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**Entrepreneurial Intentions and the Entrepreneurial Environment**  
**A Study of Technology-Based New Venture Creation**

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## **Abstract**

This dissertation aims to create new knowledge concerning technology-based entrepreneurship and the external factors affecting the entrepreneurial process. More precisely this study focuses on the relationship between entrepreneurial behavior of an individual and the environment. Particular attention is paid to the resource availability from the environment. The main research question of this study is “How does the environment affect technology-based entrepreneurial behavior of an individual?”

The theoretical framework of this study is built on the conceptual framework of new venture creation (Gartner, 1985) and on the concept of entrepreneurial intentions. Other theories applied in this study include resource-based view of the firm, social capital theory and resource dependence. The concept of entrepreneurial intentions is used in this research as a measure for the entrepreneurial behavior of an individual and the resulting entrepreneurial activity. The environment is characterized through two different factor categories: affective environmental factors and rational environmental factors. A special group of rational environmental factors is the resource availability of the environment. It is hypothesized that these environmental factors affect entrepreneurial intentions in that environment. A model defining the relationships between the environmental factors and entrepreneurial intentions was constructed drawing on the entrepreneurial intention models.

The empirical data of this study is derived from a survey and a case study. The sample for the survey was comprised of the participants of a business plan competition and students of entrepreneurship classes at selected universities. The survey data of 271 nascent entrepreneurs was used to test the model using path analysis. A case study of six recently established technology-based firms was carried out to explore the entrepreneurial process and the role of different resources in that process.

The results of the study show that the environmental factors affect entrepreneurial intentions. However, concerning resource availability only the availability of technology-related resources affected entrepreneurial intentions. The findings of the study suggest that the development of entrepreneurial intentions is a multiphase process where different external factors affect the process at different phases.

**Keywords:** entrepreneurship, entrepreneurial intentions, entrepreneurial environment, resources



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Kauniainen, May 2004

Henri Grundstén

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# 1 Introduction

## 1.1 Background

During its ninety years long history as an independent country Finland has developed from a cold and distant agricultural country to one of the leading technology-driven national economies in the world. The North-European country of 5,2 million people has recently received growing international attention as a modern, highly developed society. After the Second World War, in which the country was heavily involved, the industrialization of Finland progressed rapidly. The war indemnities made Finnish heavy metal industry to grow rapidly and together with the country's vast forest property they pushed paper and paper machinery industries forward.

During the late 1980's information and communication technology industries started to grow significantly and during the 1990's the structure of the industry in Finland changed quite dramatically. Until then the main industries in Finland had been heavy metal industry and paper and pulp industry. The change in Finland's industrial structure was also fueled by the sudden disappearing of almost all exports to former Soviet Union, which had dominated Finland's foreign trade earlier. This development towards high technology could also be seen in Finland's foreign trade. The share of high technology products exports increased from 6 % in 1990 to 21 % in 2002<sup>1</sup>.

Finland's innovation policy has also followed the shift and increasing attention is being paid to high technology and to research and development (R&D). The national investment in technological research and development increased steadily during the 90's. A significant event in this respect was the goal set by the government of Finland in 1995 to raise the investment in research and development up to 3 % of GDP by year 2000. This goal was eventually exceeded and the national investment in the R&D was 3,1 % of GDP in 1999, of which 30 % was invested by the public sector and 70 % by the industry. In 2003 the national investment in R&D was 3,4 %<sup>2</sup>.

The national emphasis in technology and R&D was also reflected in the increase of funding provided by the National Technology Agency Tekes, which increased from 100 million euros in 1990 to 390 million euros in 2000.

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<sup>1</sup> Source: Statistics Finland, according to the OECD product catalogue defined in 1995

<sup>2</sup> Source: Statistics Finland

In 2003 Tekes' R&D funding totaled 392 million euros, of which 162 million euros (41,3 %) were received by universities and research institutes and 230 million euros (58,7 %) by industry. More than half of Tekes' funding (222 million euros) was allocated to information and communication technologies and to bio and chemistry technologies<sup>3</sup>.

During late 90's Finland began to gain international reputation as a technologically advanced country and as a sophisticated welfare state. Several international studies have ranked Finland as one of the most advanced innovation environments in the world (e.g. IMD, 2003<sup>4</sup>; WEF, 2002<sup>5</sup>). WEF's Global Competitiveness Report 2003 ranked Finland as second after the U.S.A. measured by technology index and as the second after Iceland measured by ICT index (information and communication technologies). A recent article in Foreign Policy Magazine<sup>6</sup> ranked Finland as the 5<sup>th</sup> by globalization of countries. Their globalization index was comprised of 14 variables, which were categorized in four baskets: economic integration, personal contact, technological connectivity, and political engagement.

The public education system in Finland is well developed. OECD's Pisa report<sup>7</sup> in 2000 ranked Finnish students as the first in reading literacy, the 4<sup>th</sup> in mathematical literacy, and 3<sup>rd</sup> in science literacy. Also the share of people with university education in Finland is relatively high (Table 1-1). Finland ranks equally well in comparisons regarding patenting activity. In 2001 there were 340 European patent (EPO) applications per million inhabitants in Finland, which put Finland the second in the ranking after Sweden (370 applications)<sup>8</sup>. In 2000 Finland received 43 U.S. high technology patents per million inhabitants, only Japan and Sweden had more high technology patents in the U.S.

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<sup>3</sup> Source: National Technology Agency of Finland, Tekes

<sup>4</sup> International Institute for Management Development, Lausanne, Switzerland

<sup>5</sup> World Economic Forum

<sup>6</sup> Foreign Policy Magazine by A. T. Kearney, February 2004

<sup>7</sup> The OECD Programme for International Student Assessment, <http://www.pisa.oecd.org>

<sup>8</sup> Source: Eurostat

Table 1-1. Percentage of people with university education in selected countries in 2001  
(Source: Statistics Finland)

<i>Country</i>	<i>% of people aged 25 - 34</i>	<i>% of people aged 25 - 64</i>
U.S.A.	39 %	37 %
Finland	38 %	32 %
Sweden	37 %	32 %
France	34 %	23 %
Denmark	29 %	27 %
Norway	38 %	31 %
Germany	22 %	23 %

Given the fact that Finland has one of the most advanced innovation environments in the world, the technology-based new venture creation seems to be relatively low. Data from Statistics Finland shows that the rate of new, technology-based venture creation has decreased from 600 in 1995 to 350 in 2002 (new firms classified as high technology and as medium high technology firms).

Global Entrepreneurship Monitor (GEM), a multi-year international study about entrepreneurial activity (Reynolds et al., 2004) has repeatedly provided evidence concerning Finland's low entrepreneurial activity. Finland ranked as the 15<sup>th</sup> among the 31 countries surveyed in 2003 (28<sup>th</sup> / 37 in 2002) and was categorized in the below average group. The central measure in this study is the Total Entrepreneurial Activity (TEA), which indicates how much of the adult population is active in starting a new business. Finland's TEA in 2003 was 6,9 % (4,5 % in 2002).

Reynolds et al. (2004) define two kinds of entrepreneurs: opportunity entrepreneurs and necessity entrepreneurs. Opportunity entrepreneurs seek to take advantage of unique business opportunities, whereas necessity entrepreneurs cannot find a suitable work and start a business to survive. In the GEM data the share of necessity entrepreneurs is typically lower in the developed countries and higher in the less developed countries. In Finland the share of necessity entrepreneurship is almost non-existent, only 9 % of the

total TEA. Similar pattern can be found in all Nordic countries (Table 1-2).

Table 1-2. Entrepreneurial activity among adult population in selected countries in 2003 (Reynolds et al., 2004).

<i>Country</i>	<i>Total TEA</i>	<i>TEA Opportunity</i>	<i>TEA Necessity</i>
U.S.A.	11,9 %	9,1 %	1,7 %
Norway	7,5 %	6,4 %	0,7 %
Finland	6,9 %	5,8 %	0,6 %
Denmark	5,9 %	5,3 %	0,4 %
Sweden	4,1 %	na	na

Autio et al. (1997) also reported low entrepreneurial activity among Finnish engineering students in comparison with engineering students in some other countries: less than 10% of them were interested in entrepreneurship, while the respective percentage in some of the most famous universities in the U.S.A. was as high as 50%.

Entrepreneurship and new, technology-based firms have received increasing attention during the recent years. Several studies (Westhead and Cowling, 1995; Kirchoff, 1994; Storey, 1994) have reported that small and growing firms have an important role in the economic system because of their ability to create wealth, prosperity and jobs. OECD (2002) has also emphasized small and medium sized enterprises' significant role in the overall economic activity as well as their important contribution to overall employment. Similarly the European Commission<sup>9</sup> has raised entrepreneurship as an important policy area and encourages all member states to develop their entrepreneurial environment.

The present Government of Finland (inaugurated in 2003) launched the Entrepreneurship Policy Programme as part of its economic and industrial policy. The program underlines the importance of enterprises in the construction of economic growth and employment. The main focus of the program is on concrete projects that support entrepreneurship and it consists of five sub-sectors:

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<sup>9</sup> Commission of the European Communities: Green Paper - Entrepreneurship in Europe, Brussels, 21.1.2003

- Entrepreneurial training and consultancy
- Establishment, growth and internationalization of enterprises
- Entrepreneurial taxes and payments
- Regional entrepreneurship
- Provisions governing entrepreneurship and the functioning of markets

The unemployment rate in Finland reached its peak in 1994 being 16,6 %. This was due to a heavy depression in Finland at that time. It was linked to the global economic situation, but its impact in Finland was boosted by the collapse of all exports to former Soviet Union at the same time. Since then the unemployment rate in Finland has stabilized to 9 %. Even the upswing in the economy during the late 90's could not bring the unemployment back to the level where it was before the depression (3,2 % in 1990)<sup>10</sup>. Therefore one of the main challenges of the current Finnish economic policy is bringing the unemployment rate down and creating new jobs.

While the importance of small firms in job creation has been recognized it has become evident that it is the rapidly growing new firms that create the vast majority of new jobs created by all new and small firms (Autio, 2003). The report states that while high-potential new firms constitute only 3 – 5 % of all new firms they eventually account for 50 – 70 % of new jobs created by the whole population of new firms.

The entrepreneurial activity pattern in Finland is similar to that of other Nordic countries. Similarly the level of education is the same in the Nordic countries. The unemployment rate in Finland however is twice as high as in the other Nordic countries. When comparing investments in R&D and entrepreneurial activity (TEA) in selected countries it appears that there is no clear relationship between these characteristics. Interestingly the most R&D intensive Nordic country (Sweden) has the lowest TEA and respectively least R&D intensive of them (Norway) has the highest TEA (Table 1-3).

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<sup>10</sup> Source: Statistics Finland

Table 1-3. Investment in R&D and TEA in selected countries (Source: OECD; Reynolds et al., 2004)

<i>Country</i>	<i>Investment in R&amp;D (2002)</i>	<i>TEA (2003)</i>
Sweden	4,3 %	4,1 %
Finland	3,4 %	6,9 %
U.S.A.	2,8 %	11,9 %
Denmark	2,4 %	5,9 %
Norway	1,6 %	7,5 %

When the Nordic pattern is compared with the situation in the U.S.A. a clear difference emerges. In the U.S.A. the level of education, the investment in R&D, and the unemployment rate are on the same level and even the distribution between opportunity and necessity entrepreneurship is roughly the same, but the total entrepreneurial activity is twice as high as in the Nordic countries.

The declining rate of technology-based new venture creation despite of the increasing national investment in technological R&D together with the unemployment challenge draws attention to entrepreneurship, especially to the technology-based entrepreneurship in Finland. It seems evident that new venture creation and entrepreneurship will have an important role in the future economic development of Finland.

The fact that Finland and other Nordic countries differ significantly from the U.S. while many of the national and societal characteristics are the same, creates a need for an explanation for this difference. If entrepreneurial activity is to be encouraged it is necessary to know what are the disincentives and hindrances for the entrepreneurial activity to grow. If these hindrances or even some of them can be identified it may offer ingredients for policy initiatives and other government interventions to encourage entrepreneurial activity. This study will examine these questions.

## **1.2 The scope and goal of the study**

This study focuses on entrepreneurial process and on individual's behavior in



that process. This study is limited to new, technology-based firms. Only new technology-based firms with originally new business activities are studied in this research. This definition implies that e.g. management buy-out, management buy-in and business acquisition cases will be excluded. The circumstances in these cases differ significantly from originally new, technology-based businesses and thus the same set of external factors affecting the entrepreneurial behavior may not be applicable.

The process of starting up a new, technology-based firm from an individual's perspective is a complex and fragile process where internal and external factors converge and affect collectively the outcome of that process. The scope of this study is limited to the entrepreneurial process, more exactly on individual's entrepreneurial behavior. The unit of analysis is an individual, the nascent entrepreneur who is in a decision making process concerning new venture creation and entrepreneurship. In this respect the concept of entrepreneurial intentions is applied to measure entrepreneurial activity and entrepreneurial behavior. It is expected that external factors play an important role in this decision making process and hence have an impact on the outcome of the process. This study is focused on the external factors that are dependent on the surrounding environment.

This study is based on data collected in Finland and it is based on Finnish technology-based new firms as well as on a sample of Finnish individuals deemed as nascent technology-based entrepreneurs. Restricting this study only to Finland was chosen because of the increased attention in technology-based entrepreneurship in Finland, which derives from the paradox of a highly advanced innovation environment and decreasing rates of technology-based entrepreneurial activity at the same time.

The purpose of this study is to provide new knowledge concerning the relationship between the environment and entrepreneurial activity. This will serve two purposes: contribute to the theory of entrepreneurship and offer practical implications for policy makers to create incentives for promoting entrepreneurial activity. The theoretical contribution will be the integration of resource perspective and individual characteristics and individual perspective in the entrepreneurial research. This study will also provide evidence that the theoretical entrepreneurship models deriving from the U.S.A. are valid also in other cultural environments.

The results of this study will contribute to the ongoing discussion concerning high technology entrepreneurship and the different means of promoting it. The results will also contribute to understanding of the dynamics involved in the decision making process of an individual or a group of individuals concerning technology-based entrepreneurship. Practical implications of this study aim to provide knowledge and means for designing policies that promote technology-based entrepreneurship.

### **1.3 Conceptual framework**

Weber (1930) in early 1900's was perhaps the first one to write about entrepreneurship. His argument was that the Protestant work ethic is the driver of entrepreneurship and thriving for profit. Reinvesting the profit back to business activities leads to wealth accumulation. This perspective ties entrepreneurship to cultural and religious context. McClelland (1961) brought social aspects into the entrepreneurial research by arguing that e.g. parental influences and commonly held values in the society affect entrepreneurial propensity. He posited that these factors affect individual's need for achievement and hence entrepreneurial propensity.

The so-called Austrian theories (Kirzner, 1997) assume that people cannot recognize all entrepreneurial opportunities and that it is the information about opportunities rather fundamental attributes of people that determine who becomes an entrepreneur. The theories argue that this process depends on factors that are other than people's ability and willingness to take action. This process takes the market towards equilibrium from the initial nonequilibrium conditions.

One of the possible explanations for the differences in entrepreneurial activity in different countries may be dependent on the environment, the entrepreneurial environment. Katz (1992) proposed a psychological cognitive model of employment status choice. His model utilizes individual's psychology in the form of values in the decision-making process and it is dependent on the personal history and the social context. Katz's (1992) model links environmental variables with individual's behavior in the context of employment status choice where entrepreneurship is an alternative.

Attitudes toward entrepreneurship have become a central concept in explaining entrepreneurial behavior in recent entrepreneurship research.

Ajzen's (1991) theory of planned behavior links attitudes toward a behavior and intentions to perform the behavior. It has been successfully applied in entrepreneurial research (Kolvereid, 1996; Krueger et al., 2000; Autio et al., 2001). Shapero's (1982) model of entrepreneurial event also focuses on entrepreneurial intentions. He argues that entrepreneurial intentions depend on perceptions of personal desirability, feasibility, and propensity to act. Krueger et al. (2000) showed that these two intention models are cohesive when applied in entrepreneurial research. An essential part of intention models' logic is that they describe how exogenous influences affect intentions and, ultimately, affect new venture creation. Central elements in these models are perceptions of feasibility and desirability of entrepreneurship. They affect entrepreneurial intentions, which in turn correlate strongly with entrepreneurial behavior.

Role models have been attested to have role in entrepreneurial activity (Scott and Twomey, 1988; Scherer et al., 1989; Roberts, 1991; Krueger, 1993) and they relate positively with entrepreneurial behavior. Usually role models are associated with entrepreneurial parents (Shapero, 1982; Ronstadt 1984). It has also been reported that ethnic background has a role in entrepreneurial activity (Aldrich & Waldinger, 1990; Bates, 1997; Wong and Ng, 2002).

Population ecology theory (Hannan and Freeman, 1977; Aldrich, 1979, 1990; Carroll, 1984) focuses on organization environment relationship. The population ecology approach is built on the logic of environmental selection where environmental attributes and fit between organization and environment determine the death and birth of organizations. The concept of carrying capacity (Aldrich, 1979) comes close to population ecology theory and pays attention to the fact that the formation rate of new organizations depends on how much of the resources have already been exhausted.

When new venture creation and entrepreneurship is concerned the array of relevant environmental variables is narrowed down, but still quite a few of them will remain. There is for example the social environment that brings in issues like demographics, social order, etc. All issues of this nature affect new venture creation in a myriad of different ways. Cultural environment will also affect new venture creation through occupational traditions, values, heritage, etc. Yet another dimension of the environment is the governmental and political environment. Government policies affect new venture creation through legislation and regulation, licenses, taxation, etc. For example in the

public discussion the role of taxation is a relatively common topic concerning policies that affect entrepreneurship.

Resources and environment have inspired many researchers, also in the research domain of entrepreneurship. Penrose's (1959) seminal resource-based view of the firm together with all its derivatives has been the foundation for many approaches concerning new venture creation. It focuses on rather tangible resources and argues that a firm is a bundle of resources, which provide the firm with critical services. The resource dependence theory (Pfeffer and Salancik, 1978; Boyd, 1990) links resources and environment to new venture formation. It defines environment as a pool of resources, which the entrepreneur selects and acquires to establish his venture. Resource munificence, which is close to resource dependence, has been similarly tied with new venture creation (Hammers Specht, 1993). This approach builds on a view of the environment as a repository of resources on which the entrepreneur draws when engaged in entrepreneurial activity. Resource munificence is used for explaining e.g. why new firms seek their way to certain environments and the differences in regional new firm formation rates (Pennings, 1982b).

Bruno and Tyebjee (1982) explored environment's role in the entrepreneurial process extensively by building their approach on resource dependence theory. They argue that resource availability or resource munificence of the environment affects start-up outcomes significantly. By start-up outcome they refer to the number of start-ups, equity and legal structure of start-ups, and scale of start-ups. Bruno and Tyebjee (1982) also point out that the entrepreneur's subjective interpretation of environmental characteristics is crucial.

The purpose of this study is to explore the relationship between the environment and the entrepreneurial process at the level of an individual. The resource-based view of the firm (Penrose, 1959) defines the relationship between different resources and a firm, but it doesn't offer explanations why entrepreneurial activity in different environments varies. Population ecology and resource dependence concepts tie resources, environment, and new venture creation together. However, the unit of analysis in these concepts is a population of firms, not an individual firm or an individual entrepreneur. The Weberian perspective as well as the socio-psychological perspective (McClelland, 1961; Kirzner, 1997) links the social dimension and personal

characteristics to the entrepreneurial behavior of an individual. In these approaches the role of resources in the entrepreneurial behavior is not recognized.

The intention models appear to provide a plausible way to explore the relationship between the environment and the individual in the entrepreneurial process (Shapero, 1982; Ajzen, 1991). The intention models have become a widely accepted approach in entrepreneurial research and it has been attested to explain entrepreneurial behavior reliably (Krueger, 1993; Kolvereid, 1996; Krueger, et al., 2000). For this study intention models offer a framework, which enables linking all relevant elements: personal perceptions, individual behavior, environment, and resources together. This framework guides the empirical part of this study.

A survey of nascent entrepreneurs (n=1175) was carried out to test the hypotheses with statistical methods. The survey results are then paralleled with data from a case study of six recently established technology-based firms. This dualistic empirical approach will provide both ex ante and ex post perspectives to the entrepreneurial process and to the role of environmental factors there.

#### **1.4 Structure of the study**

In the next chapter the conceptual framework of the study will be specified based on a literature survey. The methods and data used in this study will be described in Chapter 3. The results of the survey will be presented in Chapter 4. Chapter 5 will present the case study and analysis of the case study data. Finally in Chapter 6 the findings of the study will be discussed including limitations of the study, including implications for policy measures, implications for theory, and directions for future research.



## **2 Specification of the conceptual framework**

In this chapter a review of research related to entrepreneurship and new venture creation is presented followed by other theories relevant for this study. These theories include resource-based view of the firm, theory of planned behavior, theory of social capital, theory of population ecology, and theory of resource dependence. After the literature review the key concepts will be defined. The detailed conceptual framework will be developed based on the extant literature.

### **2.1 Literature review**

#### **2.1.1 Entrepreneurial research and research on new venture creation**

Perhaps one of the most ancient uses of the term entrepreneur is from the first century's ancient Rome, where gladiator fights were a popular form of entertainment. Entrepreneurs acquired suitable men by purchase or recruitment, trained them, and then hired them to interested parties for fights in Coliseum. The first academic to use the term entrepreneur was probably Cantillon (circa 1700) who described the individual as a rational decision maker who assumed the risk and provided management for the firm.

Schumpeter (1934) was the first author to draw attention to the central role of entrepreneur in the innovation process. He made a distinction between invention and innovation and said that entrepreneurs seize upon these basic inventions and transform them into economic innovations. It is somewhat difficult to make a distinction between Schumpeter's entrepreneur and innovator, as it is defined today. He argued that entrepreneurs are fueling economic change by creating new combinations of resources in form of (1) a new good, (2) a new method of production, (3) opening of a new market, (4) discovering a new source of supply of raw materials, and (5) carrying out of a new organization. One of his contributions was separating entrepreneurship from capitalism. Livesay (1982) put the definition of entrepreneurship in a compact form: an entrepreneur perceives opportunity and assembles the assets necessary to exploit it.

The concept of entrepreneurial process has become widely accepted in the context of entrepreneurship to represent the chain of events that lead to the formation of a new venture. Opportunity perception (Kirzner, 1979; Shane

and Venkataraman, 2000; Alvarez and Busenitz, 2001) is often mentioned as the first event of the entrepreneurial process. Hornaday (1992) identified three dimensions that he felt were consistently used in the literature to characterize the entrepreneurial process: economic innovation, organization creation, and profit-seeking in the market sector. Timmons (1994) identified three driving forces of entrepreneurial process: founder and team, opportunity, and resources. Perhaps the most thorough concept is Bhave's (1994) process model of entrepreneurial venture creation. The process is described as an iterative, nonlinear, feedback-driven, conceptual, and physical process. It includes internally and externally stimulated opportunity recognition, commitment to physical creation, set-up of production technology, organization creation, product creation, linking with markets, and customer feedback. Reynolds and Miller (1992) adopted a somewhat more pragmatic approach in their concept of entrepreneurial process, which they called the gestation process. They defined four key events of the gestation process: principal's commitment, initial hiring, initial financing, and initial sales.

Gartner (1985) presented a four-dimensional framework for describing the phenomenon of new venture creation (Fig. 2-1).

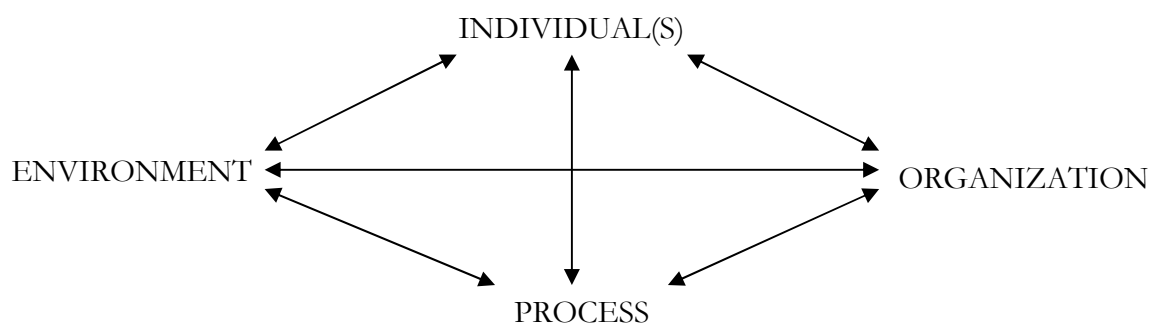


Figure 2-1. A framework for describing new venture creation (Gartner, 1985).

Gartner (1985) provides an applicable framework for the purposes of this study since it covers all the relevant components in new venture creation: the environment, the individual, the firm, and the entrepreneurial process. He augments his framework by presenting a list of variables characterizing the four categories. He formed the list by aggregating the major findings of previous research and funneling them into his four dimensional framework. The resulting list is an exhaustive summary of the most significant issues concerning new venture creation (Table 2-1).



Table 2-1. Variables in Gartner's framework for describing new venture creation (Gartner, 1985)

<i>Individual(s)</i>	<i>Process</i>	<i>Environment</i>	<i>Organization</i>
Need for achievement Locus of control Risk taking propensity Job satisfaction Previous work experience Entrepreneurial parents Age Education	The entrepreneur locates a business opportunity The entrepreneur accumulates resources The entrepreneur markets products and services The entrepreneur produces the product The entrepreneur builds an organization The entrepreneur responds to government and society	Venture capital availability Presence of experienced entrepreneurs Technically skilled labor force Accessibility of suppliers Accessibility of customers and or new markets Governmental influences Proximity of universities Availability of land or facilities Accessibility of transportation Attitude of the area population Availability of supporting living conditions High occupational and industrial differentiation High percentages of recent immigrants in the population Large industrial base Large size urban areas Availability of financial resources Barriers to entry Rivalry among existing competitors Pressure from substitute products Bargaining power of buyers Bargaining power of suppliers	Overall cost leadership Differentiation Focus The new product or service Parallel competition Franchise entry Geographical transfer Supply transfer Supply shortage Tapping unutilized resources Customer contract Becoming a second source Joint ventures Licensing Market relinquishment Sell off of division Favored purchasing by government Governmental rule changes

Gartner (1985) came up with the framework by summarizing the variables that had been used in past research to describe entrepreneurs and their ventures. While strongly questioning the validity of using psychological characteristics of any kind to describe entrepreneurs he included three variables of this kind in

his model: need for achievement, locus of control, and risk taking propensity. Other variables of the individual are related to one's background, experience, and attitudes.

Concerning process category in the framework Gartner (1985) is just listing the most cited actions that are related to new venture creation. Similarly the list of organization variables is comprised of characterizations used by several researchers defining an entrepreneurial new firm. The list of environmental variables is the longest in the framework and it captures various dimensions of the environment.

Gartner's (1985) framework appears as an exhaustive framework capturing every imaginable variable affecting new venture creation. What it does not do is to explain the relationships between the categories let alone between individual variables. The argument of Gartner's (1985) is that since every new venture is unique his conceptual framework ought to be seen as a kaleidoscope, as an instrument through which to view the enormously varying patterns of new venture creation. We are using the framework in this study as a guidance to link different factors together and to approach new venture creation for our research purposes.

To describe entrepreneurial behavior Gartner et al. (1999) developed a list of five kind of entrepreneurial activities: (1) finding and refining the opportunity: comprised of 9 different activities, such as defining the purpose of the business, planning, and analyzing competitors; (2) acquiring resources and help: comprised of 15 different activities, such as finding investors, getting advice from lawyers, getting a loan, and acquiring technical expertise; (3) operating the business: comprised of 5 different activities, such as dealing with distributors and managing the day to day operations of the business; (4) identifying and selling to customers: comprised of 5 different activities, such as identifying specific customers to sell to, selling to customers, and managing sales channels; (5) "Outside of the Business" issues: comprised of 4 different activities, such as dealing with family problems, spouse, and friends.

