. Moreover the cases imply innovator/entrepreneur's reluctance to hand over product development projects to co-workers but wants to keep strings in own hands that on its behalf affects the recruitment of new employees.

The protection that patenting and other IPR measures bring to innovation was surprisingly seen more important in small than large firms. Filling in patent applications has commonly argued to be time-consuming and expensive, and first of all not always seen to create real protection to an innovation that might discourage smaller companies to patent their invention. In the light of case interviews of small firm CEOs, the actual protection provided by patents was considered vague in the case another company wants to violate the IPRs – small companies do not often have resources to defend their position by filing a lawsuit. In spite of this, many case companies still had extensive patent portfolios. On the other hand, a right to sell licence might act as an only means to commercialise innovations in smaller firms - especially in the case of science based innovations. There are of course variations between industries' tendency to patent while also other factors might explain individual companies' patenting propensities as well. For example a strong market position or acknowledged brand name might protect larger companies' innovation that are not attainable for a start-up company.

As mentioned, new contacts and cooperation related to innovation turned out to be highly valued by company respondents especially among smaller companies. The enhanced visibility and esteem was judged the highest by micro firms. The successful commercialisation of an innovation does not solely enhance commercial values but most of all brings satisfaction to innovator/entrepreneur and improves company's esteem among stakeholders, i.e. competitors, co-operation partners and not least among financiers. Merely an image of innovativeness affects company's esteem and visibility. However, often good image is not sufficient in gaining the first customers. According to our case studies data, difficulties in gaining the first deal were stressed. Having an extensive list of references is important for companies commercialising their innovation, and therefore lack of reference list was repeatedly mentioned as one of the main hindrances in successful commercialisation.

4.4 Challenges of innovativeness

This section based on 29 company cases reveals the challenges most often faced in the innovation processes. According to company cases, duration of innovation development creates challenges to entrepreneurs in several ways. Firstly, process ties human resources and secondly it demands often relatively large financial inputs. Particularly in small firms, new innovation processes are often carried out beside the regular operations which ties innovator/entrepreneur's time, and shows commitment required to go through new product development processes. Besides to acquire specific knowledge and know-how, it requires effort to identify right actor or person. For instance to build a viable network of subcontractors, co-operators, sales agents etc, is demanding and time-consuming. Financial restrictions in innovation process are common for micro companies having not yet references or either credibility in the eyes of financiers. An indication of shortage of external sources of funding is that at the early stage of innovation development several

companies rely exclusively on income financing. Overall, uncertainty about outcome and risk are integral part of innovation and entrepreneurship.

The challenges faced in the commercialisation and internationalisation are crystallised in the lack of first references as mentioned above. Small start-up companies struggle with selling the idea without convincing references to potential customers. In addition, especially in technologically oriented companies the problems linked with commercialisation are multiplied because of inexperience in sales and marketing – some firms tend to proceed in stepwise manner focusing heavily on product development and neglecting market contacts. Paradoxically some interviewees felt that pioneering position (in a meaning of novel product) further raises threshold to enter market. The market might also be non-existing that impedes commercialisation particularly in the case of breakthrough products.

The small size of domestic markets in Finland pushes even small firms to look for foreign opportunities in the early phase of company life cycle. Naturally this creates new type of challenges concerning internationalisation; finding right distribution channels, concern about international IPRs and level of own know-how about foreign operations just to mention few.

5. Conclusions

The rather small sample size restricts us to make too far-reaching generalisation of results, however it gives implications of phenomena. Challenges that companies encounter are also dependent on industries or sectors they arise at but also dependent on markets, i.e. consumer versus business markets, they are sold.

Economic success and profitability are necessary but not alone sufficient explanations for innovation in entrepreneurial firms. Besides of economic rewards, innovative entrepreneurs seem to value self-fulfilment which shows in the preparedness and commitment to use considerable amount of own time and energy in advancing idea into successful innovation.

Today the trends of subcontracting and outsourcing in different stages of business activities and the increasing technological complexity may increase the amount of entrepreneurs active in innovation. Networking is becoming critical not only in manufacturing but also in product development. When complexity of R&D project increases the small and micro firms need to tap complementing outside sources of expertise and know-how. Instead of growth taking place in single company it might ever more become concrete in company networks, for instance the impacts of employment may spread more widely. On the other hand, this trend of specialisation may reflect on small companies perception towards growth. For example Autio (1994) when studying new technology based firms in the Cambridge (Mass.) area, Cambridge (England) and Helsinki area, found out that the majority of companies were reluctant to become larger or less specialized. From entrepreneur's point of view networking allows companies to stay controllable while also risk is dispersed.

Despite of various challenges and obstacles that entrepreneurs face during the innovation process, their commitment to learning and advancement of business seems to provide solutions to carry on - sometimes through trial and error. Besides of commitment and preparedness also dose of good fortune and timing is needed in order to succeed in innovation.

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Appendix 1.

Benefits and impacts to innovative company.

Contacts and Cooperation	Research and Development	Knowledge / IPR	Profitability	Competitiveness	Other
New contacts / improvement in co-operation	New and improved methods / services	Strengthening of knowledge and know-how	Improved competitiveness	Increase in market share in existing market	Other factors
Increase in visibility and esteem	Patents and licences	Additional R&D recruitments	Improved profitability	Access to new markets	