Bruyat and Julien (2001) define the entrepreneurial process as follows:

$$\text{Individual (I)} \Leftrightarrow \text{New value creation (NVC)}$$

By this definition they want to emphasize the dialogic nature of the

entrepreneurial system, how the individual and the environment affect one another (Fig. 2-2).

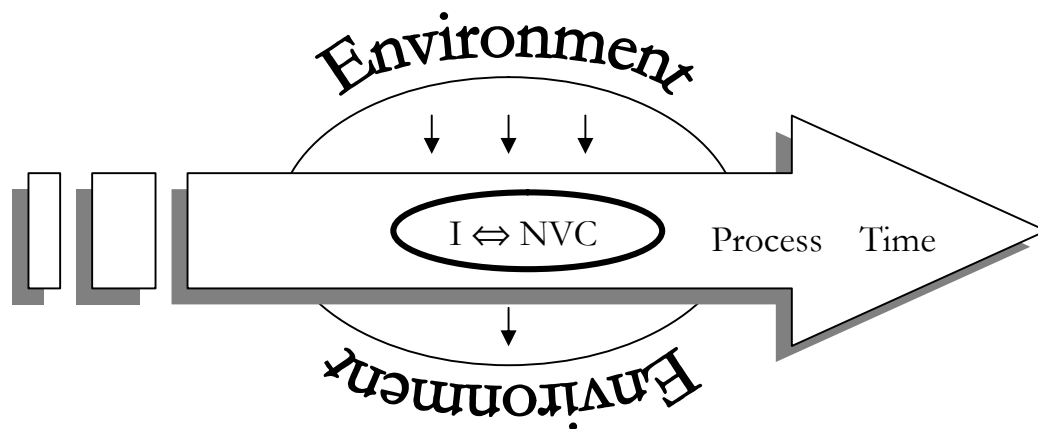


Figure 2-2. The entrepreneurial process located within its environment and time (Bruyat and Julien, 2001).

The model of Bruyat and Julien (2001) links with Gartner's (1985) model concerning the role of the environment in new venture creation. Illustrating the dialogic nature of the entrepreneurial system it is cohesive with Gartner's (1985) framework which is an open system represented by the arrows going every direction. It also supports our assumption in this study concerning the relevant role of the environment in the entrepreneurial activity.

Opportunity recognition and exploitation has been an essential part of the domain of entrepreneurship. Shane and Venkataraman (2000) define entrepreneurship as the discovery and exploitation of opportunities. They present a framework for entrepreneurship, which is comprised of existence, discovery, and exploitation of entrepreneurial opportunities. Opportunities exist if there is information asymmetry or new information that is not available to everyone. The discovery of entrepreneurial opportunities can take place if particular people possess prior information necessary to identify an opportunity and they have cognitive properties necessary to value it. The decision to exploit an entrepreneurial opportunity depends on the nature of the opportunity, the expected value of it. Furthermore, there are individual differences, which affect the decision to exploit entrepreneurial opportunities: the amount of financial capital they have, the strength of social ties to resource providers, the amount of useful information they possess concerning exploitation, and different perceptions of risk and chances. They also make an interesting remark that personal characteristics affect these essential

perceptions.

Significant entrepreneurial research has been done in the areas of personal characteristics' role in entrepreneurship and entrepreneurial intentions, which are discussed separately in the following chapters.

### **2.1.2 Resource-based view of the firm**

In her classic book Edith Penrose (1959) introduced the resource-based view of the firm. The main goal of her seminal work was to explain different growth mechanisms and the dynamics of the firm. In order to do this Penrose constructed a theory of the firm based on different resources. She defined the firm as a collection of productive resources, which are of various kinds. There are tangible resources like plant, equipment, land, natural resources, raw materials, semi-finished goods, waste products, and by-products. Another important group of resources are human resources: unskilled and skilled labor, clerical staff, administrative staff, financial staff, legal staff, technical staff, and finally, managerial staff.

As a special type of human resources Penrose (1959) introduces is the entrepreneurial resource, which is provided by the entrepreneur. Entrepreneurial resources render entrepreneurial services for the firm. She also defines the quality dimensions for the entrepreneurial services, which are: entrepreneurial versatility, fund-raising ingenuity, entrepreneurial ambition, and entrepreneurial judgment.

Entrepreneurial versatility captures the notion of different qualities, sometimes even contradictory qualities, which are required when the entrepreneurial services are considered. Bird (1988) also refers to this myriad of different functions that an entrepreneur has to master ranging from stuffing envelopes to running a machine, making sales calls, analyzing competition, meeting with bankers, and forming strategic alliances.

Fund-raising ingenuity refers to entrepreneur's ability to attract financial resources for the firm. It is important to note that this attribute is not related to persuasiveness or decisiveness but entrepreneurial abilities and credibility. This relates positively with the firm's ability to raise capital.

Entrepreneurial judgment involves a combination of imagination, 'good sense',

self-confidence, and other personal qualities. It enables the entrepreneur to make 'sound' decisions and hinders false perceptions (Penrose, 1959).

The resource-based view of the firm connects with Gartner's (1985) framework of new venture creation at several points. First, it is the firm that is the central element of the resource based view and it is one of the four basic elements of the Gartner's (1985) framework. Furthermore the framework lists resources in the organization dimension ("tapping unutilized resources"), in the process dimension ("the entrepreneur accumulates resources"), and finally in the environment dimension where the majority of variables are resource-related (financing, labor force, universities, facilities, transportation, etc.).

Drawing on resource-based view of the firm several threads of research and theory building have emerged in the field of strategic management. One of these is based on capabilities. According to Penrose (1959) capabilities refer to a firm's capacity to deploy resources along with organizational processes. Much of the research concerning capabilities has focused on building and sustaining competitive advantage (Peteraf, 1993; Hamel and Prahalad, 1994; Sanchez and Heene, 1997; Coates and McDermott, 2002). Another thread is centered on dynamic capabilities. Teece et al. (1997) define dynamic capabilities as firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Eisenhardt and Martin (2000) argue that dynamic capabilities are a set of specific and identifiable processes such as product development, strategic decision making, and alliancing. Other derivatives of the resource-based view are the knowledge-based view of the firm (Grant, 1996, 1997) and the concept of core competencies (Hamel and Prahalad, 1994).

In his review of the research concerning new, technology-based firms related to Massachusetts Institute of Technology over the past three decades Roberts (1991) emphasizes the role of management team. By management team he means those key members of the staff who start up the firm, the founders. This viewpoint of Roberts' can be seen as compatible with Penrose's resource-based view of the firm. The management team is the resource or set of resources that will provide the entrepreneurial services for the new, technology-based firm. The propensity to form entrepreneurial teams may vary across different cultural environments and hence is of interest in this study.

Kelley and Rice (2001) studied the impact of technology resources on a new

firm at its inception phase and their impact on later development of the firm. They found out that founding technology resources affect subsequent actions of the firm, especially the development of the patent portfolio and the formation of alliances. Somewhat contrasting is the finding of Bergmann Lichtenstein and Brush (2001) in their longitudinal case study of three firms tracking salient resources in these firms and analyzing how these resources changed over time. Unlike one would assume it appeared that intangible, “soft” resources (e.g. resources promoting sales and service) were more salient than tangible resources in the early stages of a growing new venture’s development. They also found clear evidence that salient resources change over time as the firm develops. They argue that if the change is only incremental the firm will survive but not grow. If the changes are evolutionary developmental changes the firm is likely to grow. This supports this study’s attention on array of resources that are perceived as critical in the start-up process and their presence in the environment.

Brush et al. (2001) studied two case firms, Palm Computing and Handspring, and explored resources’ role in new venture creation. They introduced the concept of a resource base that needs to be constructed at the launch of a new firm. For their purpose they categorized resources in to six types: (1) human, (2) social, (3) financial, (4) physical, (5) technology, and (6) organizational. When studying the case firms, which were founded by the same founders, they identified four initial resource challenges that the entrepreneurs faced: (1) assembling, (2) attracting, and (3) combining various resources, and (4) transforming personal resources into organizational ones. Their study will provide guidance for our case study analysis.

### *Summary*

Resource-based view of the firm has become a central theory in strategic management (Penrose, 1959; Amit and Schoemaker, 1993; Alvarez and Busenitz, 2001). Since its introduction many concepts have emerged that can be seen as derivatives of the resource-based view of the firm: i.e. knowledge-based view of the firm (Grant, 1996), core competence (Hamel and Prahalad, 1994), and dynamic capabilities (Teece et al., 1997). Resource-based view of the firm has also gained a significant role in entrepreneurial research. Entrepreneurship is often described as acquiring, combining, and assembling of critical resources, which make up the firm (Stevenson and Gumbert, 1985; Katz and Gartner, 1988; Winborg and Landström, 2001; Bergmann Lichtenstein and Brush, 2001; Kelley and Rice, 2001). Resources and

capabilities are also commonly held as sources of competitive advantage. Some studies have focused on resources' role in the entrepreneurial process (Bergmann Lichtenstein and Brush, 2001; Winborg and Landström, 2001; Kodithuwakku and Rosa, 2002). Furthermore, some studies have touched the issue of resource availability in the context of new ventures (Bruno and Tyebjee, 1982; Bruton and Rubanik, 2002; Westhead et al., 2001). However, it has not been studied extensively how resource availability, especially perceived resource availability affects entrepreneurial behavior of an individual, the nascent entrepreneur. It is expected here that resource availability has a positive influence on entrepreneurial intentions.

### **2.1.3 Individual characteristics in entrepreneurship**

Entrepreneur, the individual has naturally been an interesting object for researchers in the field of entrepreneurship and new venture creation. In Gartner's (1985) framework for new venture creation there were three personal characteristics variables in the individual dimension: need for achievement, locus of control, and risk taking propensity.

In the early 1960's researchers were interested in the psychological aspects of entrepreneurship. McClelland (1961) defined the entrepreneur as a person who is "the man who organizes the firm (the business unit) and/or increases its productive capacity". He based this assumption on a belief that there are psychological characteristics that make a person more prone to becoming an entrepreneur. His argument was that a person with high need for achievement translates this trait into economic development. His definition of an entrepreneur was relatively broad; he considered a salesman, a management consultant, a fund-raiser, and an officer of a large company as an entrepreneur. McClelland's (1961) need for achievement became one of the most cited characteristics of entrepreneurs. Roberts (1991) found that MIT entrepreneurs had often "inventor" personality, had moderate need for achievement and low need for affiliation. They also had had a long desire for their own business and heavy orientation toward independence as well as search for overcoming challenges, and less concern for financial rewards. There is also a lot of criticism concerning the achievement motivation approach (Brockhaus, 1982; Gasse, 1982; Gartner, 1988) because the need for achievement measure was not able to make any difference between corporate managers and entrepreneurs.

According to the locus-of-control theory, which was introduced by Rotter (1966), an individual perceives the outcome of an event as being either within or beyond his personal control and understanding. Rotter argued that need for achievement is related to the belief in internal locus-of-control. There is significant evidence that such a relationship exists and also that it correlates positively with entrepreneurship (Shapero, 1975; Brockhaus, 1975; Borland, 1974).

Several researchers have studied risk-taking in entrepreneurship (e.g. Palmer, 1971; Liles, 1974; Hull et al., 1980; Mancuso, 1975). Brockhaus (1980) defined the propensity for risk-taking as the perceived probability of receiving the rewards associated with success of a proposed venture, which is required by an individual before he will subject himself to the consequences associated with failure; the alternative situation provides fewer rewards as well as less severe consequences than the proposed venture. However, he did not find any significant differences between entrepreneurs and managers regarding risk-taking propensity.

The concept of entrepreneurial alertness was originally introduced by Kirzner (1973, 1979). It assumes that entrepreneurship involves the discovery of opportunities and the resources to exploit them as the economy moves towards equilibrium. Thus information and information-seeking behavior form the central part of entrepreneurial alertness. Gaglio and Katz (2001) defined entrepreneurial alertness as a distinctive set of perceptual and information-processing skills related to entrepreneurial opportunity identification. Entrepreneurial alertness is closely related to opportunity recognition and perception and it links personal characteristics to Gartner's (1985) framework's process dimension.

In the early 80's the entrepreneurial research, which focused on personal characteristics of the entrepreneur, the 'trait line' of research began to loose ground when more studies appeared showing no correlation between personal traits such as need for achievement and entrepreneurial behavior (e.g. Gartner 1988). Cognitive self-regulation was found to be a more reasonable basis for explaining entrepreneurial behavior and approaches building on cognitive aspects and reasoned action began to emerge in the field of entrepreneurial research. Since then Ajzen's (1991) theory of planned behavior and Shapero's (1982) concept of the entrepreneurial event have gained wide support in explaining entrepreneurial behavior.



The theory of planned behavior (Ajzen, 1991) has been successfully applied in predicting intentions to perform behaviors. Ajzen's theory predicts intentions from attitudes toward the behavior, subjective norms, and perceived behavioral control. These intentions, together with perceptions of behavioral control account for considerable variance in the actual behavior. The theory builds on cognitive self-regulation as an important aspect of human behavior. The theory of planned behavior has in many respects replaced the entrepreneurial trait approach, which has indicated low empirical relations with behavior in specific situations. The theory of planned behavior has been applied in several different disciplines. Teo and Loosemore (2001) studied waste reduction for environmental and economic reasons in construction industry applying Ajzen's theory of planned behavior. Tonglet (2002) studied shoplifting as a specific type of consumer behavior using this theory. Harrison (1995) tested Ajzen's theory in explaining motivation and decision making to attend volunteer work in a homeless shelter. It has also been used for several other purposes: explaining consumer behavior, problem drinking, losing weight etc.

The theory of planned behavior is an extension of the theory of reasoned action (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). The focus of the theory is on the individual's intentions to perform a given behavior. A prerequisite for this is that the behavior in question is under individual's volitional control. An important aspect of the theory is that the behavior is also dependent on such non-motivational factors as availability of requisite opportunities and resources (e.g. time, money, skills, cooperation of others etc.). These factors represent people's actual control over the behavior. Of greater psychological interest than actual control, however, are the perceived behavioral control and its impact on intentions and actions. It is important to distinguish perceived behavioral control from internal locus of control (Brockhaus, 1975). Another concept, perceived self-efficacy (Bandura, 1977) for its part is relatively close to perceived behavioral control and can be seen as compatible with it. Perceived self-efficacy refers to a person's ability to exercise control over the quality and nature of one's life.

According to the theory of planned behavior, perceived behavioral control, together with behavioral intention, can be used to directly predict behavioral achievement. In order to predict intentions Ajzen's (1991) theory introduces three conceptually independent determinants of intention: attitude toward the

behavior, subjective norm and perceived behavioral control. Perceived behavior control refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles. It is noteworthy that perceived behavioral control affects behavior both through intentions and directly as shown in Figure 2-3. The direct effect (the dotted line in Figure 2-3) is based on perceived behavioral control's moderating role in the realization of intentions into a behavior. Attitude toward the behavior refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question. Subjective norm refers to perceived social pressure to perform or not to perform the behavior (Ajzen, 1991).

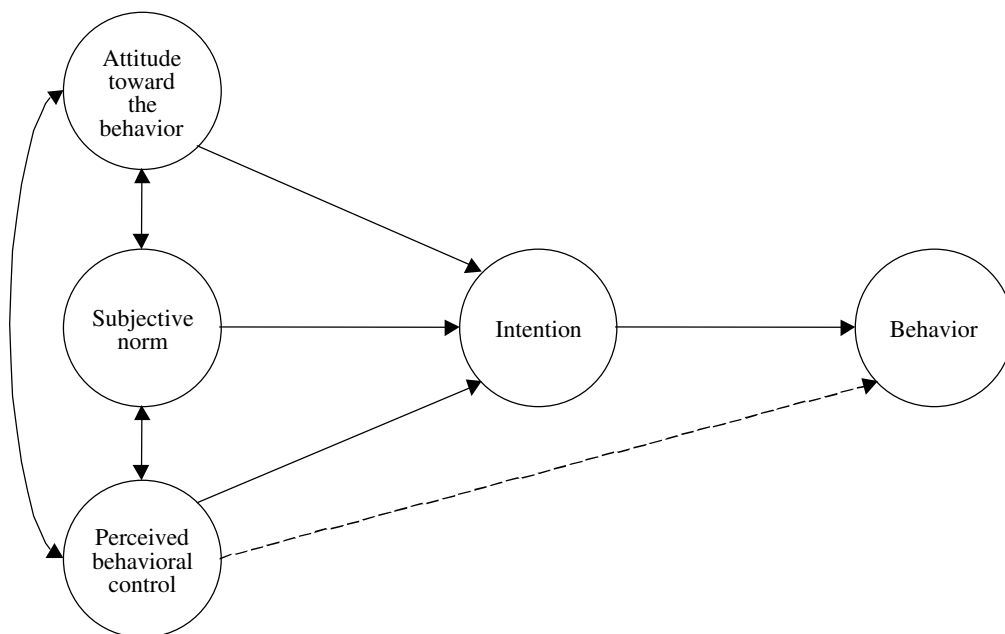


Figure 2-3. Theory of planned behavior (Ajzen, 1991)

Building on cognitive, information-processing approach Ajzen (1991) ties the antecedents of intentions with beliefs about respective objects. In case of attitude toward the behavior an estimate of the attitude can be obtained by a summative index of salient beliefs linked with the behavior. Subjective norm is related to salient referents of an individual and their approval or disapproval of performing a given behavior and to one's belief in the likelihood of that. The third antecedent of intention, perceived behavioral control deals with the presence or absence of requisite resources and opportunities. The more resources and opportunities individuals believe they possess, and the fewer obstacles or impediments they anticipate, the greater should be their perceived control over the behavior.

Ajzen's (1991) theory of planned behavior has gained popularity in entrepreneurial research. Autio et al. (2001) studied entrepreneurial intentions among university students in Scandinavia and in the U.S.A. applying theory of planned behavior. The goal was to develop a model that incorporates situational variables, reflected in perceived social norm, which can be manipulated through policy intervention. Apart from friends and family, social norm is reflected in the institutional environment in which the individual operates. In this case the university constitutes such an institutional environment through which students pass on their way toward working life. The study of Autio et al. (2001) reports strong positive correlation between attitude, perceived behavioral control and intentions. This demonstrates the robustness of the entrepreneurial intent model in different cultural environments. Another cultural specific study was that of Kolvereid's (1996) concerning employment status choices among Norwegian undergraduate students, where Ajzen's (1991) theory was applied. He studied employment status choice of Norwegian students, defined as the intention to enter an occupation as a wage or salaried individual or as a self-employed one. In his study the theory of planned behavior also predicted reliably employment status choices.

Another approach to entrepreneurial intentions was initiated by Shapero and Sokol (1982) when they introduced the concept of the entrepreneurial event, which they defined as having the following characteristics:

1. Initiative taking  
An individual or group takes the initiative
2. Consolidation of resources  
An organization is formed or restructured to accomplish some objective
3. Management of the organization by those who took the initiative
4. Relative autonomy  
Resources are disposed of and distributed with relative freedom
5. Risk-taking  
The organization's success or failure is shared by the initiators.

By this concept Shapero and Sokol (1982) wanted to make a distinction between the entrepreneurial event and the entrepreneur, and to focus on the phenomenon of entrepreneurial event apart from the individuals behind it. They also suggest a paradigm explaining how group membership and social as well as cultural environment affect the entrepreneurial event. Perceptions of desirability and feasibility are products of cultural and social environments and are argued to make an individual to determine which actions will be seriously considered and subsequently taken. Perception of desirability affects the entrepreneurial event through individual value systems and is dependent on the social system the individual is part of (family, peer groups, ethnic groups, educational and professional contexts). Concerning perceived feasibility Shapero and Sokol (1982) refer to availability of financial support and to would-be partners. Would-be partners may pull a nascent entrepreneur into the act by providing funding, moral support, labor, a necessary skill and perhaps shared risk. In fact, this appears to be related to social capital in resource acquisition (Birley 1985; Honig, 1998; Baron & Markman, 2002). Social capital is discussed more detailed in chapter 2.1.4.

Shapero's concept of the entrepreneurial event was developed further by several researchers. Bird (1988a) wanted to differentiate entrepreneurship from strategic management and in doing so she presented a framework where intentions of an entrepreneur are main drivers, which shape the form and direction of an organization at its inception. Intentions have an impact on action and are preceded by both rational and intuitive thinking. Rational thinking involves formal business plans, opportunity analysis, resource acquisition, goal setting, and most observable goal-directed behavior. Intuitive thinking is mostly inspired by vision, hunch, an expanded view of untapped resources, and a feeling of the potential of the enterprise.

When introducing her model of entrepreneurial intentions Bird (1988b) argued that entrepreneurship refers to the intentional creation or transformation of an organization for the purpose of creating or adding value through organization of resources. She also stated that no entrepreneurs begin or buy an existing business by accident or because someone tells them to – they choose this career alternative.

Boyd and Vozikis (1994) revised Bird's model describing the contexts of entrepreneurial intentionality by including the concept of self-efficacy as a

means of explaining both the development of entrepreneurial intentions and the conditions under which these intentions may be translated into action.

Krueger (1993) also developed Shapero's entrepreneurial event concept further when studying prior entrepreneurial exposure's impact on entrepreneurial intentions. He treated prior exposure as an exogenous factor, which affects intentions through attitudes, perceived desirability and feasibility. Two different dimensions were used to define entrepreneurial experience: breadth and positiveness. The study, which was conducted using 126 university students graduating in near future as the sample, reported that prior exposure's breadth was positively associated with perceived feasibility and positiveness of it with perceived desirability. In addition to this the results clearly confirmed the correlation of perceived feasibility, perceived desirability and propensity to act with entrepreneurial intentions promoted by Shapero's (1982) model. Krueger (1993) also suggests that intentions-based framework offers a mechanism to assess the relative impact of various hypothesized exogenous influences like perceived resource availability.

Roberts (1991) studied 129 entrepreneurs that had 'spun out' from Massachusetts Institute of Technology (MIT) to gain insight into the personal characteristics of entrepreneurs in the field of technology. He also used a control group of 372 individuals put together of MIT staff and faculty. Roberts (1991) found that family background affects children's entrepreneurial development through parents' entrepreneurial occupation or achievement-oriented religious background. Typical education was Master's degree, usually in engineering and typical age was mid-30's at the founding of a firm. Entrepreneurs had typically over ten years of work experience in development work (rather than in research work), they were usually productive technologists with supervisory responsibilities and challenged as well as satisfied with their work in the "source organization".

Krueger and Dickson (1994) studied how perceived self-efficacy affects opportunity recognition in a corporate environment and they found that subjects who are led to believe that they are very competent at decision making see more opportunities in a risky choice and take more risks. Respectively those who are led to believe that they are not very competent see more threats and take fewer risks. Krueger and Dickson (1994) point interestingly out that actual skills and resources have little to do with manager's behaviors and decisions. Instead, they argue that it is the perception of the situation and

perceived competence to control processes and outcomes that affect the managerial behavior. They also suggest that perceived self-efficacy should be nurtured and intentionally built in order to facilitate opportunity recognition.

Krueger and Brazeal (1994) discussed antecedents of entrepreneurial potential and proposed a model based on Ajzen’s theory of planned behavior and Shapero’s model of the entrepreneurial event. They looked at the issue from both corporate venturing and enterprise development perspectives. By combining these two concepts they came up with a model, which contains three critical constructs: perceived desirability, perceived feasibility and propensity to act (Figure 2-4).

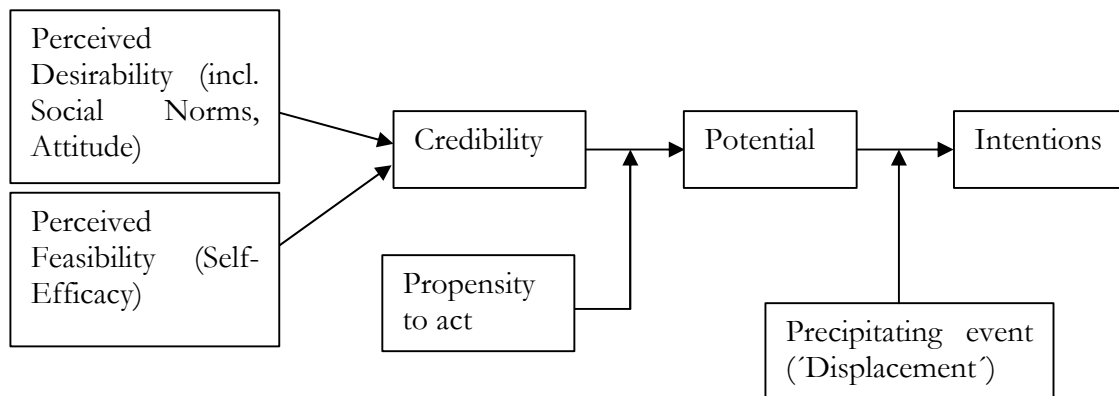


Figure 2-4. Simplified model of entrepreneurial potential (Krueger and Brazeal, 1994).

Building on this model Krueger and Brazeal (1994) present practical implications for promoting entrepreneurship. They drew attention on environment and described what they call a ‘nutrient-rich’ environment for potential entrepreneurs, which provides credible information, credible role models, and emotional / psychological support as well as more tangible resources. They also state that the environment should provide opportunities to attempt innovative things at a relatively low risk. They also emphasized the meaning of perception; what prospective entrepreneurs perceive is often more important than the seemingly objective reality. The role of the surrounding community and its supporting attitude is important to increase desirability of entrepreneurship. It is also crucial to make resources available and visible as well as to communicate success stories for providing role models to increase feasibility of entrepreneurship.

Krueger (2000) presents a further developed intention-based model of entrepreneurial activity when discussing opportunity emergence and

opportunity perception within corporations. The model is illustrated in Figure 2-5.

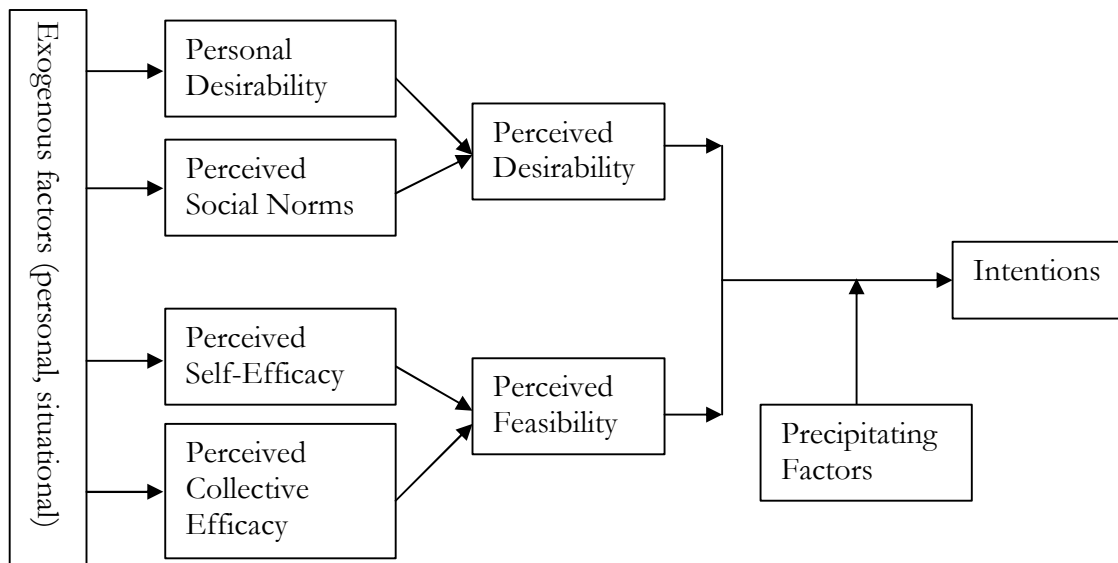


Figure 2-5. Intention model by Krueger (2000)

In his model Krueger introduces exogenous factors in addition to precipitating factors. He describes exogenous factors as situational and personal variables, which operate indirectly on intentions and behavior. For example, the presence of role models may increase entrepreneurial behavior if the role models actually change a key attitude such as self-efficacy. Some exogenous factors may also affect the intention-behavior relationship by precipitating, or facilitating the realization of intentions. For example, perceptions of resource availability may be a precipitating factor. Also some sort of displacement, a disruption in one's inertia such as getting fired or being offered a big contract may constitute a precipitating factor.

Chrisman (1999) used data from a study of the U.S. Small Business Development Center program to find out how outsider assistance and geographic location affect the relationship between entrepreneurial intentions and venture creation. His hypotheses derive from resource-based theory of the firm and he suggests that outsider assistance leads to the development of tacit knowledge, which is useful in a start-up and that geographic locations differ in critical knowledge resources available to entrepreneurs. Adopting the intention-based model of entrepreneurship based on the work of Shapero (1982) and Ajzen (1991), and which was further developed by Krueger and Carsrud (1993). Chrisman focuses on exogenous factors, which affect attitudes toward entrepreneurship which, in turn, significantly affect entrepreneurial

intentions. He applied the resource-based view of the firm to operationalize exogenous factors that influence the entrepreneurial decision. According to Chrisman the most important exogenous factors are those, which represent either the development or availability of resources required for a competitive advantage. Using this theoretical framework he explains how outsider-generated knowledge and different geographical locations affect positively the entrepreneurial process. Concerning geographical locations his argument is that it affects the process through differences in resource availability.

Finally, Krueger et al. (2000) brought Ajzen's theory of planned behavior and Shapero's model of the entrepreneurial event together and compared them by employing a competing models approach, comparing the regression analysis results of the two models. Their sample comprised of 97 senior university business students facing important career decisions. For their purposes Krueger et al. described Ajzen's theory as illustrated in Figure 2-6.

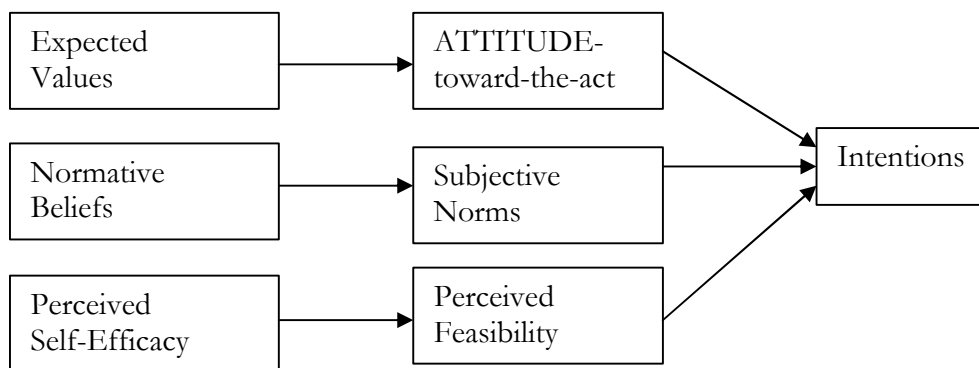


Figure 2-6. Ajzen's Theory of Planned Behavior modified by Krueger et al. (2000)

Respectively Shapero's model of the entrepreneurial event is illustrated in Figure 2-7.

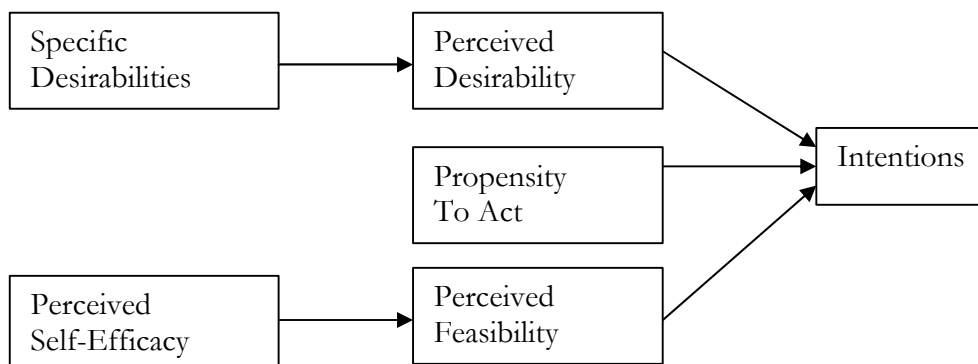


Figure 2-7. Shapero's Model of the Entrepreneurial Event modified by Krueger et al. (2000)

The data retrieved from the sample supported both models. Only the



construct of subjective norms in Ajzen's (1991) model was not supported by the data. The conclusion is that both models offer researchers a valuable tool for understanding entrepreneurial behavior the Shapero (1982) model being statistically slightly superior in explaining entrepreneurial intentions.

Krueger et al. (2000) also discussed the impact of exogenous factors on entrepreneurial process and decision making. They argued that intention-based models offer mechanisms to assess relative impacts of exogenous influences, for example, perceptions of resource availability.

### *Summary*

A significant amount of entrepreneurial research and research on new venture creation focuses on the individual, the entrepreneur. During the early days of entrepreneurial research the so-called trait line of research was dominant. It draws on the personal characteristics of the individual trying to establish a relationship between personal characteristics and entrepreneurial activity and behavior. However, researchers were not able find enough evidence to support this theory and it was gradually replaced by other theories, e.g. Shapero's (1982) concept of the entrepreneurial event and Ajzen's (1991) theory of planned behavior. However, there are concepts of entrepreneurial characteristics that are still relevant, e.g. locus-of-control, entrepreneurial alertness, and propensity to act. These personal characteristics affect individual's attitudes toward entrepreneurship and entrepreneurial behavior. Prior experiences and family background do also affect entrepreneurial behavior (Roberts, 1991; Krueger, 1993).

Ajzen's (1991) theory of planned behavior has emerged as a widely supported framework for studying entrepreneurial intentions and entrepreneurial behavior. It can be seen as having replaced the so-called trait line of entrepreneurial research. Another widely used approach to entrepreneurial intentions and behavior is Shapero's (1982) concept of the entrepreneurial event. This concept was refined by several researchers (Bird, 1988b; Boyd and Vozikis, 1994; Krueger, 1993; Krueger and Brazeal, 1994, Chrisman, 1999) and a clear path of evolution can be seen in the development of Shapero's concept. Along the way it actually approaches Ajzen's theory of planned behavior. Krueger et al. (2000) finally paralleled these two concepts and found them compatible (Table 2-2).

Table 2-2. The development of entrepreneurial intention concepts.

<i>Author</i>	<i>Contribution</i>	<i>Focus</i>
Ajzen (1991)	Theory of planned behavior	Individual
Shapero (1982)	The entrepreneurial event, initial intention model	Process
Bird (1988)	Revised intention model	Individual
Boyd and Vozikis (1994)	Revised intention model	Individual
Krueger (1993, 1994, 2000)	Applying and testing intention models	Individual, process
Krueger et al. (2000)	Comparing Ajzen's theory of planned behavior and Shapero's entrepreneurial event concept	Individual

The literature reviewed here offers several usable concepts that tie in with Gartner's (1985) conceptual framework for new venture creation. The discussed concepts link several variables of the framework together in an operational way that serves the purposes of this study. The most significant contribution is provided by the intention models, which link the individual and the environment. It is assumed here that applying intention models will produce findings that have practical policy implications for promoting entrepreneurship.

#### **2.1.4 Social capital**

The concept of social capital has received a lot of attention during the past few years. It emerged originally in sociological research focusing on community and family relationships (Jacobs 1961, Granovetter 1973). Later Granovetter (1985) introduced the concept to economic research and criticized that much of the new institutional economics at that time was crudely functionalist because the existence of an economic institution is often explained merely by the functions that it performs for the economic system and social relationships' impact had been ignored. Coleman (1988) paralleled social capital with the fundamental concepts of financial capital, physical capital and human capital. He argued that just as physical capital and human capital facilitate productive activity, social capital does that as well.

Coleman (1988) introduced three forms of social capital: obligations and

expectations, information channels, and social norms. By obligations and expectations he refers to the trustworthiness of the social environment, which means that obligations will be repaid, and the actual extent of obligations held. He also talks about ‘credit slips’ that symbolize the sort of debt that one owes to another after having received a favor from the other. By information channels he means the network of social relations that provide individuals with sources of information in a cost-effective fashion. Social norms refer to norms and sanctions that effectively guide human behavior by rewarding some forms of behavior and sanctioning others.

The central proposition of social capital theory is that networks of relationships constitute a valuable resource for the conduct of social affairs, providing their members with “collectivity-owned capital, a ‘credential’ which entitles them to credit, in the various senses of the word” (Bourdieu, 1986). In their study Nahapiet and Ghoshal (1998) introduced three dimensions of social capital: the structural, the relational, and the cognitive dimensions of social capital. By structural dimension of social capital they refer to the overall pattern of connections between actors – that is, who you reach and how do you reach them. The relational dimension of social capital refers to those assets created and leveraged through relationships. This aspect is close to Coleman’s (1988) norms and sanctions as well as to Granovetter’s (1985) obligations and expectations. The third dimension, the cognitive dimension of social capital, refers to those resources providing shared representations, interpretations, and systems of meaning among parties.

Nahapiet and Ghoshal (1998) also argued that social capital facilitates the creation of new intellectual capital and that organizations as institutional settings are conducive to the development of high levels of social capital and furthermore these two forms of capital together create an organizational advantage for the firm. By intellectual capital they refer to the knowledge and knowing capability of a social collectivity, such as an organization, intellectual community, or professional practice. Their reasoning is based on the belief that social capital significantly facilitates exchange and combination of knowledge, which enables the creation of intellectual capital.

Nahapiet and Ghoshal (1998) tie the theory of social capital to the resource-based view of the firm. They argue that the different dimensions of social capital together with its interrelationship with intellectual capital capture all of the attributes of those resources that make up the competitive advantage (rare,

hard to imitate, durable, nontradable etc.). Building on this proposition they suggest that differences between firms, including differences in performance, may represent differences in their ability to create and exploit social capital.

Nahapiet and Ghoshal (1998) conclude by defining social capital as the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or a social unit. Social capital thus comprises both the network and the assets that may be mobilized through that network.

Adler and Kwon (2002) give a compact definition for social capital: it is the resource available to actors as a function of their location in the structure of their social relations. In defining social relations they distinguish conceptually among three dimensions of social structure, each rooted in different types of relations: (1) market relations, in which products and services are exchanged for money or bartered, (2) hierarchical relations, in which obedience to authority is exchanged for material and spiritual security, and (3) social relations, in which favors and gifts are exchanged. The third type of relationship constitutes the dimension of social structure underlying social capital.

Cohen and Fields (1999) have looked at social capital in the context of Silicon Valley. Contrasting some of the fundamental propositions concerning social capital (e.g. Putnam, 1993) they exhibit significant differences in the social capital discovered behind the success of Silicon Valley. They refer to Silicon Valley as “a world of strangers where nobody knows anybody else’s mother, where there’s neither deep history nor any kind of structured community”. It is built on totally different kind of social capital, which is embedded in collaborative partnerships that are pursuing objectives related to innovation and competitiveness. The only thing common between these networks of innovation and the networks of civic engagement is the network-like structure. Again, trust is a very central component in the Silicon Valley’s particular brand of social capital.

In their study concerning the way in which social capital affects the internal functioning of firms, and how social capital contributed to a firm’s ability to create value in the form of innovations Tsai and Ghoshal (1998) found that social capital facilitates value creation at both the dyadic and the business levels. It has significant effects, directly and indirectly, on resource exchange

and combination, which is associated with product innovation.

There has also been some criticism against the concept of social capital. Woolcock (1998) claimed that “social capital’s revisionist grounding in different sociological traditions risks trying to explain too much with too little.” Furthermore he questions whether social capital is the infrastructure or the content of social relations which leaves behind the problematic task to distinguish between the sources of social capital and the benefits derived from them. Another concern emanating from the above mentioned is that social capital can justify contradictory public-policy measures, which may explain in part why it has been seized upon by advocates from all points on the political spectrum. For example there is social capital literature that promotes re-establishing of mediating structures (e.g. local civic associations) to support emergence of social capital (Putnam, 1995). Again some conservatives argue that state intervention is inversely proportional to a society’s endowment in social capital (Woolcock, 1998). Adler and Kwon (2002) argue that social capital is still in the “emerging excitement” phase of the life cycle typical of an umbrella concept trying to catch all.

Despite of the criticism it is relatively evident that social capital is a concept with significant relevance when the entrepreneurial process is concerned. Schumpeter (1934) defined entrepreneur as an innovator who combines resources in new ways, which creates new sources of value. Nahapiet and Ghoshal (1998) demonstrated that social capital facilitates resource combination through exchange. Therefore it is quite indisputable that social capital affects entrepreneurial process positively. Davidsson and Honig (2002) studied a group of nascent entrepreneurs and explored how human capital and social capital affects opportunity discovery and opportunity exploitation. Especially bridging social capital, which links different organizations together through weak ties, appears to have significant relevance in later phases of the entrepreneurial process (Davidsson and Honig, 2002).

Several studies report that social capital contributes significantly to resource acquisition of entrepreneurs and of new ventures (Birley 1985; Honig, 1998; Baron & Markman, 2002). Jarillo (1989) talks similarly about networking as a system by which entrepreneurs can tap resources that are “external” to them, i.e. which they don’t control. Baron and Markman (2000) make a profound statement that social capital – especially social skills – make significant difference in entrepreneurial success. They argue that high level of social

capital, built on a favorable reputation, relevant previous experience, and direct personal contacts, often assists entrepreneurs in gaining access to venture capitalists, potential customers, and others. They also suggest that social skills can be trained and thus contribute to social capital.

### *Summary*

The theory of social capital emerged in the 1960's and since then it has gained increasing attention. Despite of the criticism concerning the ambiguity of the concept it seems quite indisputable that the concept of social capital retains salient relevance concerning research on new venture creation. Drawing on the theory of social capital several aspects of entrepreneurship can be explained: e.g. success, international growth, financial success, resource acquisition, and opportunity perception.

Perhaps the most significant contribution of social capital theory to entrepreneurship research is associated with resources and resource acquisition. Social capital theory links entrepreneurship and the resource-based view of the firm together offering an avenue to explore significant aspects of resource acquisition at early stages of new venture creation. Social capital has a clear relationship with resource availability (e.g. Adler and Kwon, 2002) and thus it brings in an important dimension when the connections between environment, resource availability and entrepreneurial intentions are explored. The theory of social capital enlightens how different elements of Gartner's (1985) framework depend on the social environment. This is especially interesting in the case of different resource-related variables of the framework, where the social capital concept explains how resource availability is depending on the social environment and respective processes. This will contribute to our understanding how the social context relates resource availability in new venture creation.

### **2.1.5 Population ecology theory**

The theory of population ecology (Hannan and Freeman, 1977; Aldrich, 1979) focuses on populations of organizations and sheds light to organization-environment relations. Hannan and Freeman (1977) were inspired by the question "Why are there so many kinds of organizations?" Drawing on natural ecology they argued that instead of single organizations, the populations of organizations should be focused on when studying the relationship between organizations and environment. They built their somewhat Darwinistic view

on human ecology (Hawley, 1968) and extended it by using competition models to specify the process that produces isomorphism between organizational structure and environmental needs and also by using the niche theory to extend the problem to dynamic environments. By niche theory they refer to a constraint space in which the population outcompetes all other local populations. Niche width, i.e. population's fitness with the environment vs. environmental variation represents populations ability to survive environmental changes and on the other populations' ability to exploit environmental resources; in other words specialism vs. generalism.

One of the central themes in population ecology is the process of selection. According to Hannan and Freeman (1977) much of the management literature approaches the issue of organization-environment interaction from adaptation perspective. Firms or usually the managers of the firms scan the relevant environment for opportunities and threats, formulate strategic responses, and adjust organizational structures appropriately. Because of the various different inertial pressures that hamper firm's ability to adapt, Hannan and Freeman (1977) propose that the adaptation perspective must be supplemented with a selection orientation.

The population ecology model involves a notion that available resources at any moment for each form of organization are finite and fixed. Another view incorporated in the model is that the rate at which units are added to populations of organizations depends on how much of the fixed capacity has already been exhausted.

Even though the organizational population ecology concept was not originally concerned about entrepreneurship or new venture creation many of its contributions are relevant in this regard. Aldrich (1990) suggested that theories of entrepreneurial behavior or the founding of organizations should (1) give more attention to the environment's carrying capacity for organizations; (2) emphasize other organizations as part of the environment that affects new firms; (3) consider the interdependence of organizations in the host society; and (4) attend to the sequence of events associated with organizational foundings, particularly at different stages of the population life course. It is also suggested that researchers on entrepreneurship should (5) give more attention to the unique strategies developed by firms specializing in different industries (or populations) during the early years of the population life course; (6) work together in teams to build longitudinal community-based samples of

organizational populations; and (7) develop more comprehensive panel studies (multiple measures over time) of entrepreneurial behavior. Reynolds (1991) studied entrepreneurship from the viewpoint of sociology reflecting several different concepts. When organizational populations are concerned his conclusion was that new organizational foundings are depressed by a growing population of competitors. Hammers Specht (1993) also discussed this and argued that environment's carrying capacity is related to the density or number of organizations competing for the same resources in a niche. Density is determined by prior births and deaths in an organization's population.

Following population ecology framework Pennings (1982b) studied different urban environments in the U.S. and their organizational birth frequencies. He found that birth frequencies of new firms, organizations in three selected industries (plastics, telecommunication equipment, and electronic components) were related to attributes of the urban ecology and the abundance of socioeconomic resources. The results showed that organizational as well as occupational and industrial differentiation, the percentage of immigrants, the size of relevant industry, the size of the urban area, the availability of financial resources, and, to a lesser extent, the presence of universities were most critical for predicting the creation of new organizations. The summary concerning the theory of population ecology is presented in the next chapter together with the summary of the resource dependence theory.

### **2.1.6 Resource dependence theory**

Another theoretical approach concerning the relationship between environment and the firm is the resource dependence concept (Pfeffer and Salancik, 1978). It views organizations as resource-dependent on their external environment. Organizations need resources and in order to obtain resources that they don't possess yet they have to interact with other organizations, which control those resources. Hence they become dependent on their environment. Pfeffer and Salancik (1978) characterize the environment in terms of six constructs: (1) concentration – the extent to which power and authority in the environment are widely dispersed; (2) munificence – the availability or scarcity of critical resources; (3) interconnectedness – the number and pattern of linkages among organizations; (4) conflict – disagreement about the goals of the social system, (5) interdependence – the degree to which one organization influences the others; and (6) environmental uncertainty – the degree to which the future can be accurately predicted.



Pfeffer and Salancik (1978) illustrate the interplay with these constructs as shown in Figure 2-8.

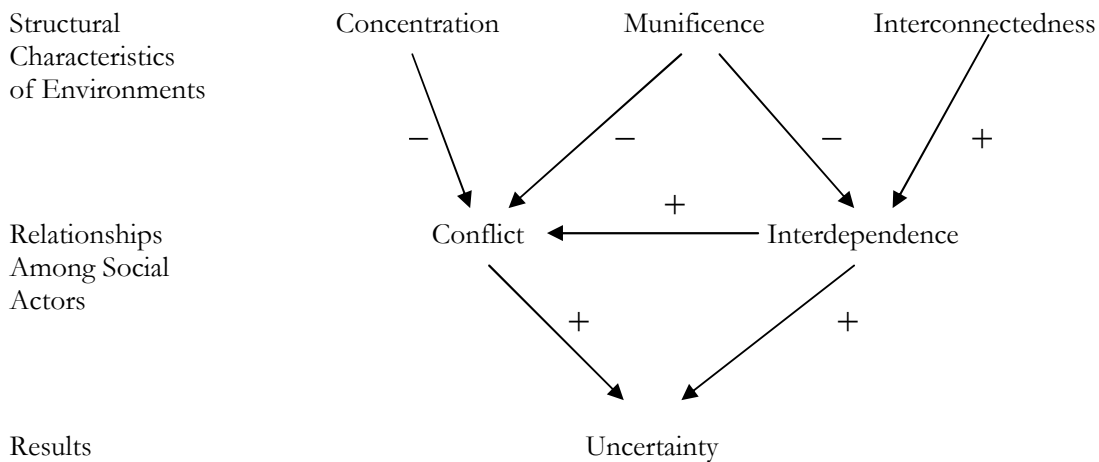


Figure 2-8. Relationships among dimensions of organizational environments (Pfeffer and Salancik, 1978)  
 (- ⇒ decreases, + ⇒ increases)

Castrogiovanni (1991) defined environmental munificence as the scarcity or abundance of critical resources by (one or more) firms operating within an environment. Resource dependence approach has often been adopted when studying the relationship between the environment and new venture creation. Romanelli (1989) came to a conclusion that given sufficient availability of resources, founders will emerge. The resources available within an environment influence the survival and growth of firms sharing that environment; they also affect the abilities of new firms to enter this environment (Romanelli, 1991). Hammers Specht (1993) proposes a model, which establishes a relationship between environmental munificence, carrying capacity, and rate of organization formation. She assumes that there is a positive relationship between environmental munificence and carrying capacity, and when munificence together with carrying capacity increases, the formation rate increases. Furthermore, she suggests that when resources become used, the carrying capacity decreases and, subsequently, the formation will decrease as well. Interestingly, Hammers Specht (1993) states that there may be possible intervention methods for affecting formation rates, such as an infusion of additional resources.

Drawing on the resource dependence concept Bruno and Tyebjee (1982) argued that the more munificent an environment, the greater the access a new firm will have to its resources. However, existing competitors in the same

environment may make the market difficult to enter. Based on the six constructs characterizing the environment by Pfeffer and Salancik (1978) Bruno and Tyebjee (1982) define the impact of the environment on start-up outcomes as illustrated in Figure 2-9. By start-up outcomes they refer to number of start-ups, equity and legal structure of start-ups, and the scale of start-ups. Start-up outcomes are positively affected by environmental munificence, interconnectedness, and uncertainty. Interdependence between organizations affects start-up outcomes negatively.

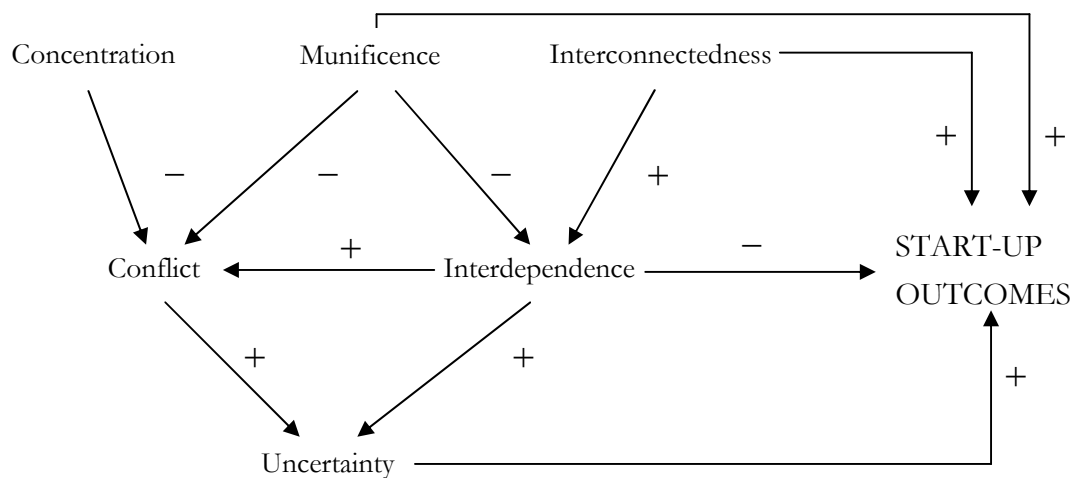


Figure 2-9. The impact of the environment on start-up outcomes (Bruno and Tyebjee, 1982).  
 (- ⇒ decreases, + ⇒ increases)

The concepts of resource dependence and population ecology actually come quite close together. Pennings (1982a) has paralleled these two approaches (his term for resource dependence is resource-exchange) and lists some key differences between them (Table 2-3). In the resource dependence concept organizations can be seen as adaptive to their environments whereas the population ecology framework treats organizations as passive and reactive agents that get selected by the environment and subsequently survive or die.

Table 2-3. Two frameworks for entrepreneurial environments (Pennings, 1982a).

<b>Resource-exchange</b>	<b>Population-ecology</b>
Acts of the entrepreneur are primarily volitional.	Acts of the entrepreneur are predominantly deterministic.
The entrepreneur makes strategic choices to secure the best transactions with the environment.	The entrepreneur's choice are predicated and molded by the industry.
The environment is a pool of resources which the entrepreneur selects and acquires to establish his venture.	The environment is a set of influences which selectively permit some ventures to survive.
The entrepreneur masters fate and makes strategic choices to minimize threats and exploit opportunities.	The entrepreneur is an exponent of environment and an instrument of economic development.

Pennings (1982a) argues that when asking what makes some environments more prone to entrepreneurial vigor than others, the population-ecology approach is more useful than resource dependence framework.

### *Summary*

Population ecology and resource dependence theories offer a useful approach for studying the environment-organization interaction coherently with Gartner's (1985) conceptual framework for new venture creation. Population ecology concept (Hannan and Freeman, 1977; Aldrich, 1979; Carroll, 1984) views organizations as reactive and passive agents, which will survive environment permitting, i.e. survival is based on environmental selection rather than environmental adaptation. Resource dependence concept (Pfeffer and Salancik, 1978; Boyd, 1990) for its part sees organizations as active, resource-optimizing agents in their environments, which adjust their posture whenever environmental conditions change.

Both concepts, population ecology and resource dependence are significant from entrepreneurship research point of view. Pennings (1982b) have applied population ecology approach in studying organization formation rates in different environments. Bruno and Tyebjee (1982) and Gartner (1985) based their review concerning the role of environment in the new venture creation process on resource dependence approach (Table 2-4). Hammers Specht (1993) brought those concepts together and proposed a model which would establish a relationship between organization formation and environmental munificence and carrying capacity.

Table 2-4. Relevant contributions concerning the theories of population ecology, resource dependence, and entrepreneurship.

<i>Author</i>	<i>Contribution</i>
Hannan and Freeman (1977), Aldrich (1979), Carroll (1984)	Population ecology, organizational ecology
Pfeffer and Salancik (1978)	Resource dependence theory
Pennings (1982a, 1982b)	Population ecology framework applied in organization formation rate
Bruno and Tyebjee (1982), Gartner (1985)	Resource dependence applied in entrepreneurship research
Hammers Specht (1993)	Bringing population ecology and resource dependence concepts together to explain variations in organization formation rate

From the current study's point of view the theories of population ecology and resource dependence are especially interesting. They establish the basic relationship between environment and organization. As an avenue to new organization birth both research streams has also been investigated. Several studies (Bruno and Tyebjee, 1982; Pennings, 1982b; Romanelli, 1989; Kodithuwakku and Rosa, 2002) have reported evidence concerning environment's impact on organization emergence and part of that, naturally, is the emergence of new ventures. The underlying rationale is either available resources that attract new firms to certain environments (resource dependence) or the selection-based approach, where environmental attributes determine the death and birth of firms (population ecology). Pennings (1982b) suggests that future research should combine the motivational and ecological antecedents of entrepreneurship, which actually is one of the goals of this study, to establish a relationship between entrepreneurial intentions and environment's resource availability.

### **2.1.7 Summary of literature review**

Entrepreneurship has been the target of increasing research interest during the past years. The aspiration has been to separate entrepreneurship from the domain of strategic management to be its own field of research. There are several different theories and research areas that contribute to entrepreneurship.

The overarching conceptual framework for this study is the Gartner's (1985) conceptual framework for new venture creation. It ties in all elements of new

venture creation and entrepreneurial activity that are relevant concerning our purposes. Of the four elements of the framework (individual, process, environment, organization) the most important ones in this respect are the individual and the environment. The problem of the framework is that it does not offer any practical means to explore the relationships between different variables that affect new venture creation. The goal of this study is to develop the approach further by applying other compatible concepts to explore the relationships between different variables and to explore how environment affects individual's entrepreneurial intentions and behavior.

Entrepreneurial intentions have emerged as a popular framework for studying entrepreneurship and entrepreneurial activity. They link most of the relevant variables of this study in the Gartner's (1985) framework together in a single operational model. Ajzen's (1991) theory of planned behavior and Shapero's (1982) concept of the entrepreneurial event form the groundwork for the research dealing with entrepreneurial intentions. Several scholars have applied these theories and developed them further. Perhaps the most productive in this respect has been Krueger (1993, 2000; Krueger and Brazeal, 1994; Krueger and Dickson, 1994; Krueger et al., 2000). Entrepreneurial intentions as applied by Krueger will provide the operational concept for this study to explore the role of the environment in entrepreneurial activity and in entrepreneurial behavior.

## **2.2 Key concepts**

### **2.2.1 New, technology-based firm**

In a study about new, technology-based firms in Finland Autio et al. (1989) define a new, technology-based firm (NTBF) as a firm with operations, which are based on exploitation of technological knowledge and capability.

Klofsten (1997) presents a solid and compact definition of the new, technology-based firm:

*A firm whose strength and competitive edge derives from the engineering know-how of people who are integral to the subsequent transformation of this know-how into products or services for a market.*

Autio et al. (1989) define the term technology as the science or knowledge of

skill. The word originates from Greek words 'techne' and 'logos'. The first word "techne" means skill or art and the second word "logos" means knowledge or science. Bush (1981) offers an extensive definition for the term technology:

*Technology is a form of human cultural activity that applies the principles of science and mechanics to the solution of problems. It includes the resources, tools, processes, personnel, and systems developed to perform tasks and create immediate particular, and personal and/or competitive advantages in a given ecological, economic, and social context.*

For the purposes of entrepreneurship research Katz and Gartner (1988) introduce a framework for identifying and selecting new organizations. Their framework consists of four properties of emerging organizations: intentionality, resources, boundary, and exchange. Intentionality refers to the agent's seeking of information that can be applied toward achieving the goal of creating a new organization. In organization creation, resources refer to the physical components (versus informational or ideational components inherent in intention) that combine to form an organization. Boundary is defined as barrier between the organization and its environment. Exchange represents transactions, which are across the borders of subsystems, within an organization, or across the organizational boundary with individuals, the environment, or other organizations.

Salonen (1995) lists some of the most frequently mentioned characteristics associated with technology-based companies:

- Established by a small identifiable nucleus of people
- Independent
- Based on exploitation of new technological resources
- Invests a large fraction of their resources in research and development
- Competes through technological innovation
- Employs people with technical training
- Has good contacts to universities of technology and research centers
- Operates in industries with rapid technological change
- Has short product life cycles due to changing technologies, products and competition
- Produces world market products typically geared at market

niches

- Faces high risk concerning technological success and economic rewards

The list gives a very thorough collection of different characteristics of a new, technology-based firm and provides a suitable definition for a new, technology-based firm for the purposes of this study. However, in this study a somewhat broader definition is adopted, but not all the characteristics listed above are required to make a new firm a technology-based firm. In this study only the following characteristics are defined to make the firm a new, technology-based firm:

- independent, majority of the ownership held by the entrepreneurs
- employs people with technical or natural science education
- competes through technological innovation
- has R&D activities
- originally new business (not e.g. an MBO or acquisition)

This relatively broad definition serves the purpose of this study well because the population of new, technology-based firms is not very large in Finland. The other reason for this is that we want to focus on those new, technology-based firms, where there is an entrepreneur involved and his or her role is crucial.

### **2.2.2 Resources**

The concept of resource is very central in this study and therefore it is essential to define the term as clearly as possible. Penrose's (1959) resource-based view of the firm provides the foundation for the concept of resource used in this study. She defines different categories of resources, which include tangible resources (plant, equipment, land, natural resources, raw materials, semi-finished goods, and waste products) and human resources (unskilled and skilled labor, clerical staff, administrative staff, financial staff, legal staff, technical staff, and finally, managerial staff). An interesting category among Penrose's (1959) categories is that of entrepreneurial resources, which are entrepreneurial versatility, fund-raising ingenuity, entrepreneurial ambition, and entrepreneurial judgment.

Alvarez and Busenitz (2001) extended the resource-based view of the firm by

introducing entrepreneurial recognition as a resource. This concept refers to the ability to identify business opportunities early and based on limited information.

Knowledge is often treated as a resource. In fact, the knowledge-based view of the firm is an extension of the resource-based view of the firm, which is built on the view of knowledge as a resource (Grant, 1997).

Hamel and Prahalad (1994) treated competencies of a firm as critical resources that provide the competitive advantage for the firm. Penrose (1959) defines capabilities as capacity to deploy resources along with organizational processes. Knowledge is also conceived as an asset that creates competitive advantage together with dynamic capabilities, which firms use to alter their resource base, as a source of the competitive advantage (Spender and Grant, 1996; Eisenhardt & Martin, 2000).

A wider definition of the concept resource is adopted in this study. It captures all tangible and intangible issues that are needed to establish a new, technology-based business, which is viable, possesses competitive advantage and has potential for growth and international business operations.

### **2.2.3 Entrepreneurial intentions and entrepreneurial behavior**

The approach in this study is based on the view of entrepreneurship as planned and intentional behavior, not as a conditioned response to a stimulus. Intentions in this context refer to individual's intention to perform a planned behavior. When behavior is difficult to observe, intentions offer an avenue to explore entrepreneurial behavior (Ajzen, 1991). The simple reasoning behind this is that intentions predict behavior and therefore intentions provide a better way to understand the action and the behavior itself (Ajzen, 1991).

Entrepreneurial behavior and entrepreneurial activity are often used as synonyms to refer to the set of actions of an individual that lead to the creation of a new venture. As distinct from entrepreneurial process the concept of entrepreneurial behavior brings the notion of human behavior into the entrepreneurial research.

Erikson (2002) conceives entrepreneurial behavior as the pursuit of opportunities regardless of the resources at hand. He even goes as far as



defining the concept of entrepreneurial capital as the present value of entrepreneurial behavior.

The concept of entrepreneurial behavior is relatively close to entrepreneurship and they can actually be seen as synonyms. In this study the entrepreneurial behavior is conceived as the set of actions of a nascent entrepreneur that form a path towards new venture creation. Again, entrepreneurial behavior in a corporate environment is not included in our definition of entrepreneurial behavior.

#### **2.2.4 Entrepreneurial environment**

In this study we refer with entrepreneurial environment to the regional, physical, psychological, and social environment of the nascent entrepreneur. In Gartner's (1985) four-dimensional framework of new venture creation he brings several topics forward that characterize the surrounding environment of the new venture. These topics include venture capital availability, presence of experienced entrepreneurs, technically skilled labor force, accessibility of suppliers, accessibility to customers and/or new markets, proximity of universities, etc. This list of environmental characteristics was originally presented by Bruno and Tyebjee (1982).

Bruno and Tyebjee (1982) based their approach on the theory of resource dependence (Pfeffer and Salancik, 1978) and actually linked the theory with the domain entrepreneurship for the first time. Building on the theory of resource dependence they state that the more munificent an environment, the greater the access a new firm will have to its resources.

Bruno and Tyebjee (1982) also remind that existing competitors in the same environment may make the market difficult to master. This statement clearly touches the theory of population ecology (Hannan and Freeman, 1977). Bruno and Tyebjee (1982) also make an important remark by saying that we must not ignore the crucial role of the entrepreneur's subjective interpretation when considering the environmental characteristics, i.e. subjective versus objective characteristics of environments.

The concept of entrepreneurial environment is central in studying the impact of the environment on entrepreneurship and entrepreneurial behavior of an individual. By entrepreneurial environment we refer to those environmental

attributes that have an impact on entrepreneurial behavior and that interact with the entrepreneurial process. In fact, this definition of entrepreneurial environment comes relatively close to the concept of innovation environment that has recently been the topic of many discussions and evaluations, especially in Finland (OECD, 2003; Lievonen, 2002). In this study we will apply Gartner's (1985) definition of environment for the entrepreneurial environment (Table 2-1).

### **2.2.5 Affective and rational environmental factors**

In order to operationalize the entrepreneurial environment we categorized the relevant environmental attributes into two different categories: affective factors and rational factors. Affective factors are attributes of the social environment that include social identification, role models, and social norm. Social identification is aimed to capture such notions as how individuals relate themselves to surrounding environment, particularly to the social environment when they perceive themselves as entrepreneurs. Social identification is related to how a person see herself or himself as an entrepreneur, as more appreciated or as less appreciated.

Role models' impact on entrepreneurial behavior has been studied by many researchers and it has been found to correlate significantly with entrepreneurial behavior and intentions (Roberts, 1991; Krueger, 2000). Role models may occur within the family (entrepreneur parents) or within other social contexts. Role models refer to the amount of successful entrepreneurs in the environment that the person knows.

Social norm has been included in many versions of the intention model (e.g. Krueger and Brazeal, 1994; Krueger, 2000). Social norm represents the attitude of fellow-men, like members of the family, colleagues, friends, etc. towards entrepreneurship and entrepreneurial occupation.

Rational factors in the constructed model refer to rational and calculating thinking of individuals. Rational factors include financial expectations, perceived opportunity, and perceived availability of five types of resources: technology-related, financial, social capital, access to market, and human resources. These factors are linked to the environmental variables of the Gartner's (1985) framework for new venture creation. It is again anticipated here that perceptions are important here when the impact of these factors on

entrepreneurial process is concerned.

Financial expectations, i.e. expectations and beliefs concerning the return on investment in entrepreneurial activity, constitute perhaps one of the most relevant issues of the rational factors. It is important to notice that the concepts of financial resources and financial expectations are not connected. Financial expectations refer to wealth creation, which is commonly held as a powerful motivation for all kinds of different individual behaviors (Birley and Westhead, 1994). It is anticipated that also in this context the desire for wealth creation is a significant driver, which affects entrepreneurial intentions through intention model's perceived feasibility. This factor is assumed to be dependent on the given environment. E.g. the taxation of entrepreneurial income, capital gains and dividend varies across different environments, states and countries. Therefore financial expectations can also be linked to environmental attributes.

Opportunity emergence and recognition has been found to be a central phenomenon in the field of entrepreneurship (Eckhardt and Shane, 2003, Krueger, 2000; Krueger and Dickson, 1994; Timmons, 1994; Singh, 2000). Opportunity emergence and respective opportunity perception can be linked to environment (Gnyawali and Fogel, 1994) and it is assumed that it differs from an environment to another. From this study's perspective opportunity perception is of interest and is assumed to affect entrepreneurial intentions.

Perceived resource availability is the central interest of this study. The extant literature suggests that the interpretations of the entrepreneur are of importance when resource availability is considered (Bruno and Tyebjee, 1982; Krueger and Brazeal, 1994) and that the perceived resource availability is more important than actual resource availability. The concept of resource availability is related to the concept of resource munificence (Castrogiovanni, 1991). It is anticipated here that perceived resource availability influences entrepreneurial intentions.

For the purposes of this study resource availability was broken down in to availability of different types of resources that include technology and respective know-how, financing, social capital (contact networks), market access, and human resources and skills. This categorization was based on the extant literature and on the relevant types resources mentioned there.

Following the intention models both the affective factors and the rational

factors are assumed to affect entrepreneurial intentions through attitudes towards entrepreneurship. Affective factors are expected to affect entrepreneurial intentions through perceived desirability and respectively rational factors through perceived feasibility.

### **2.2.6 Perceived desirability and perceived feasibility of entrepreneurship**

Perceived desirability of entrepreneurship and perceived feasibility of entrepreneurship represent attitudes toward entrepreneurship in the intention models. These concepts derive directly from the original intention model by Shapero and Sokol (1982). They define perceived desirability as a factor that affects the entrepreneurial event through individual value systems and is dependent on the social system the individual is part of (family, peer groups, ethnic groups, educational and professional contexts). Shapero and Sokol (1982) define perceived feasibility respectively as related to availability of financial support and to would-be partners. Ajzen (1991) defines the concept of perceived behavioral control, which is closely related to perceived feasibility and also related to presence or absence of requisite resources and opportunities. We will follow these definitions in this study.

### **2.3 Key relationships**

Drawing on Gartner's (1985) conceptual framework for new venture creation and intention models (Krueger et al., 2000) we make assumptions concerning relationships between different variables of the framework. These relationships will operationalize the framework for our purposes in exploring the relationship between entrepreneurial activity and the environment.

We anticipate that the affective factors of the environment affect perceived desirability attitude towards entrepreneurship. Respectively we anticipate that the rational factors affect perceived feasibility attitude towards entrepreneurship.

Drawing on intention models that have been applied in several entrepreneurial studies we assume that the attitudes toward entrepreneurship, namely perceived desirability and perceived feasibility of entrepreneurship affect entrepreneurial intentions. This means that when these attitudes towards entrepreneurship of an individual develop positively the entrepreneurial

intentions of the individual increase.

The relationship between entrepreneurial intentions and entrepreneurial behavior is based on a wide range of studies concerning different behaviors and intentions where it has been reported that intentions explain 30% or more of the variance in behavior (Krueger et al., 2000). Therefore we will apply entrepreneurial intentions as a measure for entrepreneurial behavior in this study.

Krueger (2000) presented a further developed intention-based model of entrepreneurial activity when discussing opportunity emergence and opportunity perception within corporations (Figure 2-10).

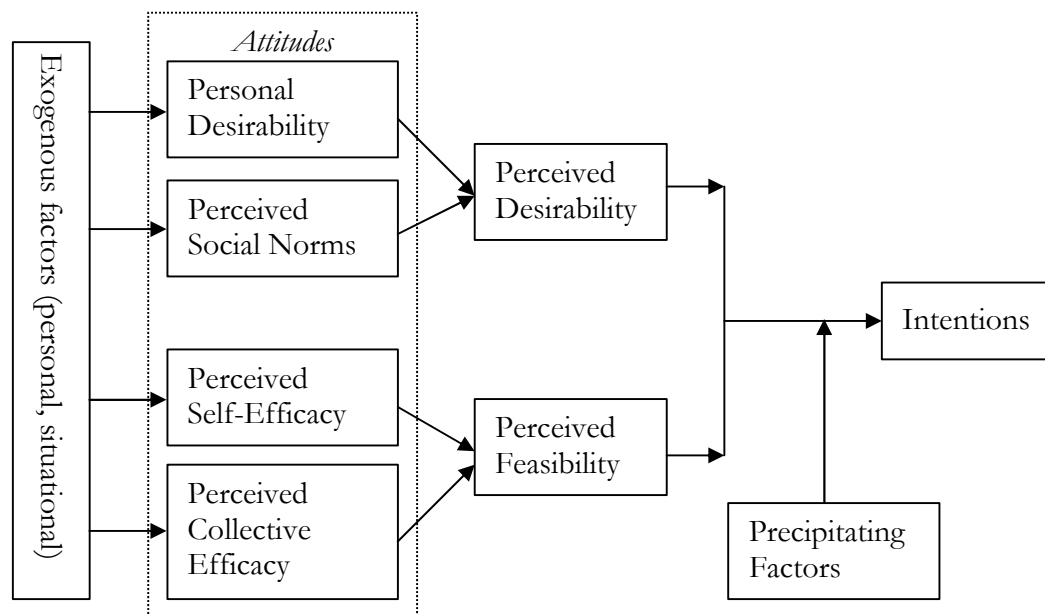


Figure 2-10. Modified intention model by Krueger (2000).

In Krueger's (2000) model there are components, which appear applicable for exploring the relationship between environmental attributes and entrepreneurial intentions. He modified the intention model in order to include cognitive infrastructure's impact on opportunity perceptions into the model. In the model there are some components which link environment and entrepreneurial intentions via perceived desirability and via perceived feasibility. Exogenous factors and precipitating factors are closely related to each other and they operate through two different paths in the model. First, exogenous factors affect the attitudes (personal desirability, perceived social norms, perceived self-efficacy and perceived collective efficacy), which subsequently affect intentions. Second, some exogenous factors such as getting

fired or divorced can act as precipitating factors and moderate the relationship between attitudes and intentions and furthermore the relationship between intentions and subsequent behavior, the realization of intentions. In his study Krueger (2000) mentioned e.g. role models of successful entrepreneurs as an example of exogenous factors. He also mentioned perceptions of resource availability as such exogenous factors. Precipitating factors reflect typically some sort of displacement, a disruption in one's inertia such as getting fired or being offered a big contract.

Drawing on Krueger's (2000) modified intention model we constructed a model to capture environmental attributes' impact on entrepreneurial intentions and subsequent entrepreneurial behavior. We apply the construct of exogenous factors to represent the environmental attributes that we expect to have an impact on entrepreneurial intentions. At the same time we make an assumption that the environmental attributes affect intentions through attitudes toward entrepreneurship, which are perceived desirability and perceived feasibility. (Figure 2-11).

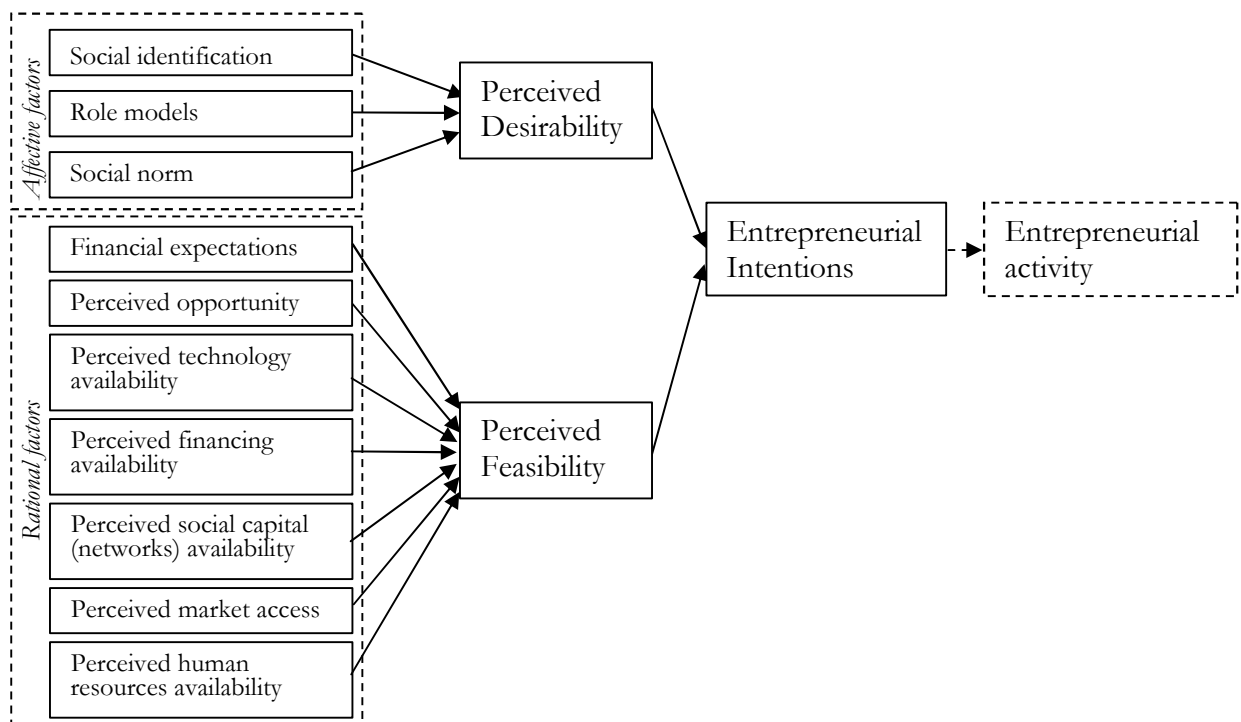


Figure 2-11. Modified intention model for exploring environment – entrepreneurial intentions relationship.

These relationships illustrated in the model will serve as the research questions for this study. They will be articulated as hypotheses for this study in the following.

## 2.4 Hypotheses

In this study it is expected that prevailing environment and environmental attributes affect entrepreneurial intentions and subsequent entrepreneurial behavior. We also assume that some of these environmental attributes affecting entrepreneurial intentions are controllable, e.g. alterable through policy measures or other possible government interventions.

We hold the strong positive relationship between entrepreneurial intentions and entrepreneurial behavior reported by several earlier studies (Boyd and Vozikis, 1994; Krueger and Brazeal, 1994; Krueger et al., 2000) as our point of departure and hence apply the concept of entrepreneurial intentions as a measure for entrepreneurial behavior and entrepreneurial activity in this study.

Several studies (Bruno and Tyebjee, 1982; Krueger and Brazeal, 1994; Krueger and Dickson, 1994) suggest that perceptions are important when entrepreneurial activity and attitudes toward it are concerned. Therefore we focus on perceptions when we analyze the impact of environmental attributes on entrepreneurial intentions. This will be reflected in the following hypotheses.

The first hypothesis is based on the goal of this study:

*Hypothesis 1: The prevailing environment has an impact on entrepreneurial intentions.*

The prevailing environment refers to the geographical and social environment where the individual deemed as nascent entrepreneur is living. This includes the family, work, school, spare time, and social activities as well as the political and societal circumstances. Entrepreneurial intentions refer to the intention of an individual to perform entrepreneurial behavior, i.e. to start a business of ones' own.

The extant literature suggests that attitudes toward entrepreneurship correlate significantly with entrepreneurial intentions (Ajzen, 1991; Krueger, 1993; Krueger and Brazeal, 1994; Krueger and Brazeal, 1994; Krueger, 2000; Krueger et al., 2000). Based on these findings we also expect that attitudes toward entrepreneurship, namely perceived desirability of entrepreneurship

and perceived feasibility of entrepreneurship affect entrepreneurial intentions also in the Finnish entrepreneurial environment.

*Hypothesis 2: Perceived desirability of entrepreneurship affects entrepreneurial intentions.*

*Hypothesis 3: Perceived feasibility of entrepreneurship affects entrepreneurial intentions.*

When applying the intention approach and addressing the impact of the environment there we defined two different categories of environmental influence: affective and rational environmental factors. Affective factors are those environmental attributes that are expected to relate with perceived desirability of entrepreneurship. They represent mostly the social environment and are issues like how the person's family or friends would feel about her or him becoming an entrepreneur. Respectively rational factors are those external issues that are relevant concerning the calculating thinking of the person, e.g. the financial issues involved or the technology that provides the competitive advantage for the business.

*Hypothesis 4: The affective factors of the environment affect entrepreneurial intentions through perceived desirability of entrepreneurship.*

*Hypothesis 5: The rational factors of the environment affect entrepreneurial intentions through perceived feasibility of entrepreneurship.*



### **3 Material and methods**

The conceptual framework as well as the hypotheses of this study were developed based on a literature survey. In the first phase the model and the hypotheses will be tested using data retrieved from a survey. In the second phase the results of the survey will be reflected on a case study data from six recently established technology-based firms.

The first phase will provide us with evidence concerning the validity of our model in explaining the relationship between entrepreneurial behavior and the entrepreneurial environment. The second phase will contribute to our understanding about the practical implications of our model. It will also provide us with an ex-post perspective to the entrepreneurial process and particularly to the role of resources in the process. Comparing ex-post perspective (the survey) and ex-ante perspective (the case study) will also deepen our understanding concerning the development process of entrepreneurial intentions and the role of different exogenous factor in that process.

#### **3.1 Survey study**

The survey was carried out to test the model constructed in the previous chapter and to test the hypotheses that were set forth. The suggested model describes the relationships that are expected to exist between environmental factors and entrepreneurial intentions of an individual. The hypotheses articulate the expected nature of the relationship between environment and entrepreneurial intentions.

The survey was carried out as a joint effort of the author and an undergraduate student from Helsinki University of Technology, Mr. Tuomas Maisala, who was preparing his Master's thesis at the same time. His aim was to study the impact of a business plan competition, Venture Cup Finland on academic entrepreneurship and the added value that it provides for the participants. The questionnaire was designed to serve the purposes of both researchers with the same set of questions.

##### **3.1.1 Sample and data collection**

As this study aims to explore the relationship between environmental

attributes and entrepreneurial intentions we concluded that the survey must be targeted at nascent entrepreneurs, in other words people who are not entrepreneurs yet, but are pondering on it. This kind of a population was expected to offer the best chances to explore entrepreneurial intentions ex ante.

In order to get hold of nascent entrepreneurs there are several options available. Autio et al. (2000) ended up sampling engineering students when exploring entrepreneurial intentions. The sample of Krueger et al. (2000) consisted of students who were facing imminent career decision. We identified a recently introduced business plan competition as an appropriate sample for our survey. Participants of a business plan competition most likely meet the criteria of a nascent entrepreneur and they also meet the definition of planned behavior as they have demonstrably planned starting a business of their own. This complies with the intention model applied in this study.

Venture Cup Business Plan Competition was introduced in Finland in 2000 by McKinsey & Company, which had been launching the competition in several different countries since 1996. The competition is focused on universities and polytechnics, but usually there are few participants from outside universities as well. The competition is carried out during the academic year and it consists of three different phases. In the first phase a brief description of the business idea is submitted to the competition. In the second phase a sketch of the business plan is required from the participants. In the final phase a complete business plan is expected. In each phase a jury composed of experienced entrepreneurs and venture capitalists evaluates the competition entries. In each phase there are monetary prizes, which total up to over 80 000 euros the first prize being 25 000 euros.

In the first year (2000 – 2001) of Venture Cup Business Plan competition there were 310 entries in the competition and in the second year (2001 – 2002) respectively 235. The majority of these entries were submitted by teams, which actually is promoted by the organizers. The participants of the first two years of the competition formed the first group of the sample of the survey (n=1026). The individuals who had either participated in the competition alone or had been a member of a participating team formed the sample.

A second group of the sample was formed of students who had attended entrepreneurship classes in Helsinki University of Technology (n=155),

Tampere University of Technology (n=24), Helsinki School of Economics (n=25) and Kymenlaakso Polytechnic (n=3). Together these two groups formed a sample of 1233 people. After deleting duplicates and outdated contact information the sample was reduced to 1175 people. A total of 330 people downloaded the questionnaire form from the Internet, and 271 of them completed it and hence the response rate was 23,1%. Most likely the length of the questionnaire form caused relatively many to give up answering before completing the form. The length of the form resulted from our endeavor to combine two slightly separate surveys in one questionnaire.

The survey was carried out by using an e-mail invitation to participate in the survey and the questionnaire was to be filled out in the Internet on a web-page, which was designed particularly for this purpose. Internet technologies provided an easy-to-use solution for the questionnaire and also enabled automated data collection. The data of the survey was stored directly into the database, which again can be used as direct input for an appropriate software package. Internet-based questionnaire was also expected to increase response rates because of the ease of filling out the questionnaire without any forms to be mailed. Another means of increasing the response rate of the survey was a raffle that had three prizes and was to be drawn among the participants to the survey. A reminder message was also sent after one week from the first invitation. The survey questionnaire is in Appendix A.

The 271 respondents who completed the form broke down to 165 (60,9%) people who had participated the Venture Cup Business Plan Competition in one or more phases during either one of the two years. The rest 106 (39,1%) respondents had not participated in the competition in any way. The obtained division is somewhat different from the original sample (Table 3-1).

Table 3-1. Distribution of respondents and the original sample concerning.

<i>Venture Cup Business Plan Competition</i>	<i>Respondents</i>	<i>Original sample</i>
Participated competition	165 (60,9%)	988 (84,1%)
Did not participate the competition	106 (39,1%)	187 (15,9%)
<b>Total</b>	271 (100%)	1175 (100%)

The entrepreneurial status of the respondents was also controlled. There were 179 (66,1%) people who did not work in their own firm nor had made any binding decision to start working in one's own firm and the rest 92 (33,9%)

worked or had made a binding decision to start working in one's own firm at the time of the survey (Table 3-2). All respondents were hence either entrepreneurs or nascent entrepreneurs (had at least attended entrepreneurial classes at a university or a polytechnic).

Table 3-2. Distribution of respondents concerning entrepreneurs and non-entrepreneurs vs. participation in the Venture Plan business plan competition.

<i>Venture Cup Business Plan Competition</i>	<i>No entrep. activity</i>	<i>Entrepreneurial activity</i>	<b>Total</b>
Participated competition	105	60	165
Did not participate the competition	74	32	106
<b>Total</b>	179	92	271

Of the respondents 216 (79,7%) were men and 55 (20,3%) women. Women's share among Venture Cup participants was slightly lower (18,4%) and respectively among non-participants higher (24,4%) (Table 3-3).

Table 3-3. Gender of respondents vs. participation in the Venture Plan business plan competition.

<i>Gender</i>	<i>Had participated</i>	<i>Had not participated</i>	<b>Total</b>
Female	34 (18,4%)	21 (24,4%)	55 (20,3%)
Male	151 (81,6%)	65 (75,6%)	216 (79,7%)
<b>Total</b>	185 (100%)	86 (100%)	271 (100%)

The age distribution of the respondents is shown in Figure 3-1. None of the respondents was under 20 years old.

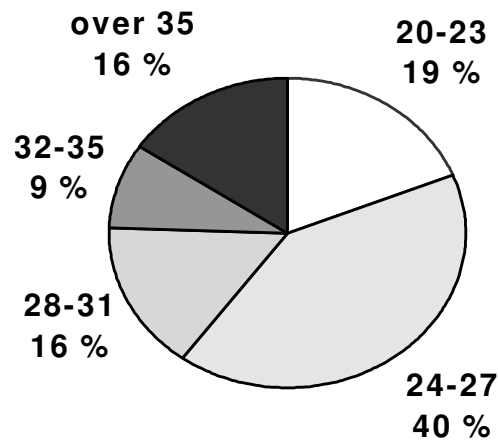


Figure 3-1. Age distribution of respondents.

As far as the respondents' level of education is concerned Master's degree was the most common degree by far (72%). The rest of the respondents had either high school/college degree (16%), Ph.D. degree (8%), or Bachelor's degree (4%). The level of education was defined as the degree the respondent already has or will have after completing current studies. Roughly one quarter of the respondents had already completed their studies. The most common was technical education (43,9%) and 27,7% of the respondents had either economical or social science education.

As far as the distribution of the respondents is concerned it can be argued that the sample represents rather well the population of the study, which is technology-based nascent entrepreneurs. The division between genders is roughly the same as reported by the GEM study (Reynolds et al., 2004). Equally the age distribution corresponds with the age distribution of the GEM study where the majority of the entrepreneurial activity falls between ages of 25 and 44. Furthermore the level of education complies also with focus of this study, which is technology-based entrepreneurship.

### 3.1.2 Operationalization of constructs

There are several studies concerning entrepreneurial intentions (e.g. Krueger et al., 2000; Autio et al., 2001) that have applied surveys in testing intention models in explaining entrepreneurial intentions. They have applied different constructs to measure entrepreneurial intentions in their studies. In the present

study we have adopted those constructs and also their operationalizations as questions of the survey.

The dependent variable in the survey is entrepreneurial intention. Krueger et al. (2000) measured entrepreneurial intentions among senior students facing career decisions with a question: “Estimate the probability you’ll start your own business in the next 5 years?” (scale 0 – 100%). We applied the same measure for global entrepreneurial intentions in this study.

The mediating variables in the model (Figure 2-11) were perceived desirability and perceived feasibility. For perceived desirability we applied a measure that Krueger et al. (2000) used to measure global perceived desirability: “*How desirable it is for you to start your own business?*” (scale: 0 to 100). Equally for perceived feasibility we applied a measure that Krueger et al. (2000) used to measure global perceived feasibility: “*How practical is it for you to start your own business?*” (scale: 0 to 100).

For our modified intention model (Figure 2-11) we defined the concept of affective environmental factors. This concept is related to the social environment and its variables are social identification, role models, and social norm. This concept is assumed to affect entrepreneurial intentions through perceived desirability of entrepreneurship.

Respectively we defined a concept of rational environmental factors, which is assumed to affect entrepreneurial intentions through perceived feasibility of entrepreneurship. A part of the concept of rational environmental attributes is the perceived availability of different resources, which is of special interest in this study. The other variables in the concept of rational environmental attributes are financial expectations, and perceived opportunity.

For all variables of affective and rational environmental factors we used the 5-point Likert scale. The complete operationalization list of variables in the model is shown in Table 3-3.

Table 3-3. The operationalization list of the modifies intention model.

	<i>Variable</i>	<i>Question</i>	<i>Source</i>
<i>Endogenous variables</i>	Entrepreneurial intention	“How likely it is that you will start a company of your own or with friends in next 5 years?” (Scale 0 – 100 %)	Krueger et al.
	Perceived desirability	“How desirable it is for you to start your own company?” (Scale 0 – 100 %)	Krueger et al.
	Perceived feasibility	“How practical it is for you to start your own business?” (Scale 0 – 100 %)	Krueger et al.
<i>Affective factors</i>	Social identification	“I would be more / less appreciated as an entrepreneur”	Developed for the study
	Role models	“There are many / few successful entrepreneurs among the people I know”	Developed for the study
	Social norm ( $\alpha = 0,70$ n=251)	“My friends would look it positively / negatively if I started my own firm” “My family would look it positively / negatively if I started my own firm”	Developed for the study
<i>Rational factors</i>	Financial expectations	“I believe I can make more money as an entrepreneur than in other occupations”	Developed for the study
	Perceived opportunity ( $\alpha = 0,64$ n=212)	“The technology at our disposal will provide us with clear competitive advantage” “There is demand for our products or services in the market” “The competitive advantage of the products or services is good / poor ”	Developed for the study
	Perceived resource availability, technology / know-how ( $\alpha = 0,70$ n=227)	“There is the technology or some other specific know-how needed to start a new firm at founders’ disposal” “The founders posses full rights of the technology”	Developed for the study
	Perceived resource availability, financing ( $\alpha = 0,51$ n=230)	“There is enough financial resources available to start a new firm” “The founders have the necessary financing to start a new firm”	Developed for the study
	Perceived resource availability, social capital / networks ( $\alpha = 0,77$ n=247)	“The founders know people who will help in starting and running a new firm” “The contact network of the founders provides links to important directions (e.g. concerning marketing, financing, or technology)”	Developed for the study
	Perceived resource availability, market access ( $\alpha = 0,61$ n=244)	“The founders have a vision how to reach their target group in the market” “The products or services will be easily launched in the market”	Developed for the study
	Perceived resource availability, human resources / skills ( $\alpha = 0,50$ n=250)	“The founders have necessary experience and skills to start and run a firm” The previous experience of the founders is useful in starting a new firm”	Developed for the study

The data collected by the survey were analyzed to find causal relationships between affective environmental attributes and entrepreneurial intentions through perceived desirability of entrepreneurship. Similarly rational

environmental attributes were analyzed against perceived feasibility of entrepreneurship and intentions. The analysis of the survey data was carried out applying path analysis. For this purpose the method of structural equation modeling was applied and AMOS statistical analysis software was used. The structural equation modeling is a method where a set of regression equations can be tested simultaneously.

## **3.2 Case studies**

The original purpose of the case studies was to explore the technology-based entrepreneurial process that typically occurs in the Finnish entrepreneurial environment and to gain insight concerning the role of resources in the start-up process. The population for the case studies was new, technology-based firms. Six newly established technology-based firms were studied as case studies by exploratory interviews of their founders. The interviews focused on the start-up process, especially on exogenous factors and their impact on the entrepreneurial process.

### **3.2.1 Case study method**

Yin (1994) has made a significant contribution in defining the methodology and arguing for the case study research. He defined case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. He also defined three types of case studies: exploratory case studies, descriptive case studies, and explanatory case studies. In exploratory and descriptive case studies research questions are typically of “what” type and in explanatory case studies questions are respectively of “how” and “why” type.

A crucial phase in case study research is selecting the cases. Eisenhardt (1989) prefers theoretical sampling rather than statistical sampling in theory building case study research. In theoretical sampling cases are chosen to replicate previous cases, or to extend emergent theory, or they may be chosen to fill theoretical categories and to provide examples of polar types whereas in statistical sampling cases are selected randomly.

Yin (1994) has identified four dominant techniques for analyzing the data: pattern matching, explanation building, time-series analysis, and program logic



models. In pattern matching analysis the empirically based pattern is compared with a predicted one. If the patterns coincide the evidence can be said to exist and the internal validity is strengthened. Explanation-building strategy is used mainly in explanatory studies, where the goal is to build an explanation about the case. The method is iterative by nature where an initial theoretical statement or proposition is made first and compared with the findings of an initial case. After that the statement or the proposition is revised and compared with the second and third case and again revised if necessary. In time-series strategy the focus of the analysis is on the indicators that are traced over time and trends that can be identified. Program logic strategy is a combination of pattern-matching and time-series analysis. This strategy is typically used to analyze a chain of complex events (pattern) over time (time series).

The purpose of the case study was to explore technology-based entrepreneurial process in Finland and to find out about critical resources' role in the process. Pattern matching techniques will be applied in analyzing the case evidence to identify typical patterns occurring in the start-up process of a new, technology-based firm. The launching platform concept will be used as a conceptual framework for this analysis.

### **3.2.2 Case selection and data collection**

The case firms were sampled from the customer base of the National Technology Agency of Finland, Tekes. Tekes is a government agency that finances research and development in Finland. In 1998, when the case study was carried out, Tekes had 1064 firms as customers, which had received financing for their R&D projects from Tekes. The annual number of new, technology-based firms in the customer base is typically between 50 and 60. Given Tekes' central role in the Finnish innovation systems it was expected that the customer base of Tekes is the best possible sample of Finnish technology-based firms and it was available for the researcher. The case firms represent information and communication technologies and biotechnology. All firms except two were less than three years old at the time of the interview.

The cases were sampled following the theoretical sampling (Eisenhardt, 1989). The firms were selected so that they meet the definition of new, technology-based firm as well as possible. This was relatively easy because the population used for sampling was comprised of Tekes' customers, which are all R&D

intensive, technology-based firms. Earlier in this study we defined the new, technology-based with following characteristics:

- independent, the majority of the ownership held by the entrepreneurs
- employs people with technical or natural science education
- competes through technological innovation
- has R&D activities
- originally new business (not e.g. an MBO or acquisition)

These criteria were applied in selecting the cases. Another criterion was that the case firms had to be recently founded to make sure that the events and circumstances, which took place at the time of starting up the firm could be reliably recalled. The selected firms were between one and four years old except for one, which was 12 years old and they all met the definition of technology-based firm. The sample was focused on information technology, communication technology, and biotechnology so that it would follow the division of R&D investments across different technologies in Finland. The selection was carried out by asking 'Tekes' technology experts in respective technology departments to select firms that would meet the definition. Two of the firms were biotechnology firms and four were information technology firms. All the selected firms accepted the invitation to participate in the study.

A case study protocol was outlined for the study. The main data collection method was interviewing the firm's founder or the leading founder. Before the interviews a review of all existing material about case firms was carried out (brochures, www-pages etc.). A pilot case study (Case Remtec Systems Oy) was also conducted at the beginning to test the case study design and protocol. All interviews were conducted by the author. Interviews focused on the firm creation process and the events that took place during the process. The dates and interviewees of the interviews are listed in Appendix B.

The topics for interviews were defined following a hypothetical framework called launching platform. The idea of launching platform was originally presented by Klofsten (1992) in his dissertation, where he introduced the concept of business platform. Business platform represents the stage of business operations where they have reached the level of going concern and are less vulnerable, i.e. the new business is likely to survive.

For the purposes of the case study an initial sketch of launching platform

concept was drafted. The framework was comprised of six different external factors, which were believed to affect the start-up process: technology, human resources, financing, market access, contact network (social capital), and situational factors (Figure 3-2). Social capital was operationalized as contact network for the purposes of the case study interviews. These factors had emerged as relevant external factors in the start-up process based on extant literature. Interestingly, when Brush et al. (2001) recently studied two case firms, Palm Computing and Handspring, and explored resources' role at new venture creation they came up with similar approach. They introduced the concept of resource base that needs to be constructed at the launch of a new firm. They categorized resources in to six types: (1) human, (2) social, (3) financial, (4) physical, (5) technology, and (6) organizational.

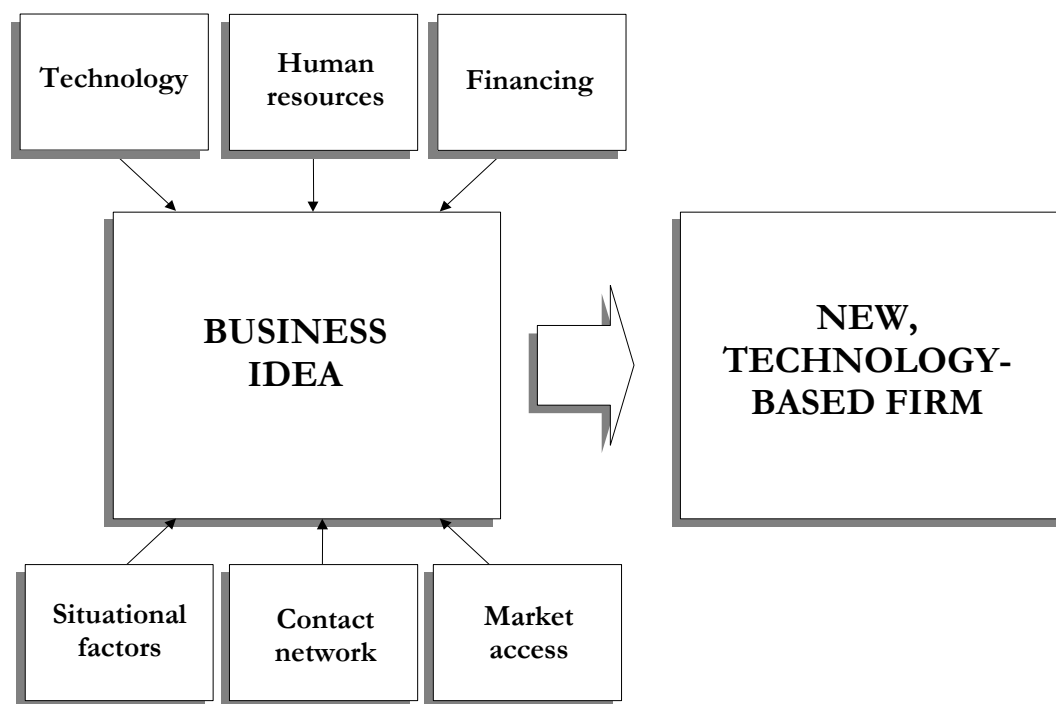


Figure 3-2. The concept of launching platform.

The components of the launching platform concept were used as topics for the interviews in the case study protocol. This framework of topics was loosely followed during the interviews and every topic was not necessarily covered exhaustively in each case. The goal was more to screen out the most significant issues concerning the start-up process. In addition to the sequence of events and the above mentioned topics also ‘soft’ data was collected, such as how did the founder feel during the process and how did the founder perceive different things affecting the process. All interviews were carried out between October 1998 and March 1999. The interviews were recorded and transcribed to be

included in the case study data base.

The data collected from the case study firms was first analyzed individually, i.e. case by case. In this phase the variables defined in the launching platform framework were analyzed qualitatively. The analysis applied Yin's (1994) pattern matching method. The purpose of this phase was to identify relevant factors and resources that had affected the start-up process in each case. The case study was an ex post analysis of entrepreneurial behavior.

In the second phase of the case study a cross-case analysis was performed, where cases were analyzed in parallel using the same framework of topics that was used in the interviews. The purpose of this was to identify patterns that would occur across cases.

#### 4 Survey results

The purpose of the survey was to test the model that was constructed to describe the relationship between environmental factors and entrepreneurial intentions of an individual. The suggested model and its constructs formed the basis for the survey questions. The statistical analysis of the survey data provided the results that are presented first in this chapter and after that the validity of the hypotheses is discussed.

In analyzing the data with structural equation modeling method the affective and the rational environmental variables were defined as exogenous factors in the model. Respectively the perceived desirability of entrepreneurship, the perceived feasibility of entrepreneurship, and the entrepreneurial intentions were defined as endogenous variables in the model.

The exogenous factors of the model appeared to correlate moderately and hence they were treated as separate dimensions of the entrepreneurial environment. The correlation matrices of the exogenous variables of the model are shown in Appendix C.

The data analysis results are shown in Figure 4-1 with standardized path coefficients. The significant relationships are highlighted with a bold arrow in Figure 4-1. The data ( $n=271$ ) was sufficient to execute the analysis. Of affective factors only social norm appears to influence ( $\beta = 0.15, p < .05$ ) perceived desirability of entrepreneurship. Respectively of rational factors financial expectations ( $\beta = 0.22, p < .001$ ) and availability of technology-related resources ( $\beta = 0.21, p < .01$ ) affect perceived feasibility of entrepreneurship. As expected both perceived desirability ( $\beta = 0.39, p < .001$ ) and perceived feasibility ( $\beta = 0.32, p < .001$ ) affect entrepreneurial intentions significantly. The squared multiple correlation of the model was  $R^2 = 0.25$ . The model fit to the data however was not very good ( $\chi^2 = 303.5; df = 42; p < .001$ ).

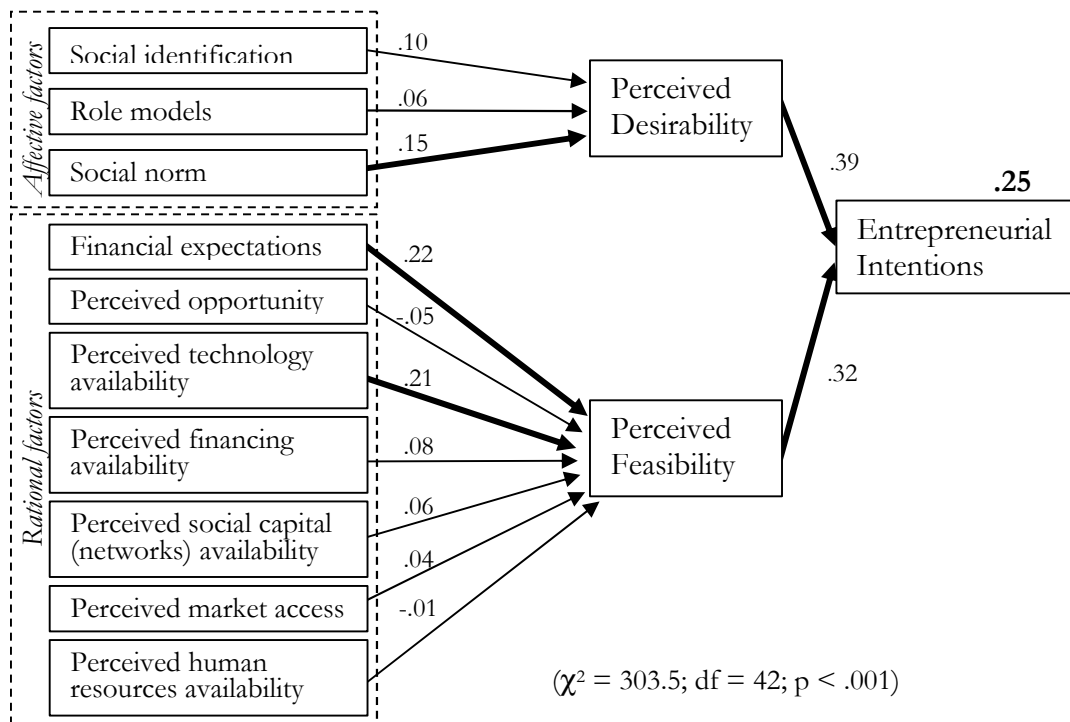


Figure 4-1. The output of the path analysis.

When the data was analyzed allowing the environmental variables to link also directly with entrepreneurial intentions we found additional significant relationships, which added the squared multiple correlation of the model from  $R^2 = 0.25$  to  $R^2 = 0.33$ . There appeared a direct relationship between social identification and entrepreneurial intentions ( $\beta = 0.21, p < .003$ ). A weak direct relationship ( $\beta = 0.14, p < .10$ ) emerged also between perceived market access and entrepreneurial intentions. (Also the model fit to data improved slightly ( $\chi^2 = 287.5; df = 32; p < .001$ )). The output of this analysis is shown in Figure 4-2.

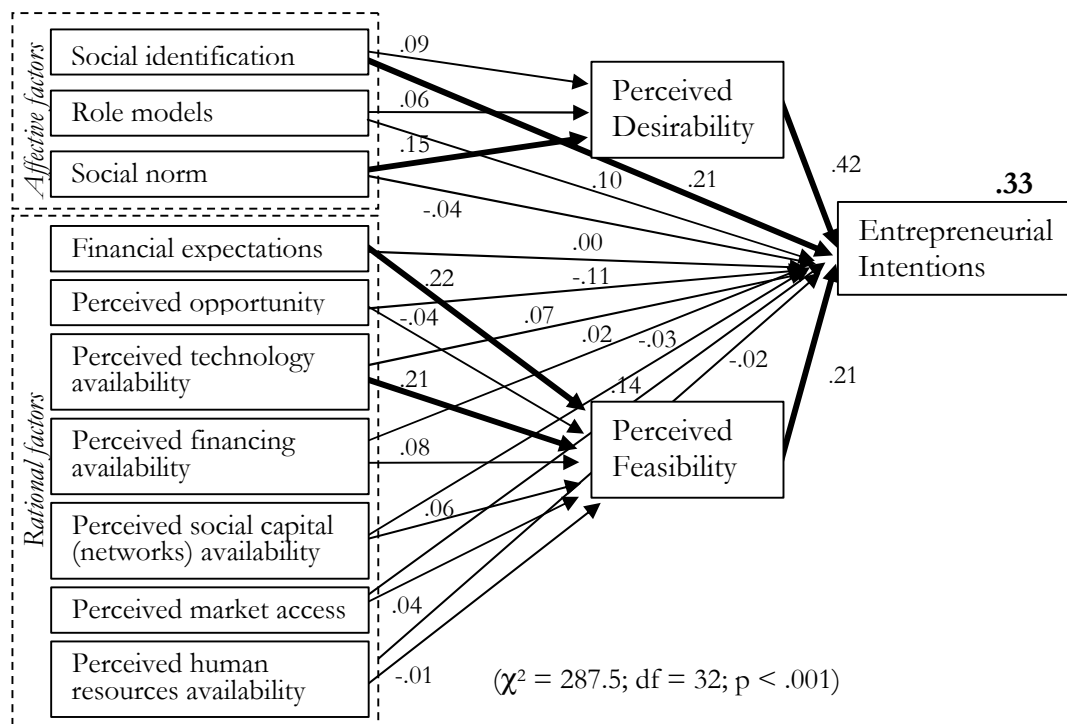


Figure 4-2. The output of the path analysis with direct relationships between environmental variables and entrepreneurial intentions.

Based on the path analysis of the modified intention model of this study it appears that the model is valid ( $R^2 = 0.25$ ) and explains reliably variations on entrepreneurial intentions.

Our first hypothesis posited that environment has an impact on entrepreneurial intentions. The path analysis provides evidence that our modified intention model explains reliably the relationship between environmental variables and entrepreneurial intentions. Therefore Hypothesis 1 is supported by the survey data.

The survey data showed a strong relationship between perceived desirability of entrepreneurship and entrepreneurial intentions. Therefore Hypothesis 2 is supported by the survey data. Similarly a strong relationship between perceived feasibility of entrepreneurship and entrepreneurial intentions and therefore Hypothesis 3 is supported by the survey data.

Hypothesis 4 was also partially supported by the survey. Of affective factors of the environment only social norm affects entrepreneurial intentions through perceived desirability of entrepreneurship. The other affective factors of the environment (role models and social identification) did not affect entrepreneurial intentions through perceived feasibility of entrepreneurship in

any way. However, social identification affected entrepreneurial intentions directly, which was not expected.

Of the rational factors of environment financial expectations and availability of technology-related resources affect entrepreneurial intentions through perceived feasibility of entrepreneurship. Other exogenous factors from rational environmental factors did not influence entrepreneurial intentions through perceived feasibility of entrepreneurship. Therefore Hypothesis 5 was partially supported by the survey data.



## **5 The cases**

The case studies will be presented in this chapter followed by the cross-case data analysis. The data of the case studies will provide us with an ex-post perspective to new venture creation and to the relationship between new venture creation and environment. The goal is to deepen the insight concerning the development of entrepreneurial intentions and the role of the environment there.

### **5.1.1 Case Remtec Systems Oy**

Remtec Systems was established in 1994 by three researchers who were working at the TAI research centre of Helsinki University of Technology (HUT). The business area of the firm is telecommunication- and multimedia-based applications for after-sales purposes, “information logistics“ according to their own definition. Their customers are large industrial companies with significant after-sales operations. In 1998, when the data was collected, the firm employed 15 people and its annual sales were about 1,35 million EUR (1,35 million USD). It was headquartered in Espoo at Innopoli science park.

The founding team worked at the TAI research centre in EU-funded projects, which were affiliated with the former RACE-program. In these projects they were exposed to the latest telecommunications and multimedia technologies as well as to the industrial applications of these technologies. The TAI research centre can be regarded as the source organization for the technology and know-how that constituted the foundation of the new, technology-based firm in this case. In the course of these projects the founders had also established contacts with their future customers.

Only one of the three founders began to work for the new firm at the beginning while the other two continued working for the research center finishing their work with the project. The first employee was also hired before the other two founders joined the firm. His responsibility was to specialize in the SGML-technology (Standard General Markup Language) that one of their first customers was requiring. Gradually all of the founders started to work for their firm and they also began to hire more personnel.

### *Technology*

Remtec Systems applied broadband telecommunications, multimedia, SGML, satellite-based data transfer, and Internet technologies in developing their products and services. The applications of these technologies were targeted at after-sales purposes of large industrial companies. One example of these applications was an information system designed for maintenance and service purposes of large diesel engines operating in distant locations. This system provides the service personnel in site with real-time connection to manufacturer's experts. This link carries documents as well as real-time video and audio, to and from the site. The system can also be used for training purposes. Later on Internet technologies became an essential part of the technology portfolio.

The source of the technology can be deemed to be the TAI research centre at HUT. In practice the technology was transferred into the new firm by the founders as embedded in their knowledge and skills. Some of that knowledge was of course originating elsewhere, but in broad terms the research center provided the platform where all the knowledge and skills were refined for the purposes of the new, technology-based firm.

There was no specific intellectual property issues involved in the technology transfer in this case. The law in Finland at that time allowed researchers to retain all intellectual property rights created in research projects that are carried out in research institutes and in universities. Despite of this matter the founders of Remtec Systems made an agreement concerning intellectual property rights with the university when the firm was started up. The purpose of this was to avoid any future disagreements. On the other hand, no patenting measures were carried out to protect the technology.

The competitive advantage of the firm was based on a head start in applying Internet technologies, SGML and telecommunications in after-sales support systems. Early adopting of PC-platform for these applications was also a critical advantage. Close co-operation with customers provided the firm with valuable knowledge concerning customer needs. That knowledge together with mastering the most recent information technologies provided the competitive advantage for the firm.

### *Human resources*

The founding team consisted of three technologists, which had somewhat similar backgrounds. They were all researchers at the university working on similar issues. Regardless of this the division of responsibilities in the new firm was quite clear already from the beginning: founder A (CEO): the driving force, marketing, and network builder; founder B: technology expert and programmer; and founder C: integrator, problem solver, and application engineer.

Considering the skill set of the founders it can be said that technological skills were the most dominant ones. In addition to technological skills marketing skills and social skills existed also, which were quite important in starting up the firm and in closing the first contracts. There were some management skills present, but according to the founder's own judgment, too few - some more would have been useful. Some financial skills existed also, but not enough. Despite of these shortcomings there were not any major problems in running the business successfully. The method in this respect was 'learning by doing'.

Founders' perception of their skills and capabilities as well as their shortcomings was not completely objective. This may have affected the decision making during the time of starting up the firm. One of the founders said that "in case we had known what we know now, we might have not started...". This does not mean that he regrets the decision to start the firm, only he points out that a second round of thinking could have taken place.

However, the founders realized that there were plenty of things to be learned ranging from marketing to book-keeping in the field of entrepreneurship and strategic management. They also joined the incubator program Spinno at Innopoli technology center. Spinno is a program for educating founders of technology-based start-ups and it also provides the entrepreneurs with third-party consulting services.

### *Financing*

The firm was founded with the least required amount of initial capital which was at that time 1 300 EUR. There was not any venture capital or loans involved in financing the start-up. The only investors were the founders themselves.

The main source of financing was the sales revenues, which the firm was able to initiate at the very beginning. This was due to the contacts, which the founders had established during the joint research projects with the industry. The founders were virtually asked to sell the technology accompanied with their knowledge to the first customers.

There were not any significant investments either to be made at the beginning. All necessary equipment and facilities could be purchased with the money available from the initial capital and sales revenues. Later on, when they invested in research and development, some financing was obtained from the National Technology Agency (Tekes). Also some additional investments were made by the owners of the firm, but there were not any venture capital investments or loans involved in the firm at the time of the interview.

#### *Market access*

Remtec Systems had clearly quite a good market access to start with. This was because of the founders' involvement in research projects where there were industrial partners in the project consortium. These companies had realized the possibilities of the new information technology and thus the demand for offerings of this kind started to emerge. At the same time the founders were pondering on the possibilities of starting up a new, technology-based company. This constellation provided them with immediate market access, which was a triggering factor in the start-up process.

Their knowledge concerning the target market was also based on the contacts with their pilot customers. Therefore the short term market knowledge was quite good. On the other hand there wasn't any particular long term market intelligence available, only a mutual feeling of the founders that this is the way that things are going to go.

The founders of the firm were also able to make use of media and the publicity gained through it. With the new technology and its innovative applications they managed to raise interest among potential customers, which contributed to their marketing efforts.

There were not any partners in marketing at the beginning. All of the marketing was done by the firm itself and its own resources. All contacts with the final customers were handled by the people working for the firm and no intermediaries existed.

### *Contact network*

The contact network at the new firm's disposal was relatively operational at the start-up. This was because of the social contacts of the founders that originated from different sources: studying period, hobbies, previous employment, etc. It was clearly quite beneficial for the firm at the beginning to have such a contact network available. It provided the necessary access to different resources of which the most important were the pilot customers. The positive effect was undeniable, but it was by no means any key factor. It worked in the background for the firm's benefit.

The contact network offered the founders of the firm also a forum to exchange ideas and to test them as well. This was quite important also from the viewpoint of technology and its development. With this kind of linked peers it is possible to identify the trends and pick up the most appropriate technologies for the applications that are being developed.

### *Situational factors*

In this case there were also a number of situational factors present that had their influence on the event of starting up the new, technology-based firm. Most of these factors are related to the source organization, the TAI research centre at HUT. While working there the founders identified a window of opportunity by virtue of available technology together with emerging customer needs. Also the projects, which they had been working with, were approaching their termination. The national economy was at the same time leaving the extremely severe recession period behind, which yielded positive atmosphere.

There were also some positive and successful role models available in the research environment. There were a couple of earlier spin off firms originating from the same source organization. These encouraging examples had clearly an impact on the start-up process.

An important factor affecting the start-up process of the new firm was the opportunity, which was available because of the founders' exposure to large industrial companies during the research projects. This provided the firm with direct and immediate access to pilot projects with the first customers, which provided references to support future marketing efforts and to create credibility.

### *Summary*

Remtec Systems is clearly a technology driven firm, which has an identifiable source organization for its technology and know-how. It had full rights to the technology and it also possessed the necessary skills to exploit it, which made up a critical resource for the firm. It also had most of the necessary human resources, most significant of which were marketing skills and social skills. Management skills and financial skills were limited, but somewhat adequate. The founders were aware of this and sought for education and training in entrepreneurship. Human resources were also organized and responsibilities were clearly divided.

The financial resources of the firm were minimal, but that was compensated with a jump start in revenue generation, which set off immediately. The only investors were the founders and no loans existed.

The most important asset for the new firm was the market access that was available due to the founders' exposure to large industrial companies during the research projects. This provided the firm with direct and immediate access to pilot projects with the first customers and generated references to support future marketing efforts and to create credibility.

The contact network was also a beneficial resource for the new firm providing contacts to key persons in the industry and in customer companies. It enabled the firm to acquire critical resources like knowledge concerning new technologies, access to customers and expertise for idea testing. There were also a number of situational factors present that affected the process of starting up the new firm: the research projects approached their termination, the heavy recession gave up, and successful role models were around.

#### **5.1.2 Case Oy Juvantia Pharma Ltd**

Juvantia Pharma is a product oriented drug discovery company that was established in 1997 by four founders. Two of them had a strong background in pharmaceutical industry and the other two had a university researcher background. The firm employed 12 people at the time of the interview and its annual sales were 170 000 million EUR. Juvantia Pharma was located in Turku at the BioCity center at the time of the interview.

Two of the founders have been working for Farnos, a Finnish pharmaceutical

company that had R&D activities in Turku. At the beginning of the 90's Farmos was acquired by Orion, another Finnish pharmaceutical company. When Juvantia Pharma was established one of the founders set up also another firm at the same time and began working for it. The other founder with industry background started to run Juvantia Pharma while the remaining two founders stayed at the university.

The business idea of the firm was to develop new drugs to be produced and marketed by large global pharmaceutical companies. Juvantia Pharma takes the drug discovery process to the phase of clinical tests and continues from there in cooperation with major pharmaceutical companies. Juvantia Pharma's sales revenues come in a form of down payments and other kinds of milestone-based payments. At later stages royalty-based income will naturally start to build up. Their first product concept, a drug for Parkinson's disease, was supposed to enter clinical tests during the first half of the year 1999.

### *Technology*

Juvantia Pharma's core technology is the know-how concerning the operational structure of the adrenergic alpha-2 receptors and other G-protein coupled receptors. This knowledge is then exploited in drug discovery process. The other two areas of expertise of Juvantia Pharma are combinatorial chemistry and high-throughput screening. These fields of know-how formed the technological base for the Juvantia Pharma's operations.

The source of technology, in this case the chemical family of compounds containing the clinical drug candidate for the Parkinson's disease product concept, was partly Orion (formerly Farmos) and its research center, where two of the founders had worked. Quite a few other employees from Orion had also been hired since the beginning, which also yielded know-how transfer from the source organization. Other sources of technology had been universities, mainly University of Helsinki and University of Turku. Most of the technology transfer from universities had occurred in the field of combinatorial chemistry.

There were not any intellectual property rights involved in Juvantia Pharma's technology. The methods used in the drug discovery process are common knowledge and available for everyone skilled in the art of drug discovery.

The competitive advantage is based on the solid and long-time experience

concerning receptors and their structure as well as on how to exploit that knowledge in drug design. That kind of knowledge is difficult to protect, but at the same time it is hard to copy. It is embedded in the personnel of the firm.

#### *Human resources*

The human resources of Juvantia Pharma were plenty at the beginning. The founding team possessed a lot of know-how and skills in the area of drug discovery as well as in the field of combinatorial chemistry. Only one of the founders started to work for Juvantia Pharma while the others either stayed with their previous employment in the academic world or started to work for the other new firm. Lots of know-how and skills were also acquired by hiring previous co-workers from Orion. This knowledge was mainly related to the drug discovery process, technology, and the methodology.

Other areas of knowledge and skills in setting up and running the new firm were not that well covered by neither the founders nor the initial workers of the firm. Management skills were strong because of the earlier work experience of the CEO as the head of department at the research center of his previous employer. Organizational skills were equally good. On the other hand financial skills were somewhat limited at the beginning, especially when the significant role of financial issues at the start-up phase of this kind is considered. The knowledge of different available financial options was not comprehensive and thus financial planning was not as advanced as it could have been. Previous knowledge concerning administrative routines of a firm was also slightly short-handed, but this gap was overcome rather quickly by means of learning by doing and also through the management support by the board of directors.

Marketing skills in this case are in a bit different position when compared with a typical start-up firm. Marketing has not any dominant role at the beginning of this kind of a business operation. A drug discovery firm typically focuses on research and drug discovery at the beginning. If a new drug concept is discovered the major pharmaceutical companies will automatically be interested in the new product. So in this case marketing skills mean familiarity with this paradigm and previous experience concerning it. This could be called conceptual know-how. In this regard there were marketing skills present at the beginning of Juvantia Pharma. This was due to the experience of the two founders in strategic management of drug design process.



### *Financing*

In this kind of a business case financial resources are extremely crucial since there are no revenue generating activities for some time after the commencement of the business operation. In practical terms this means that several years of operation have to be financed by the initial capital invested in the start-up firm.

In Juvantia Pharma's case the initial capital was provided by The Finnish National Fund for Research and Development (Sitra) as seed capital. Tekes participated also in the financing of Juvantia Pharma's R&D operations. Tekes' financing was in the form of grants and subsidized loans for the R&D projects that Juvantia Pharma initiated at the beginning. Sales revenues started to build up after six months of operation. The volume of this income however was not significant.

The initial capital of Juvantia Pharma amounted to a little over 1 million EUR. The financing from Tekes was in addition to this. The minimum amount of capital in this kind of business operation is something like 0.5 million EUR per year and desired capitalization would be something like 1,6 million EUR (approx. 1,6 million USD). In this respect Juvantia Pharma was somewhat adequately financed at the beginning and financing was not a limiting resource.

### *Market access*

Market access is a bit complicated issue in Juvantia's case. As described earlier in this chapter, the marketing paradigm in this industry is not in any way typical. There is nothing to sell in the first couple of years of the new firm. So the market access has not an important role in this respect. However, it has some relevance in this case also. Of different components of market access market knowledge is relevant in this context: understanding of dynamics of the market, knowledge concerning competitors and knowledge of could-be customers as well as their ways of operating.

Market access during the start-up process of Juvantia was based on the founders' previous experience in pharmaceutical industry. They were familiar with the business paradigm in the industry and they knew how eagerly major pharmaceutical companies looked for new, innovative drugs developed by small drug discovery firms. They also knew all the major players in the field as well as their future competitors. A few personal contacts had also developed

during the work career of the founders. This part of market access was obviously quite good.

On the other hand Juvantia did not have any immediate partnerships or contracts that would have had any marketing value at the time of starting up the firm. There were not any direct channels available where to feed their products once they were finished. In this sense the market access was poor, but according to the business paradigm as it was described, it had no relevance whatsoever. The founders counted totally on the dynamics of the market in the industry, which means that large companies are always shopping around and demand exceeds supply at all times. All that has to be done is to develop an attractive new drug.

No specific marketing activities were conducted at the beginning of the firm. This was quite reasonable since there was nothing to sell at that time. There was neither any dedicated marketing resources in the beginning.

#### *Contact network*

The social capital that was present at the start-up of Juvantia Pharma was relatively good. The founders as well as their initial workers had good contacts within the industry. Contacts to universities were also good, which was actually one of the reasons for founding the firm, to nurture these contacts. Universities became important subcontractors for the firm. Contacts to financiers were also relatively good, especially to Tekes and Sitra. This was important in raising the necessary initial capital. Contacts related to marketing and future customers were not that good whereas contacts to suppliers were good.

A special kind of relationship that deserves to be mentioned is the close and special relationship with the other drug firm, which was started at the same time by one of the founders of Juvantia Pharma. By means of this relationship a great deal of co-operation took place and a lot of knowledge was shared.

#### *Situational factors*

There were also a few situational factors that affected the starting up of Juvantia Pharma. In their previous work at Orion the founders were unhappy about some of the actions that were carried out there. This kind of a decision was e.g. giving up some of the research lines, which were important to these people. At the same time this provided a window of opportunity for the

founders. The corporate culture at Orion, especially when compared with that of former Famos, was actually a push factor to start up the new firm. One of the negative issues was for example the rejection of cooperation with universities.

Another situational factor was the recent development of the financial market in Finland, which meant a significantly easier access to initial capital that was needed to start up the firm. There were also some positive role models around, new successful drug firms that encouraged the founders.

### *Summary*

Juvantia Pharma is a product oriented drug discovery firm established in 1997. Its area of specialization is the know-how of different receptors and the exploitation of this knowledge in drug design. The source of the know-how is the former employer of the founders and key workers, and also to some extent universities. The competitive advantage of the firm is based on the knowledge possessed by the people in the firm.

The human resources and skills present at the beginning were mainly concentrated around the drug discovery process and its management. The know-how and skills concerning managing and running a firm were somewhat limited, especially concerning financing. Marketing skills were based on conceptual know-how concerning drug discovery process and market dynamics in the industry.

Financial resources were somewhat adequate to start the firm, even though they weren't quite what had been ideal. The financial package was put together with seed capital, venture capital and government's R&D funding. It amounted to approx. 1 million EUR.

Market access in this kind of a business is not typical compared with other industries. The demand exceeds supply at all times and when an attractive new drug is developed there will always be big medicine giants shopping around. In this respect Juvantia's market access was relatively good since they were familiar with this paradigm and knew their competitors as well as their future customers.

Social capital was also rather good at the beginning. Due to the work experience of the founders they had good contacts among the industry and

also with the universities. Adequate contacts existed also among the financiers, which helped them significantly in raising the initial capital. Contacts related to marketing were not equally good, but they were less important at the start-up.

Some situational factors were also present at the start-up of the new firm. There were some push factors at founder's previous work environment, some of which actually provided the opportunity for the founders. Financial markets developed favorably and there were also some positive role models around at that time.

### **5.1.3 Case Delisoft Oy**

Delisoft Oy is a software firm established at the end of 1996 by three researchers and scientists, who were previously working for the Technical Research Center of Finland (VTT). The actual business operations started at the beginning of 1997. Delisoft develops software that exploits interval constraint solving technology and enables arithmetic with inaccurate numbers expressed as intervals. At the time of the study the firm was still at its start-up phase and it employed two of the founders. It had released its first product in 1998, Interval Solver for Microsoft Excel, but there had not been any significant sales revenues. The firm was located in Helsinki.

Two of the founders of Delisoft worked as researchers at VTT and the third founder had formerly been the head of the same laboratory at VTT. They had worked for some time with interval computation and constraint solving methods and published a few scientific papers about the topic. Their research work produced results that offered a new, innovative approach to calculation with inaccurate numbers. At the same time the common development of information technology made it possible to implement these results as software applications.

After starting up the new firm two of the founders, the former researchers started to work for it while the third founder continued his present employment as a university professor until the end of summer 1998.

#### *Technology*

The key technology of Delisoft was clearly the know-how of interval constraint solving, interval arithmetic and computations. It allows calculations to be completed with inexact numbers, which are expressed as intervals. The

results of these computations are also expressed as intervals. The technology enables solving of both equations as well as inequalities. It finds the solutions for these equations, and what is more important, all of the possible solutions. Yet another application for Delisoft's technology are symmetric calculations. This makes it possible e.g. to set the desired output value and then to find out the respective input values for a given formula. There are some parallel methods, which enable same kind of calculations. When compared with these methods Delisoft's technology is more efficient and it does not require any technology expertise from the user like the others do. It is a sort of a black-box solution for this kind of calculation problems.

The first commercial application of Delisoft's interval calculation method was Interval Solver for Microsoft Excel spreadsheet software. It is an easy-to-use, add-in application, which is installed on top of Excel. It aimed to be a professionally finished software product with state-of-the-art installation procedure. It enables the users of Excel to type in the initial values for calculations as intervals and gives the results also as intervals. Also the symmetric calculation technology was included in this package.

Another commercial application for the technology is the C++ libraries for software developers. These libraries provide the same features and can be embedded in all kinds of software applications where interval calculation features are desired.

The source organization of the interval calculation technology is VTT. The applied research work that was done there by the founders of Delisoft provided the groundwork for this new, technology-based firm. In the research work both the mathematical knowledge and software development skills were intertwined to form the desired outcome. Somewhat crucial was also the emergence of the 32-bit Windows architecture that provided the necessary platform for the technology.

The intellectual property rights of the technology were originally held by VTT, but Delisoft purchased all rights from VTT and has all the property rights now. There are no patents involved.

#### *Human resources*

When human resources of Delisoft are concerned it is quite obvious that technological skills were the most dominant ones at the beginning. Due to

their long term research work at VTT technological skills were of relatively high quality, even on international level. There had been several international conferences where they had presented their research work. One of the founders had specialized in the science and mathematics while the other had specialized in software development and respective technical issues.

Managerial skills were moderate when compared with the technological skills. The founders did not have any previous business or management experience except for the third founder, who had been the head of a laboratory at VTT and worked as a business consultant since 1994. The other researcher had previously been a part time entrepreneur as a consultant for universities. The management skills of the founders were complemented by their venture capitalist, The Finnish National Fund for Research and Development (Sitra) and its managers through the board of the firm. Another addition to the managerial skills was provided by the son of the third founder, who had both juridical and commercial education and was running his own business providing administrative services.

#### *Financing*

Delisoft started its operations with heavy product development and the plan was that sales revenues would take place shortly after the beginning. This required solid financing which in this case was accomplished. The initial equity capital of Delisoft was only the required minimum, but using other financial instruments a total of 200 000 EUR was raised. The majority of the initial capital was provided by Sitra and the rest was invested by the third founder.

Since Delisoft concentrated on R&D at the beginning it was able to receive financing also from Tekes. This was part of the plan because the founders were familiar with the financing available from Tekes.

The initial investment and the following Tekes funding formed the financial foundation for the new, technology-based firm. With this financial resource the firm was able to start the planned product development. This also implied that the sales revenues had to start within a certain time frame.

#### *Market access*

With totally new and innovative technology and applications Delisoft was entering an unknown territory to begin with. This certainly emphasizes market access in all its aspects. There had been some prototypes during the time at

VTT and some licenses had been sold. This was however marginal and did not provide any market knowledge let alone access to market.

There were not any strategic partners that would have provided market for the new firm. Already at VTT there had been some initial endeavors to contact Microsoft, the vendor of the leading spreadsheet software Excel. Microsoft was naturally the most desired partner for Delisoft. Any detailed plans concerning partnerships and distribution channels did not exist at the beginning.

The market knowledge concerning targeted business areas was also quite limited. It was mainly based on few separate observations. The main conception of markets was built on the global population of spread sheet users and the market volume that they create. Another driver was the generic nature of the technology and its wide application possibilities. But there was no market research done which would have provided information concerning the market, substitutive products, competitors etc.

#### *Contact network*

The three founders of Delisoft had relatively good contacts in the research world. All of them had long careers in research institutes and universities. This provided them with easy access to all relevant knowledge concerning the technology and research. On the other hand they were the leading researchers in this field and thus the added value of this part of contact network was not crucial.

They had also rather good contacts with the financiers. The third founder had previously worked for Sitra and knew their activities as well as the people there. Due to the research projects at VTT they knew Tekes and some people there. This paved the way to negotiations with the financiers.

Contact network in the business dimension was not that good for the founders. There had been some activities in the past with firms the had participated their research projects at VTT. Also Finnish Foreign Trade Association was familiar to the founders, which later assisted Delisoft in internationalization. Contacts to future customers or distributors were almost non-existent.

### *Situational factors*

Some situational factors did also exist. There were some positive role models in sight that had been successful, which affected positively the entrepreneurial thinking of the founders. Purely coincidental factors were the participating in the annual CeBit-show in Hannover, Germany in 1996 (while they were still with VTT), where they presented their technology and its applications. At the same event they also ran across with some Finnish venture capitalists. The interest that they were able to raise at CeBit and the emergence of possible financing made the founders to make the decision to start the new firm.

Furthermore, the status of the research project at VTT and technological advancements that became available had a positive impact on the entrepreneurial process. The nature of the research project changed, which did not quite fit into VTT's line of business anymore. It was quite obvious that there will be a commercial software product as the final output and that is not the business of VTT. The technology concerning PC's had also advanced significantly and Windows with 32-bit architecture was introduced. This made it eventually possible to implement interval solving technologies for PC platforms.

### *Summary*

Delisoft was established in 1996 to commercialize the interval constraint solving technology that was developed at VTT by the founders of the firm. There were three founders which were all former employees of VTT. Two of them started to work for the firm. The operations were started with a significant product development effort and the sales were planned to start after the first products were completed.

The technology was originally developed at VTT, but Delisoft purchased the technology and all its property rights from VTT. The technology provides means for calculations with inexact numbers that are expressed as intervals. It also solves equations and inequalities and enables symmetric calculations, i.e. it calculates the respective input values from targeted output values for a given formula. The first commercial application of the technology was the Interval Solver for Microsoft Excel, the world-known spread sheet software.

The human resources of the firm were all researchers and scientists by background. This implies that the most advanced skills of the firm are



technological skills. There were also some financial and managerial skills present at the beginning. Business, marketing and sales skills were somewhat limited.

Financing of Delisoft was rather well provided. There was a venture capitalist, Sitra involved, which became the major investor in the start-up. One of the founders invested also significantly into the firm. There was roughly 200 000 EUR of initial capital to start with. Soon after the beginning Tekes decided to finance Delisoft's R&D project. On the whole Delisoft was rather well financed.

Market access in this case was not very extensive. There were not any strategic partnerships or any other means for accessing the market, the plan was first to develop the software and after that to market and sell. Some sales had taken place at VTT while the technology was still in its research phase. Their main target was Microsoft and the wide user base of Microsoft Excel spreadsheet software.

The contact network of the new firm was quite good in the research world due to the background of the entrepreneurs. Also some contacts with financiers were there. Other parts of contact network were not equally well developed. Business contacts were few and contacts with future customers or strategic partners were almost non-existent.

Some positive role models, advanced technology becoming available, and the research project approaching its end were some of the circumstantial factors present at the start-up of the new firm. Partly coincidental factors were the participating in the CeBit '96 and meeting some venture capitalists there. Some personal, motivating factors were also there, particularly the fact that VTT was not interested in supporting their research any further.

#### **5.1.4 Case Finnzymes Oy**

Finnzymes Oy is a biotechnology firm that had specialized in restriction enzymes and later on other DNA modifying enzymes, e.g. DNA polymerases. Restriction enzymes are used as a tool in genetic engineering. Finnzymes was established in 1986 by three founders, two of which were researchers and the third one was an experienced entrepreneur and an investor at later phases of the process. Its annual revenues at the time of the interview were 4,5 million

EUR and it employed 25 people. It had already international operations and it was headquartered in Espoo, Finland.

Originally the idea that finally led to starting up the new firm was developed by two students of chemical engineering at the Helsinki University of Technology in mid 80's. They had an assignment where they were supposed to design some kind of a chemical manufacturing process and a factory for that. They decided to design a factory for restriction enzymes. This exercise made them to think about the possibility of creating a business of their own based on this technology. During the completion of the exercise they teamed up with an experienced entrepreneur who was a family friend of the other student.

One of their professors also got interested in the idea and they decided to apply for funding for a research project, which would explore restriction enzymes. They approached Tekes for funding, which was eventually granted. According to one of the founders this was the moment when the true commitment to start up the new firm took place. Both younger founders had a career available at a larger corporation with fairly good benefits, but they decided to go for their own project, which was aimed at starting up a new, technology-based firm of their own.

During the research project they contacted several overseas universities, institutes and companies in the field of restriction enzymes. One of the first ones to respond was a U.S. company from Boston, Massachusetts. It invited the researchers for a visit. The relationship with that company grew deeper and it made it possible to transfer some technologies from the U.S. company into their research project. Their research work proved successful and they managed to discover new enzymes that benefited genetic engineering. After the project they decided to start up their own business together with the third founder and the U.S. company as investors. There were already some potential buyers around at that time who were willing to buy their discoveries.

Finnzymes began already at the beginning to distribute their U.S. partner's products in Scandinavia, which helped them to create revenues early at the beginning. It worked also the other way round, the U.S. company sold Finnzymes' products under its own label providing a worldwide distribution channel for the new firm. The relationship with the U.S. company was very significant and it provided a lot of technology and know-how for this new, technology-based firm.

### *Technology*

The core technology of Finnzymes was the know-how of restriction enzymes or more broadly genetic engineering. Screening, extracting, and refining of new enzymes are the basic technologies involved in their process. Restriction enzymes are used in genetic engineering for precise cutting of DNA sequences. There are some 300 different enzymes identified so far, which all perform a different cutting operation. The enzymes are produced by different bacteria and the key issue is to find all kinds of different bacteria and then to extract the specific enzymes from the bacteria.

The source of the technology in this case is the Helsinki University of Technology in the first place and also to some extent the University of Helsinki as the other founder attended some classes there. A very significant source of technology has been the U.S. company that produces restriction enzymes. It invited the young researchers in and let them learn the essentials of producing restriction enzymes. It even provided the researchers with special computer software, which is used for identification of enzymes.

At the beginning there was not any patenting involved in this industry. Later on it has become the industry standard to patent all new, discovered enzymes. Therefore the real assets of a firm in this industry are the patented bacterial strains that it has in its possession.

### *Human resources*

As human resources of Finnzymes there were the two founders, who started to work for the firm while the third stayed at the background as an investor. The active founders were young researchers with good skills and knowledge about restriction enzymes and about the process to produce them. The skills were purposefully acquired through studying and through specific research work at the university.

Both of the two founders had perceptibly well developed social skills, which were beneficial in many respects. They were able to search and get access to the knowledge they needed whether it concerned technology, financing, or marketing. They were able to build contacts with the academia in order to take up the research project with necessary financing. They also set up a rewarding relationship with the U.S. company and its owner, who later on became their partner. Good social skills helped them also in starting the marketing activities.

Managerial and administrative skills were somewhat limited among the two younger founders, but the third founder provided the new firm with this kind of skills. He had a background as an owner of a medium-sized industrial firm. He also brought in financial skills of high quality.

### *Financing*

When Finnzymes was originally set up it had not any business activities for a while and there was only the required minimum of equity capital. When the business activities started a second round of financing took place at the end of 1987. The third founder and the U.S. company were the investors providing the capital. The total amount of initial capital was 0,1 million EUR. Tekes was also funding the research work that was initiated at the beginning.

Rather shortly after the actual operations of the new firm were started it began to generate cash-flow. This was based on an agreement that Finnzymes would begin to distribute the products of the U.S. company in Scandinavia.

### *Market access*

The market access of the new firm was relatively good at the beginning. There were several reasons for this. First the founders had been working as researchers before they started the firm and thus they knew their target market. Therefore researchers' needs in this field were familiar to the founders and they could address their offerings accurately. They were also able to identify their customers easily.

Another critical factor concerning access to market was the relationship with the U.S. company. The distributorship of their products was crucial for Finnzymes' marketing efforts. There was already a demand for the U.S. products that Finnzymes was able to exploit. The original plan also included the reverse operation. The U.S. company was supposed to distribute Finnzyme's products on OEM (Original Equipment Manufacturer) basis through their channels. Distributing the U.S. products also taught them a lot about the marketing and selling of these products. This lesson was learnt early on which helped them to avoid the typical difficulties that new, technology-based firms often face in marketing and sales.

They also launched a new way of deliveries. They promised deliveries during the same day in the Helsinki metropolitan area and in 24 hours everywhere in

Scandinavia. This idea was based on their own experiences as researchers when they realized how much their work was delayed because of the days-long deliveries of the enzymes they needed.

The market access of Finnzymes in the beginning was exceptionally good compared to that of a typical new, technology-based firm. There were several issues that provided them with the market access to start with: special relationship with the U.S. company, the distributorship of the U.S. products, their background as researchers, and their marketing innovations. All this combined with their good social skills provided them with good access to their target market.

#### *Contact network*

There were not significant contact networks available at the beginning. The founders were familiar with a few professors in the field as well as with some financiers. This contact network provided them with access to technological know-how as well as to managerial and financial knowledge and services. The third founder had previously been an entrepreneur and he had good contacts within the food industry as well as in the financial sector.

What was the most important issue in this respect were the extremely good social skills of the founders. This made it easy for them to build contacts for all kinds of purposes. Without any prejudices they contacted professors, large companies in the industry, financiers as well as potential customers in Finland and abroad.

The social skills were critical also in the development of the critical relationship with the U.S. company and its founder. This contact was very significant in many ways. It provided means for technology transfer, financing and market access to mention few of them. The founder of the U.S. company was personally involved in the relationship with the young entrepreneurs. This commitment was probably one of the most important assets of the new firm.

#### *Situational factors*

As far as the situational factors are concerned one of them was obviously the friendship of the other of the younger founders and the third founder who had earlier been an entrepreneur. This led the chain of events gradually towards the founding of the firm. It provided the entrepreneurial aspect in the pondering of different options.

Obviously there was some kind of ambition also present in the process of starting up of the firm. The young researchers wanted to carry on with their research work without any restrictions and also in the way they wanted. This was best achieved in an own firm.

The founders were also relatively young at the time of starting up the firm and the risk they were taking was acceptable. They thought that they can always start working for some of the companies in the industry in case their own venture would fail.

### *Summary*

Finnzymes was established in 1986, but it started its actual operations at the end of 1987. It specialized in restriction enzymes in the first place and later on in DNA polymerases and also in genetic engineering. It was founded by two young researchers together with an experienced entrepreneur.

The technology of the firm was originating from Helsinki University of Technology where the two founders had studied and later on worked as researchers. During the project they had also created a significant relationship with a company from Boston, Massachusetts. This company was a remarkable source of technology for the new firm. The technology consisted of the know-how concerning the screening, extracting, and defining of restriction enzymes that are used in genetic engineering.

The human resources of the start-up firm brought in several other resources. It was quite natural that the technological skills were good. Two of the founders had purposefully studied and worked as researchers in this field. The third founder had experience in entrepreneurship and especially in financing. He provided also managerial skills and know-how for the new firm. The most important skills that the founders possessed were the social skills, which enabled them to build up contacts and relationships in all necessary areas: technology transfer, financing, marketing, etc.

The firm was relatively well financed to start with. When the actual business operations were started the third founder and their U.S. partner company invested in the company. They received also some R&D funding from Tekes. This covered their financial need for the first two years. In addition to this they were able to initiate the sales revenues almost immediately, which improved

their financial position.

Market access was a significant resource in this case. It was to a great deal due to the strategic relationship with the U.S. company. Finnzymes started to distribute its partner's products in Scandinavia, which provided it with existing clientele. The U.S. company was also supposed to distribute Finnzymes' products. They had also fairly good market knowledge at their disposal at the beginning because of their experience as researchers in the field. Their well developed social skills were fundamental in building up the market access and in maintaining it.

Their contact network at the beginning was quite typical. It covered mainly the university and research world. Some contacts with financiers also existed. The most critical issue in this respect was their ability to build contact network as they went along. The most significant achievement in this respect was the strategic partnership with the U.S. company. The relationship with the third founder, who was an experienced entrepreneur, was also significant.

There were not any situational factors affecting the event of starting up the new firm that would have been crucial. The acquaintance of the younger founder with the experienced entrepreneur can be mentioned as a factor of this kind. It provided the process with some entrepreneurial thinking that lead to the establishment of the firm.

### **5.1.5 Case Sitedesigner Technologies Oy**

Sitedesigner Technologies Oy is a software firm that is specialized in Internet-related technologies. Its main product is an easy-to-use tool for creating and maintaining www-pages. The firm began its business operations in 1996, but had existed as a legal entity for some years before that. The first product of the firm was released at the time of the interview, but any significant sales had not taken place yet. The firm employed three people and it was located in Espoo.

There was only one founder starting up the firm. He is an engineer in information technology by education and he had previously worked for two different companies in pharmaceutical and health-related industries. His last assignment was in Silicon Valley for two years, after which he decided to return back to Finland and start his own business. He was supposed to have a partner to start the firm with, but eventually he ended up starting the firm up

by himself alone.

The founder of the firm had obtained extensive know-how and experience in Internet-related technologies during the period in Silicon Valley and he was able to exploit that asset at the beginning. The firm acquired its first customers practically at the same time as it started its operations. At the beginning it was mainly consultancy services and programming for customers, who were setting up their www-based services. Quite soon the idea of a software tool for this purpose began to emerge and the firm started to shift towards product oriented approach targeting at international markets. The first product launch was in late 1998 and the main sales channel was Internet.

### *Technology*

It is quite obvious that the key technology of Sitedesigner was composed of different Internet-related technologies as well as relative skills and know-how. These technologies included http- and FTP-protocols, HTML-standard, as well as different file formats for pictures etc. In addition to this the strong experience in programming had also an important role. These technologies and respective skills provided the competitive advantage for this new, technology-based firm at the beginning. It is important to notice that at the time of the interview Internet was on the threshold of its break-through and expertise in these technologies and skills were scarce.

It is a bit difficult to define the source of the key technology of the firm. It had accrued over time as skills and capabilities of the founder and one cannot say that it was transferred from some specific source. Important contributors to this development were among other things keen interest in computers and programming at young age, studies in engineering, previous work experience in software business and perhaps most of all, the opportunity to watch the rise of Internet in a box seat in Silicon Valley.

There was not any patenting involved in this technology at the beginning. Most of the Internet technologies are commonly shared knowledge and available to everyone. Then again the real know-how and the technological assets are embedded in the programs, which are typically protected by copyright and cannot be reverse engineered. This gives in practice a rather good protection for the technology of the firm. There is one piece of technology that is licensed to the firm. That is the GIF (Graphics Interchange Format) format for picture files, which is patented by a major U.S. computer



manufacturer.

### *Human resources*

Also in this case the technological skills were the dominant human resources available at the beginning. The founder had strong experience in Internet-related technologies and in programming as well as in managing large software development projects. This formed the technological foundation of the firm.

There were limited marketing and sales skills available for the firm at the beginning. The founder had some experience in customer relationship management due to his previous work career. In addition to this there were social skills present that made up the lack of experience and skills in marketing. There was also some management skills present at the beginning. The founder had run quite large product development projects in the past and therefore had some experience in managing projects and people. On the other hand there was not any significant previous experience in managing a firm in all its various duties like administration, financing, cash management, and so on.

### *Financing*

Sitedesigner was started up with relatively little capital, only 25 000 EUR. The source of financing was the savings of the founder, which he had put aside during the period in the U.S.A. There was not any outside capital involved at the beginning.

An important factor was that there were already contracts with the first customers to start with. These were consulting and programming services which were related to Internet-technologies. This made the sales revenues to start immediately at the beginning, which was the most important source of financing for the new firm.

The founder of the firm perceived the initial financing as adequate when he decided to start the new, technology-based firm. He found his savings to cover the necessary investments at the beginning and he also trusted the sales income to start immediately. The founder said that afterwards he has realized that the financial resources at the beginning were clearly too small, but he didn't have enough experience nor knowledge concerning these issues. Therefore his perception was that there were enough financial resources in place to start a new firm.

### *Market access*

The founder of Sitedesigner had some customer relationships established already before he started the firm. One of these was his former employer Wallac Oy, a subsidiary of EG&G in Finland. There were also some contacts to firms, which were looking for a subcontractor for programming work. On the other hand there were neither any partnerships nor any agreements that would have contributed to the marketing or the sales of the new firm.

The knowledge concerning the target market, competitors and different customer segments was somewhat limited. Some market surveys had been done by the founder himself regarding competitors and substitutive products. A great deal of the vision in this respect was based on the fact that Internet is growing at an enormous rate and it will inevitably create an increasing demand for this kind of products and services.

All the marketing was done by the founder himself. He made some campaigns at the beginning offering Sitedesigner's products and services to targeted groups of potential customers. These efforts did not yield much sales and the sales revenues were mostly based on the initial customers that were already there at the beginning.

### *Contact network*

The contact network at the start-up phase of Sitedesigner was almost non-existent. The founder had just returned from the U.S.A. and settled down in the Helsinki area. He did not have a very large contact network there and started purposely working on this issue trying to create a network of contacts and the advanced social skills of the founder were clearly of benefit here. On the whole it could be said that the contact network at the start-up was rather limited, which was partly resulting from the withdrawal of the other founder.

### *Situational factors*

In this case there can be found several different situational factors that affected the event of starting up this new, technology-based firm. The returning of the founder back to Finland from Silicon Valley was one of the most significant factors. He had a kind of a break point in his work career that provided an encouraging situational factor. It is also quite obvious that the enormous growth of Internet and the increasing demand for software and know-how related to it provided a true window of opportunity. The founder had also had a dream of his own firm with professional software products.

This was accompanied by an inclination for creating wealth. One of the reasons he also mentioned was that he had no children which made it somewhat easier to make the decision.

### *Summary*

Sitedesigner Technologies Oy was founded in 1996 and it specialized in Internet-related technologies. Its main product is a software application for creating and maintaining www-pages. At the time of the interview the firm employed three people and its annual sales were around 170 000 EUR.

The key technology of the firm is comprised of different Internet-related technologies and the know-how of these technologies. There are no patents involved and the technology is available to all. The competitive advantage of the firm is the ability to exploit these technologies in easy-to-use commercial software products. The source of the technology is in the previous work career of the founder, especially in the work he did during the period in Silicon Valley. The technology was not transferred in the traditional way from the previous employers, it was more because the founder was exposed to these new technologies and he started to acquire information and to develop skills in this field.

There were little human resources and different skills present at the start-up. There were originally two founders, but the other one withdrew shortly before they were supposed to start. The available skills were mainly technological, but some social and marketing skills were also there. The founder had some management experience having managed large software projects during his previous career.

There was also limited initial capital at the beginning and it was all invested by the founder himself. The main source of financing was the sales income which started immediately. An important point in this respect is that the founder perceived the financing as adequate, which he afterwards did not.

Market access was quite limited and it was based on the few contacts that the founder had established before he started up the firm. These contacts brought the first assignments, which involved consultancy and programming services. Market knowledge was scarce and rested mainly on the surveys made by the founder himself.

Contact network was very thin at the beginning. The founder had just returned from Silicon Valley and settled down in the Helsinki area. Also the withdrawal of the co-founder worsened the situation. This was partly compensated by the social skills that the founder possessed. This influenced very likely marketing, financing and partnership formation at the beginning.

Relatively many situational factors can be found in this case. Returning from the U.S.A., no children, a dream of a firm of one's own with commercial software products were some of these. Huge growth of Internet also opened up a tempting window of opportunity for this kind of a new, technology-based firm.

### **5.1.6 Case Aplac Solutions Oy**

Aplac Solutions Oy was established in 1998 to commercialize a software package that had been developed at Helsinki University of Technology. The software is used for electronics design automation by electronics designers. The firm was founded by a group of eight people and a venture capitalist. Roughly half of the founders remained working at the university while the others started to work for the firm. It employed nine people at the time of the interview and its sales revenues during the first fiscal year (six months) were 700 000 EUR. The firm is located in Espoo.

The development of the technology of Aplac Solutions was started at Helsinki University of Technology as early as 1972. In 1988 it was adopted by Nokia, which fuelled the development work. Later on during the 90's it was also sold to a number of other users by the university. Because of this the reputation of the software had grown and it gave the new, technology-based firm a real jump start. Another reason for this was the big initial customer, Nokia, which was already using the software quite extensively. This made it possible for Aplac Solutions to grow from four employees to nine employees in less than a year.

The business operations of the firm cover both the sales of software licenses and respective services like maintenance and consultancy. Their main clients are electronics manufacturers, especially those of radio frequency equipment. They had already substantial international sales and they were planning to expand their operations overseas.

### *Technology*

The key technology of Aplac Solutions is embedded in the software that is used for design and analysis in electronics design work. It comprises of different mathematical algorithms that make up the nucleus of the application. The architecture of the application is very innovative and it allows it to be modified for different purposes and design functions. The innovativeness extends also to the user interface, which enables the user to perform complicated operations without digging oneself in to the algorithms themselves. Object oriented programming was also adopted at an early stage.

The research work on this subject commenced at Helsinki University of Technology (HUT) back in 1972. Since then there has been a steady research work contributing to this technology. The source of the core technology in this case is clearly HUT. In 1988 Mobira, which is today known as Nokia Mobile Phones, began to use this technology and this fueled the research and development significantly. Nokia participated also in the development work. It was estimated that by 1996 over 100 man years of research and development work had been invested into this technology.

Because of the tradition in Europe concerning software there are no patents involved in this technology, only copyright. The law in Finland at that time allowed the researcher in a university to retain all the rights concerning the results of the research. In this case it made the situation rather complicated. Over the years there had been several researchers working on the technology and the copyright belonged to all of them. Nokia also had a share of the rights. In planning the business of the new firm it was set as a prerequisite that all the rights must be controlled by the firm. Quite a sophisticated setting was constructed with which all of the copyrights were transferred exclusively to the firm. This process took nearly two years to complete and it also delayed the start-up of the firm.

Because of the relatively long period of research behind the technology it was well proven and it provided the new firm with a solid technological foundation. It had developed into a unique tool with many different features in the same package and with an advanced user interface. Substitutive solutions require several different applications, which are often difficult to integrate.

### *Human resources*

There were relatively many people involved in the establishment of Aplac Solutions. These people formed different interest groups in relation to the new firm. Two key groups emerged, which were the 'entrepreneurs' and the 'IPR-holders' (IPR = Intellectual Property Rights). The entrepreneurs were those who began to run the firm and they came from industry whereas the other group, IPR-holders, were researchers who remained working at the university. Most of those coming from the industry had been working for Nokia. The entrepreneurs were four in number and the IPR-holders three.

The skills represented by the founders were of relatively high quality. All founders were quite experienced with long careers both in industry and in research work. Technological skills were also in this case the most significant ones. The founding team had all the necessary skills that covered the whole technological spectrum of their business. The other group of founders, who stayed at the university, tapped the firm to the latest relevant know-how.

Marketing and selling skills were also present to some extent. The founders coming from the industry sector had some experience in marketing-related activities, but this was not at the same level as the technological experience. Sales experience was also nearly non-existent. There were management skills available because of the industrial work experience of the entrepreneurs. These skills were mostly related to management of people and projects whereas entrepreneurial management skills were scarcer at the beginning.

One of the human resources worth mentioning was a senior consultant with long experience in electronics industry. He was acting as a mentor for the founders during the start-up process. He provided them with experience in the management and in running the firm.

On the whole the human resources as well as the skills and capabilities were rather well available at the beginning for the new firm. The human resources were naturally emphasized on the technological side, but there were sufficiently other skills present as well.

### *Financing*

Financial resources for Aplac Solutions were very good to start with. This was because of the venture capital investor who came along at the very beginning

and also because of the relatively large group of founders. Together they brought in initial capital worth 400 000 EUR. This made it possible for the firm to set up an organization required by the business processes and also to focus on core issues.

Another contributing factor was the sales income, which started almost immediately. This was mainly because of their first customer, Nokia, which signed a maintenance agreement with the new firm as first things. Nokia was using the software already quite extensively and was willing to make this kind of a contract with Aplac Solutions. The sales of new licenses started relatively soon, too. This was due to the sales that HUT had done during the previous years. That sales work had created a reputation for the software. It was actually a bit surprising that only less than half of the sales revenues came from Nokia during the first six months.

The financing of the start-up was perceived sufficient by the founders. At least it was by no means considered as any restricting factor and it enabled the firm to set up a right kind of an organization and business processes.

#### *Market access*

Because of the long history of development and especially the sales, that HUT had achieved, the market access of Aplac Solutions was relatively good. There were already more than 100 software licenses sold when Aplac Solutions was started. The Aplac name was also already launched by HUT and it was known among the people in the industry. The most important user was without doubt Nokia, which also provided a very good reference site for the new firm. Nokia had also a very large network of different kinds of partners, subcontractors, etc. that made up a large clientele. There were also a large number of scientific papers published about the technology and the software, which contributed to the reputation of the software.

The founders put also emphasis on the market knowledge at the start-up phase. They purchased a market study from a global market intelligence firm IDC, which provided them with relevant information concerning the target market, which was electronics design automation. They were also quite familiar with the competitors in the field and they were also able to identify the smaller ones of them, which had not been reached by IDC's survey. They also got hold of the potential client companies around the world, but finding the right people within these companies was more difficult. Internet proved very useful

for them in this respect.

They had not any partners in the marketing side. This was quite natural since their product is quite complicated and demanding, which makes direct sales almost the only option. It also requires well established support and maintenance services, and this is possible only with direct contacts to the customers.

They did not make any marketing efforts at the beginning to enter the market or to gain market share. They were able to start selling immediately without practically any marketing efforts. There was already a demand for their products out in the market and HUT also directed inquiries concerning the software to Aplac Solutions.

#### *Contact network*

There existed a contact network at the beginning, which provided the firm with necessary resources. This network comprised of different segments: It was partly brought about by the founders themselves since they were experienced and had worked in the field for long. Nokia, the previous employer of some of the founders and their key customer, provided also a significant contact network. Furthermore, the researchers at HUT had built an international contact network over the years, which also contributed to the new firm. The senior consultant, who became the chairman of the board, brought also in significant network at the firm's disposal.

These contacts, which were available for the founders, contributed the founding process in many ways. They played an important role in raising the financial capital needed to start up the firm. They provided operational links to the key customers as well as to new, potential customers. A unique kind of a partner was of course Helsinki University of Technology because of the researchers there as owner's of the firm. This partnership made up also a significant share of the R&D resources and technological know-how of the firm.

The social capital of the founders and the new firm can be said to be exceptionally good at the beginning. This most likely paved the way of the founders in many ways. Perhaps the most significant contribution was related to marketing and sales, which made the sales revenues to start shortly after the start-up.



### *Situational factors*

The role of the situational factors in this case is not very important. All of the founders had strong confidence in the possibilities and the potential of the software and in this respect it provided the window of opportunity for them, which had evolved over time as the technology advanced and the selling of software licenses took off. Those founders, who came from industry and became entrepreneurs, identified some issues of situational nature in their environment. They found their career opportunities somewhat limited in a large multinational company where they had specialized in this particular software application. This can be considered as a push factor that affected the event of starting up the firm. Rather than as a result of significant situational factors the process of starting up Aplac Solutions can be seen as an outcome of a long term, goal oriented process with careful planning to found the firm.

### *Summary*

Aplac Solutions was established in 1998 to commercialize the technology that had been developed at Helsinki of University of Technology and Nokia (formerly Mobira) during the past quarter of a century. The technology was in a form of a software application that is used for electronics design automation. It had already been sold by HUT to several customers worldwide before the new firm was started. The most important customer was Nokia, where some of the founders worked before they became entrepreneurs. Another group of founders worked as researchers at HUT where they also remained after the firm was started.

The key technology was the result of a long-term research work and it originated from HUT. The technology makes it possible to automate electronics design and it also makes it possible to combine different design functions in the same application. The architecture of the system makes it easy to modify for different purposes and easy to use. To transfer all the copyrights of the technology to the new firm took quite a lot of effort and resulted as a somewhat complex construct where all the IPR-holders including Nokia became stakeholders.

There was a large pool of human resources present in the start-up process. It provided the new firm with multiple skills and capabilities. The technological skills were again the most completely represented, but there were also management and marketing skills available for the firm.

Financing was also sufficiently provided at the beginning. This was brought in by a venture capitalist and the numerous founders. The sales revenues started also fairly soon after the start-up, which contributed significantly to the financial position of the firm.

There was a remarkably good market access at the beginning. This was based on the work done by HUT over the years in the field of scientific publications as well as in actual sales. This meant an unusual market reputation for a start-up firm. Nokia as a reference customer was also a significant asset in this respect.

The contact network was exceptionally good for the new firm. It accrued from many different sources. The founders had long careers behind them and they were many. Nokia with its partners provided an important part of their contact network. They also had a mentor who is an experienced, senior consultant with wide networks. This all added up to a significant social capital.

There were not many situational factors affecting the event of starting up this new, technology-based firm. Some push factors in present employment of the founders can be found as well as a window of opportunity was clearly there. The new firm was an outcome of a goal-oriented, well planned process which took place over a relatively long period of time.

## **5.2 Cross-case analysis**

All of the firms that were studied as cases were clearly technology-based firms. They exploit technology and knowledge intensively in their business operations. It can also be argued that the case firms' competitive edge derives from technological innovations. Also the majority of their personnel have technological education.

The case firms are also all privately owned and the owners or at least one of them works full time for the firm. The mean age of the firms was 3.7 years at the time of the interview; one of them was eight years old, another one was four years, and the rest of them were less than three years old.

Two of the studied firms had generated significant sales revenues and the other four were still at R&D phase or their sales were just starting. Two of the

firms had practically no sales revenues at all. The firms employed 11 people on average and the range was from two people to 25 people. (Table 5-1)

Table 5-1. Summary of the case study firms.

<i>Firm</i>	<i>Year establ.</i>	<i>Sales (mill. EUR)</i>	<i>Personnel</i>
Remtec Systems Oy	1994	1,35	15
Oy Juvantia Pharma Ltd	1997	0,17	12
Delisoft Oy	1996	-	2
Finnzymes Oy	1986	4,5	25
Sitedesigner Technologies Oy	1996	-	3
Aplac Solutions Oy	1998	0,7	9

### *Technology*

Technology as well as technology related skills and knowledge appeared to have been strongly present in each case's start-up process. In nearly every case the key technology became available in some particular way, which then had been the critical catalyst for the start-up process. There was not any firm, where the process would have started because of some market opportunity, at least as the first issue initiating the process. Only the case of SiteDesigner Technologies differed to some extent from this stereotype. The environment's role in regards with the availability of the technology resource was recognizable in the case firms. Most often environment's impact was that of the source organization that acted as the 'technology incubator' for the founders. Based on the case study evidence it can be said that technology was clearly the most central factor in the start-up process.

### *Financing*

The initial assumption in this study was that financing and more importantly the availability of financing would have a major impact on the entrepreneurial process. When the case evidence was analyzed it caught attention that the amount of initial capital varied significantly across cases. The reason for variation in the amount of initial capital is presumably due to different business models of the case firms. Another reason is probably the differences in targeted business volumes and growth rates. It was also evident that the perceptions of available financing were crucial in this regard. In fact, one of the case firms' founders reported that he perceived the financing as adequate

to start the firm, which he afterwards did not. It also turned out that the perceived initial sales earnings affect the role of financing in the start-up process. Early sales earnings seem to be a substitute for initial capital. The longer it takes to generate sales revenues the more initial capital is needed. The evidence from the cases also indicated that there were no typical modes for raising the necessary funding at the inception phase. Furthermore there was neither minimum nor typical amount of initial capital that would have enabled the creation of a new firm.

#### *Human resources*

Concerning human resources in the case firms a clear pattern can be observed. All except one have a team of active founders and at least one additional founder, who stays at the background and does not work full-time for the firm. These background founders or 'business angels' are typically mentors, investors, or both. In one case the available financing did not carry the weight of all founders and therefore they remained at their previous employment and in another case the other founder started his own, separate firm, where he started to work. Only one of the case firms was started by only one founder, which however was not the original plan. The fact that there is a founding team in place seems to have an impact on the start-up process. In some cases having multiple founders may be due to the industrial property rights, in some other cases it may be because of assembling the desired skill set. Then again it may simply be about sharing the risk.

#### *Contact network*

The case interviews also explored the role of social capital issues during the start-up process. In the launching platform concept social capital was operationalized as contact network. The founders were asked what kind of a contact network was at their disposal during the start-up process and how did it affect the process. In every case there were some contacts in place, which the founders perceived as important or at least useful in some way. In some cases there were significant social skills present, which contributed to social capital. Social skills for their part are embedded in human resources of the firm. Like the extant literature suggests social capital identified in the case firms contributed significantly to resource acquisition (Baron & Markman 2002, Honig 1998, Birley 1985). Most often it was related to either the acquisition of financial resources or to the acquisition of market exposure or market access. Some case firms reported that they knew people at Sitra or at Tekes and this paved the way for arranging necessary financing at the

beginning, or there was a friend of the founders, who became an investor in the new firm. Contact network also seemed to entail mentoring services for the firm from experienced people with useful skills and knowledge. Therefore it can be concluded that social capital enables also human resource acquisition. Naturally social capital issues had been strongly present in the process of assembling the founding team with complementary skills and capabilities.

#### *Market access*

Market access was a concept applied in the interviews to measure access to target market, market exposure, and market knowledge available for the firm during the start-up process. The case study data showed significant variation regarding market access among the case firms. In Aplac's case the market access was extremely good because of the sales that had taken place already before Aplac's launch, during the research project and because of a significant initial customer, Nokia. Delisoft's case, if possible, is the other extreme. There were practically no initial market exposure, no initial customers and only limited market knowledge was available. This finding implies significant differences in perceptions concerning marketing and market opportunities. It is noteworthy that the perceived opportunities originated more from technology issues than from market issues. For example the emergence and rapid growth of Internet and respective technologies was significant in Sitedesigner Technologies' case. For Delisoft it was the wide adoption of spreadsheet software as the tool for calculations and the emergence 32-bit Windows operating system together with more powerful PC's.

#### *Situational factors*

In every case there were some kind of situational factors present, which affected the start-up process. The most typical situational factor was a discontinuity in the previous employment or assignment, e.g. a research project was approaching its termination. Another situational factor of this kind was that the founder relocated to some other region. In some cases founders perceived the emergence of opportunity as a situational factor. Situational factors can be treated as uncontrollable random parameters in the entrepreneurial process since their emergence is impossible to foresee and their origin is typically rather complex and it cannot be attributed to any particular part of entrepreneurship. When analyzed from the launching platform point of view it appears as if situational factors compensate deficiencies in other components of the launching platform. It implies that situational factors may trigger start-up process even though other factors are

not all in place yet. Therefore situational factors clearly have a role in the entrepreneurial process which must not be ignored. However, the nature of this kind of a factor is different from the other elements of the launching platform. It is usually a triggering factor in the process, which has a precipitating role.

It was also a clearly observable pattern that in almost every case there was a founding team that had started up the new firm, in fact only one of them was started by a single entrepreneur. This finding resonates with previous studies (Roberts, 1991; Timmons, 1994). A special pattern was also that in four out of six cases there was a so-called background entrepreneur (or entrepreneurs) as part of the entrepreneurial team. It appears that assembling a team of founders is typical for a technology-based start-up. Based on the case study evidence the bias towards multiple entrepreneurs is related to issues like sharing risk, raising the necessary financing, shared intellectual property rights, and need for human resources and respective skills.

A summary of different environmental factors and their role in the start-up process is presented in Table 5-2.

Table 5-2. The role of different factors in the start-up process of the case firms.  
(+ = strongly present, + = present, +/- = neutral, - = not adequately present)

<i>Factor</i>	<i>Remtec Systems Oy</i>	<i>Oy Juvantia Pharma Ltd</i>	<i>Delisoft Oy</i>	<i>Finnzymes Oy</i>	<i>Sitedesigner Technologies Oy</i>	<i>Aplac Solutions Oy</i>
Technology	++	++	++	+	+	++
Financing	-	++	+	+/-	-	++
Human resources	+/-	++	+/-	+	-	++
Social capital	+	+	+/-	+	-	+
Market access	+	+	-	+	+/-	++
Situational factors	+	+	+	+	++	+/-
Team	++	+	+	+	-	++

### *Discussion*

Following Yin's (1994) methodology the pattern matching concept was applied in analyzing the case firms. The point of departure for this analysis was provided by the literature review, especially the theories of planned behavior,

population ecology and resource dependence. Drawing on these theories the launching platform framework was constructed for analyzing environment's role in the entrepreneurial process in the case firms' start-up process. Intentions proved to be difficult, if not impossible to explore ex ante during the case study. On the other hand the case study can be seen as exploring the entrepreneurial behavior retrospectively. The role of personal perceptions was to some extent visible in the cases and the role of perceptions could be tentatively analyzed.

When analyzing the case studies few patterns emerged, some clearly, some more vaguely. Perhaps the most evident pattern was the role of technology and the respective knowledge as a resource in the start-up process. Technology was clearly the starting point for the entrepreneurial process in all of the cases. Perceptions concerning technology, its availability and its progressiveness appeared as a strong factor in the entrepreneurial process.

Another, a relatively clear pattern was the composition of the founding team. In all cases except for one there were active, 'hands-on' founders and at least one non-operative, 'background' founder. The exception was also the case with only one founder, in which case it was however not the original plan. This pattern is related to human resources, and respective skills and competencies available for the firm. It seems that during the start-up process founders pursue assembling as wide pool of committed human resources as possible. It can be concluded that there probably is a sort of a threshold level, at least conceptually, which must be achieved so as to take the entrepreneurial process forward. Again the perception of human resource availability and the perception of their adequacy are of importance here.

The role of available financing at the start-up phase turned out a bit differently from what was anticipated. The expectation was that financing would have a pronounced role in the start-up process. When analyzing the evidence from the case studies it appears that the role is not that crucial. It is naturally an important ingredient in the process, but the nature of available financing's role is perhaps more like a facilitating one. The impression is that the availability of financing does not initiate the entrepreneurial process in any way. Financing of the start-up is assembled in several different ways once the other, seemingly more crucial factors are already in place. Concerning available financing the role of perceptions appears to be central. One of the interviewees testified that his perception of the adequacy of the financing at the inception was too

optimistic. It was also discovered that anticipated early stage sales earnings have to be included in the perceived available initial financing.

The relevance of social capital in the start-up process was also supported by the case evidence. The pattern of resource acquisition through contact network, which had already been reported by several studies (Baron & Markman 2002, Honig 1998, Birley 1985), was clearly observable in the cases. The founders in each case were able to identify at least some relevant contact or acquaintance that affected the start-up process. Typically the contacts were exploited in raising the necessary financing, assembling the founding team with desired human resources and capabilities, or accessing market and potential first customers as well as partners. Social skills emerged as an important factor related to human resources when social capital's and contact networks' impact was explored.

During the case study the impact of situational factors was also explored. Their impact appears as decisive in many cases. However, the role of situational factors is difficult to control. It is important to understand the precipitating role of the situational factors in the entrepreneurial process. This finding supports Krueger's (2000) revised model of entrepreneurial intentions and entrepreneurial behavior, where precipitating factors moderate the relationship between entrepreneurial intentions and entrepreneurial behavior. Situational factors can be seen as sort of a ballast among the factors initiating the start-up process, i.e. they compensate the lesser role of other factors in the start-up process.

An important finding of the case study was the intertwined relationship of many of the explored factors that affect the entrepreneurial process. For example, social capital provides means for acquiring other critical resources that are missing, e.g. financial resources or human resources. Similarly, available human resources with embedded social skills contribute to social capital by enabling networking and building of personal contacts. Again, increased social capital loops back to the availability of human resources.

In this case study it is worthwhile noticing that the role of physical resources was practically non-existent in the cases studied. When asked about other significant factors in the start-up process none of the interviewees mentioned physical resources like space, raw materials, machinery, etc. as a critical resource in the start-up process. This is most likely due to focusing on



technology-based firms, which are typically not dependent on physical resources.

A summary of the case study's findings is presented in Table 5-3.

Table 5-3. Summary of case study findings.

<i>Finding</i>	<i>Type</i>	<i>Role</i>
Technology	Resource	Critical resource, often initiates the entrepreneurial process, source of the technology has a role also
Human resources	Resource	Relevant resource, brings in different skills and capabilities, usually founders, attracts special attention during start-up process
Financing	Resource	Facilitating resource, not the most meaningful resource, which would initiate the entrepreneurial process
Social capital	Resource	Special kind of resource, affects almost all other resources by providing means for acquiring other necessary resources as well as access to customers and knowledge
Market access	Resource	Diverse role, involves significant differences in personal perceptions
Situational factors	Precipitating factor	Hard to categorize and control, affects significantly the entrepreneurial process (e.g. termination of previous employment, relocating to new environment, role models)



## **6 Discussion**

In this chapter the findings of this study are first discussed in the light of the previous studies, both the areas of convergence and the areas divergence. After that the conclusions of the study are discussed followed by the limitations of the study. Finally the implications of the results for policy and for theory are discussed as well as proposed directions for future research.

### **6.1 Areas of convergence**

The findings of the survey and the findings of the case studies support one another concerning the central role of technology-related resources in the entrepreneurial process and in the development of entrepreneurial intentions. It seems that technology-related issues are important concerning the development of entrepreneurial intentions as they are important in the process of starting up a new technology-based firm. Also the weak positive relationship between perceived market access and entrepreneurial intentions in the survey data is coherent with the pattern found in the case studies concerning the access to market and initial customers.

Our modified entrepreneurial intentions model was tested by the survey data. It explains reliably variations in the entrepreneurial intentions as a function of environmental variables. It appears to establish a valid relationship between entrepreneurial intentions and affective environmental attributes as well as between entrepreneurial intentions and rational environmental attributes.

The results of the study support Gartner's (1985) conceptual framework for new venture creation where the relationship between environment and individual in new venture creation is defined. The results of this study provide an operational link between those dimensions of the framework of Gartner (1985). These results are also congruent with previous studies, which have focused on the relationship between attitudes toward entrepreneurship and entrepreneurial intentions (e.g. Ajzen, 1991; Krueger, 2000; Autio et al., 2001). There was a rather strong positive relationship between perceived desirability and entrepreneurial intentions as well as between perceived feasibility and entrepreneurial intentions.

Available financial resources did not show significant association with entrepreneurial intentions. This correlates with the finding of Bergmann

Lichtenstein and Brush (2001) that financial capital was hardly ever mentioned as a salient resource by the studied firms and technology for its part was mentioned most often as a salient resource in their study.

## **6.2 Areas of divergence**

The analyses of the survey data and the case study data revealed several areas of divergence. In the case studies the role of opportunity perception, financial resources, contact networks and human resources appeared as significant in the entrepreneurial process whereas they did not show any significance in the survey data concerning entrepreneurial intentions. Also role models appeared slightly differently in the case studies and in the survey.

In the survey data there appeared to be no relationship between market opportunity and perceived feasibility of entrepreneurship. This finding of our survey is somewhat contradictory with the case study, where a perceived opportunity of some sort was observable in some case firm's start-up process. This opportunity however was typically rooted in technology, not in market-related issues. Our findings alarmingly support the common perception of Finnish high technology entrepreneurs, which are deemed to be too much technology-oriented and ignorant concerning market-related issues.

Also the role of financial resources appeared differently in the case study and in the survey. The case studies provided evidence concerning the important role financial resources in the start-up process whereas the survey data did not show any relationship between perceived availability of financial resources and entrepreneurial intentions.

Similarly in many of the case studies the influence of contact networks was evident whereas the survey data did not show any relationship between contact networks (social capital) and perceived feasibility of entrepreneurship. The case studies provided evidence that contact networks of the founders contributed to resource acquisition, e.g. raising the necessary financing for the start-up firm or assembling the pool of human resources.

Availability of human resources did not correlate with entrepreneurial intentions in the survey data. It is relatively difficult to interpret this finding. It appears as if the fact that the founders have the necessary skills and experience does not matter when entrepreneurial intentions are concerned. In other

words people without necessary skills and experience can equally develop entrepreneurial intentions when compared with people with experience and skills. The explanation behind this may be that the perceived importance of this kind of a resource is not significant and therefore the availability or the lack thereof does not affect entrepreneurial intentions in any way. The case studies, however, showed that assembling human resources is central in the gestation process. In almost every case firm there was a clear tendency to assemble a pool of human resources for the new firm. The firms had assembled management teams with diverse skills. In many cases there was also a so called background founder or a 'business angel' involved.

The testing of the modified intention model that was performed using the survey data showed also that there are direct influences between entrepreneurial intentions and the environmental factors. Social identification affected entrepreneurial intentions directly in our survey data unlike expected. There were also environmental attributes in the model, which seemed to have no significance regarding entrepreneurial intentions whatsoever. These variables were role models, perceived opportunity, and perceived availability of financial resources, perceived availability of social capital (contact networks) and perceived availability of human resources. Also the model did not fit the data well. These findings indicate that a need for better models for defining the relationship between the entrepreneurial environment and entrepreneurial intentions exists.

Some of the findings of this study are contradictory with the extant literature. The fact that entrepreneurial role models did not show any relationship with entrepreneurial intentions in the survey data and appeared only weakly in the case study data is different from the extant literature where the relevance of entrepreneurial role models has been reported (Shapero, 1982; Roberts, 1991; Krueger, 2000). The survey data also showed that social identification influences the entrepreneurial intentions directly and not through the perceived desirability like Krueger (2000) suggests.

The survey data showed that there is only a weak relationship between perceived availability of resources and perceived feasibility of entrepreneurship. This finding is somewhat contradictory with Gartner's (1985) framework, where many of the environmental factors were related to resources and resource availability. However, the case study showed that resource availability plays an important role in the start-up process. This

finding supports Gartner's (1985) framework and also the study of Bruno and Tyebjee (1982). Therefore it appears quite clearly that resource availability does not influence entrepreneurial intentions in the early phases of the entrepreneurial process, but gains importance towards the actual event of starting up the new firm.

Somewhat surprising finding of the study was also the insignificant roles of factors like opportunity perception, networking and social capital as a resource and availability of human capital. Drawing on extant literature (Kirzner, 1979; Shane and Venkataraman, 2000; Alvarez and Busenitz, 2001; Eckhardt and Shane, 2003) the role of opportunity perception in the entrepreneurial process is central. In our sample opportunity perception did not relate with entrepreneurial intentions. The definition of entrepreneurial opportunity usually involves market-related issues like target customers and demand for a product or a service (e.g. Timmons, 1994; Singh, 2000).

Social capital and contact networks did not correlate with entrepreneurial intentions in our survey. Many researchers have provided evidence concerning social capital's relevant role in entrepreneurial process (Birley, 1985; Jarillo, 1989; Honig, 1998; Baron & Markman, 2000, 2002). Based on our finding it appears that social capital is not perceived as a resource, which is critical in the entrepreneurial process – at least ex ante. This may be due to nascent entrepreneurs' limited understanding of how several different kinds of resources could be available through networks. Again, this may reflect national characteristics and culture, which in Finland has been claimed to be independent and self-reliant. Becoming dependent on others' help and resources may hence be somewhat undesirable.

### **6.3 Limitations of the study**

This study has focused on environmental factors and their impact on entrepreneurial activity through entrepreneurial intentions. While approaching this challenging task we have made some simplifications. For example, the assumption that all factors examined here are dependent only on the prevailing environment may simplify the phenomenon excessively. There is likely to exist other dimensions apart from entrepreneurial environment that affect the factors deemed as environmental factors here. However, these factors undisputedly differ from environment to another and therefore they can be seen as dependent on the environment. It is also possible that there are more

environmental factors that affect entrepreneurial intentions either through perceived desirability, through perceived feasibility, or directly, which were not included in the model.

The path analysis of the model revealed that the model does not fit the data very well, which means that there probably are other models which would fit the data better. However, we wanted to apply the modified intention model to establish relationships between the environment and entrepreneurial intentions and also to establish causal relationships between the affective and rational environmental factors and entrepreneurial intentions.

The theoretical approach of this study deserves also critical evaluation. The underlying assumption behind the whole study was that entrepreneurial intentions yield entrepreneurial behavior and activity. This causality was not tested in any way, but rested on the findings of the earlier studies. Also the constructs that were applied in the survey concerning resource availability have not been tested in any other context and thus the reliability of those constructs and their operationalization require more evidence from different populations before this approach deserves more credit. The purpose of these constructs was to measure the perceptions concerning the availability of critical resources. The questions harnessed for this purpose may not be ambiguous enough to eliminate misinterpretations by respondents.

It should be critically assessed whether the questions applied in the survey questionnaire operationalized the constructs reliably. Furthermore, it is also worth considering whether the questions were articulated clearly enough to eliminate possible misinterpretations.

We must also bear in mind that this study was carried out in Finland and may therefore carry national or cultural biases that can cause these results to be inapplicable in some other geographical regions and cultures. However, the explicit purpose of this study on one hand was to find explanations for the relatively low entrepreneurial activity in Finland and on the other hand to come up with conceivable measures for promoting entrepreneurship in this context. More data and studies from Finland and other countries are required to assess national differences further in this respect.

The fact that this study was not longitudinal by nature is clearly a limitation. In order to explore entrepreneurial intentions and especially the factors that are

critical in this respect it would undoubtedly have added validity if a longitudinal study had been carried out. Our data in fact suggests that different factors affect attitudes toward entrepreneurship at different phases of entrepreneurial intentions development process.

The case study approach to entrepreneurial process was retrospective by nature whereas the survey sample was compiled of individuals deemed as nascent entrepreneurs. This difference in perspective between these two approaches may cause misleading interpretation of the findings. A possible source for unreliability of results may also derive from the relatively low response rate of the survey.

However, with these limitations this study provided operational relationships between Gartner's (1985) two dimensions (environment and individual) in his conceptual framework for new venture creation. The statistical analysis also showed evidence that the modified intention model of this study explains the causal relationship between the two dimensions. The two perspectives that the two phases of data collection offered revealed the possible multi-phase nature of the entrepreneurial intentions' development process.

#### **6.4 Implications for theory**

The conceptual framework for new venture creation by Gartner (1985) establishes relationships between four significant dimensions of new venture creation: the individual, the process, the environment, and the organization. This study established a causal and operational relationship between two of these dimensions: the environment and the individual. The evidence of this study shows that there are affective and rational factors in the environment that affect the attitudes of the individual towards entrepreneurship and new venture creation. These attitudes relate with entrepreneurial intentions and subsequent entrepreneurial activity.

This study also provided evidence that the intention model (Shapiro, 1982; Ajzen, 1991; Krueger et al., 2000) applied in entrepreneurial research is operational also in the Finnish entrepreneurial and cultural environment and hence contributes to the reliability of the intention-based approach in the entrepreneurial research.

This study applied two sets of empirical data, the survey data and the case



study data. These data sets provided respectively an ex-ante perspective and an ex-post perspective to the entrepreneurial process. The differences that emerged from these two distinctive perspectives to the entrepreneurial process suggest that the development of entrepreneurial intentions is a complex, multi-phase process where different exogenous factors operate differently at different stages of the process.

## **6.5 Implications for policymaking**

The findings of this study suggest that there are environmental factors that affect entrepreneurial activity. It was assumed at the beginning of this study that some of these environmental factors may be alterable or controllable and hence they would offer means to promote entrepreneurship. It is important to realize that the time lags involved with different environmental factors' impact obviously vary significantly, which may affect their applicability for policy measures to promote technology-based entrepreneurship.

Of affective environmental factors social norm and social identification had an impact on entrepreneurial intentions and subsequent entrepreneurial activity. This means that issues like self esteem, approval of family, appreciation of friends are of importance when attitudes towards entrepreneurship are concerned. This implies that measures, which contribute to entrepreneurship's appreciation, would encourage entrepreneurial intentions and entrepreneurial activity. There is arguably a rather wide array of different imaginable measures that would comply with this recommendation. For example, if entrepreneurs were given more public acknowledgement concerning their contribution to national economy and job creation, it would eventually contribute to entrepreneurial activity. Perhaps the most important long term plan in this respect could be a whole-hearted plan to introduce governmental bills that would improve entrepreneurs' societal status and hence increase the desirability entrepreneurship. This would send a signal from the authorities that entrepreneurs' role is important in the national economy and their contribution is valuable.

The reversed leverage is also important in this respect. If the risks involved in entrepreneurship materialize, the consequences are typically devastating, both materially and socially. The social consequence could for example be that the individual loses his or her credibility and trustworthiness, or even becomes a suspect of a financial crime by default. These concerns are extremely

important regarding the attitudes towards entrepreneurship. It is argued here that if there is a potential threat to one's social credibility or appreciation it will most likely affect the desirability of entrepreneurship negatively via the causality shown in this study. Therefore, it is suggested that perceptibly diminishing negative social consequences of entrepreneurial failure would contribute entrepreneurial activity.

Financial expectations were found to affect entrepreneurial intentions through perceived feasibility of entrepreneurship. It is rather natural that financial issues are substantially involved in entrepreneurial activity. Ignoring the leverage of perceived financial rewards in the entrepreneurial process would be a connivance of significant realities that drive human behavior. Therefore it appears to be possible to promote entrepreneurship by enhancing perceived financial rewards obtainable from a successful entrepreneurial activity. There is apparently a myriad of different ways to make this happen, e.g. adjusting tax rules in favor of entrepreneurship. Again, we must not forget that it is the perception of obtainable financial rewards that count when entrepreneurial intentions are concerned.

When considering financial expectations involved in entrepreneurship the risk/reward ratio emerges as an interesting concept. During the course of this study it has become more and more evident that approaching entrepreneurial activity and entrepreneurial intentions through the risk/reward ratio would be useful. Individuals seem to evaluate different options and make decisions concerning career choice mostly rationally assessing rewards and risks involved in different choices. It is quite obvious that there is a bias towards choices with most perceived rewards with least perceived risks, in other words towards the most favorable risk/reward ratio. The determinants of the risk/reward ratio in case of entrepreneurship are important. There are factors that are affective in our terms, which affect risks, first and foremost social risks. Threats of losing social trustworthiness, credibility, and appreciation are significant determinants of risk. Reversely, in a positive case the same factors can be determinants of reward, social reward to be more exact. Respectively, perceived financial expectations are determinants of reward. And in a negative case they are determinants of risk. Therefore, a strongly recommended policy framework for promoting entrepreneurship would be first defining the determinants of the risk/reward ratio carefully, and then exercising entrepreneurial policy geared towards maximizing the perceived risk/reward ratio perceived by the most desirable, potential entrepreneurs.

The fact that the availability of technology-related resources affects entrepreneurial intentions and at the same time perceived market opportunities, perceived social capital, or perceived availability of human resources seemed to have no impact whatsoever deserves also further consideration. This most likely does not offer any means for promoting technology-based entrepreneurship, but may explain some of the defects in the Finnish entrepreneurial culture. Anecdotal evidence suggests that Finnish technology-based firms almost without exception are founded by people with technological education and background. Similarly, anecdotal evidence suggests that the market-related knowledge and skills are often underrated and furthermore, market-related issues like market opportunity are ignored. Our findings support partly this commonly held impression showing no relationship between market opportunity and perceived feasibility of entrepreneurship. In the light of our findings it also seems that potential high technology entrepreneurs in Finland do not deem contact network as significant resource in the context of entrepreneurial activity. For some reason availability of human resources also did not affect entrepreneurial intentions. All above mentioned findings may indicate some sort of a handicap in the entrepreneurial culture and tradition in Finland. Even though it may not contribute to entrepreneurial intentions in any way it could be worth considering to exercise some sort of measures to enhance entrepreneurial alertness and entrepreneurial cognition. Most likely this calls for some sorts of educational efforts, and also sharing successful case stories and best practices could be useful. Mentoring services as well as advisory services may contribute also in this respect. The purpose of these actions should be to improve preparedness for entrepreneurship and thus contribute to survival and growth of new high technology firms.

The impact of technology-related resources' availability on entrepreneurial intentions is also an important result. It augments the innovation policy that has been implemented by the Finnish Government since early 90's. The main attention of that policy has focused on technological research and development. Building on our findings it can be argued that this investment in technology supports also entrepreneurship. Technological assets seem to initiate entrepreneurial intentions more than any other resource and therefore it can be argued that the technological progressiveness of Finland provides a solid foundation for technology-based entrepreneurship. The remaining challenge is to identify the other critical environmental factors that affect the

later phases of the development process of entrepreneurial intentions and nurture the process all the way to the creation of a new venture.

The relationship between entrepreneurial intentions and technology-related assets emphasizes also the importance of clear and justified arrangements concerning the intellectual property rights concerning technology and know-how, especially in the context of universities. If there is some dispute or ambiguity concerning the property rights of the technology, which is supposed to be the key resource of a new, technology-based firm, it will affect entrepreneurial intentions negatively and hamper entrepreneurial activity. Therefore it is important to pay extended attention to property right issues and arrange them in a fashion, which is favorable to entrepreneurial activity.

## **6.6 Directions for future research**

This study provided an operational causal relationship between the two dimensions of Gartner's (1985) conceptual framework for new venture creation, the environment and the individual. The framework being metaphysical by nature where everything is related with everything calls for further development and specification of the framework. More operational and causal relationships need to be defined between the dimensions of the framework.

The underlying idea in this study is that there are controllable environmental factors, which affect entrepreneurial activity by affecting attitudes toward entrepreneurship. We paid special attention on the social environment and on resource availability as characteristics of the prevailing environment. Several relative issues, which may have relevance regarding entrepreneurial intentions, emerged during the course of the study. Some of these may provide interesting topics for future research.

One of the most interesting future research topics concerning entrepreneurial intentions may very well be the risk/reward ratio. Risk/reward ratio has typically been discussed in the context of corporate entrepreneurship (e.g. Stevenson and Gumbert, 1985; Morris and Trotter, 1990; Stevenson and Jarillo, 1990). In the light of this study it emerges as a promising antecedent of entrepreneurial intentions. It can be assumed that individuals calculate risks and rewards vested in entrepreneurial activity relatively rationally and hence the risk/reward ratio may carry significant relevance concerning

entrepreneurial intentions. The challenge is to define the determinants of the ratio carefully to maximize its descriptive power. It can be easily figured out that financial expectations lie in the reward side whereas e.g. social and financial consequences of bankruptcy lie in the risk side. Again, perceptions of these determinants are of interest when entrepreneurial intentions are considered. A thorough examination of risk/reward ratio's impact on entrepreneurial intentions and subsequent entrepreneurial behavior on individual level is worth recommending. It is also suggested that risk/reward ratio would be controllable. Findings concerning this aspect may turn out significant. One potential avenue for this endeavor could be an international comparative study paralleling perceived risk/reward ratios coherently in different countries together with entrepreneurial intentions.

This study also brought about evidence suggesting that the development of entrepreneurial intentions is a complex, multi-phase process by nature where different exogenous factors operate differently at different stages of the entrepreneurial process. For example the role of perceived availability of financial resources may have different impact on entrepreneurial intentions at different stages of the entrepreneurial process. This phenomenon deserves further studying.

Another direction for future research could be to explore the impact of early stage resource availability on later success of new, technology-based firms. Based on experiences from this study it is supposed that early stage availability of resources together with their exploitation affects later stage success of technology-based firms. The expected results from this kind of a study could provide means for supporting survival and growth of new, technology-based firms.

The need for extended knowledge concerning technology-based entrepreneurship is evident in the current economic circumstances. Technology-based new firms have gained increasing attention globally as agents of transition from industrial age to knowledge age. This is perhaps more true in Europe than in the U.S.A. where the takeover of technology-based businesses arguably started. Europe has lagged behind the U.S.A. when technology-based business activities are concerned, judged e.g. by successful new technologies that have become globally dominant. Entrepreneurial activity in Europe appears also as underdeveloped when compared with the U.S.A. Therefore it is of great importance to gain more understanding regarding

technology-based entrepreneurship and underlying mechanisms so that pan-European as well as national challenges of entrepreneurship can be successfully met.

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# Appendix A



## Survey

### Entrepreneurial intentions and Venture Cup -business plan competition's importance in promoting entrepreneurship and new venture creation in Finland.

All information received with this form will be processed confidentially. The results of the survey will be exhibited as statistical summaries.

#### 1. Background

1.1 Gender  Female

Male

1.2 Age

1.3 Education Undergraduate and post graduate students: Please indicate future degree. Other respondents: current degree and year of graduation.

[HELP: Degrees as PDF-file](#)

Other:

Other:

1.4 How does your spending of time break down between studying and working at the moment? (Divide 100 % across the choices)

Left:  %

Salaried work:  %

Studying:  %

Own business or business idea:  %

### 1.5 Work experience

According to the choices below specify your work experience by their share of your total work experience. When necessary convert part-time working into effective full-time working.

Total work experience  , out of which

in large companies (more than 50 people)

in small firms (less than 50 people)

in scientific research work

### 1.6 Has there been a change in your personal life situation or is something significant currently happening?

- Just graduated / graduating
- Termination of employment
- I've been asked participate in a business enterprise

Else, what:

## 2. Profile

### 2.1 How do you perceive entrepreneurship?

	1	2	3	4	5	NA
I find entrepreneurship	extremely unappealing		. . .		great	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As an entrepreneur I will be overworked.	be		. . .		not be	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As an entrepreneur I will reach my goals in life	poorly		. . .		well	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As an entrepreneur I would be excited about my work.	not be		. . .		be	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 2.2 How desirable it is for you to start your own business?

(Scale 0 to 100)

### 2.3 How would you assess your odds as an entrepreneur?

	1	2	3	4	5	NA
I find it extremely difficult to start my own business	difficult		. . .		easy	

to start my own business.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To start my own business would probably be the worst way for me to take advantage of my education.	. . .			best		
I have skills and capabilities to succeed as an entrepreneur.	insufficient			sufficient		
I personally consider entrepreneurship as highly career alternative for people with my professional and educational background.	undesirable			desirable		
I'm confident that I would succeed if I started my own firm.	poorly			well		

#### 2.4 How practical it is for you to start your own business?

 (Scale 0-100)

#### 2.5 How do you perceive following issues concerning entrepreneurship and starting one's own business? Choose the option that is the most true in your case.

	1	2	3	4	5	NA
As an entrepreneur I would appreciate	a lot less		. . .		a lot more	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are successful entrepreneurs among the people I know.	very few		. . .		very many	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My friends would look it if I started my own firm.	very negatively		. . .		very positively	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My family would look it if I started my own firm.	very negatively		. . .		very positively	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe I can make money than in other occupations	a lot less		. . .		a lot more	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3. Entrepreneurial education and skills

#### 3.1 Completed courses in entrepreneurship (in university or polytechnic)

I have completed courses in entrepreneurship or some topics of entrepreneurship, e.g. classes in financing or business planning

These courses have covered:

- evaluating of business ideas
- evaluating of business plans
- lectures given by entrepreneurs

- presentations of entrepreneurial service providers (VC, business incubator etc.)
- description of a business concept
- preparing a financing plan
- preparing a business plan
- lectures organized by Venture Cup

Else, what?

### 3.2 Have you participated in some other entrepreneurial training? (excl. Venture Cup)

Which?

### 3.3 Entrepreneurial skills

Asses your current level of competence and experience reflecting the requirements for the management of a start-up.

My own competence and experience concerning	1	2	3	4	5	NA
- business planning and strategy is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- sales and marketing is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- financing and accounting is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- leadership and management is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- internationalizing is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- legal issues is	very poor		. . .		very good	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 4. Venture Cup -business plan competition

### 4.1 How did you first learn about Venture Cup competition?

- Have not heard More info: [Venture Cup web pages](#)
- Posters or flyers
- Articles or adds
- In a class
- Direct contact (e-mail, letter)



Otherwise, how?

**4.2 Have you participated in Venture Cup's training sessions or other sessions, or Venture Cup competition in year 2000/ 2001 or year 2001/ 2002?**

Yes Continue at section 4.3

No What were the most important reasons for you not to participate? (Divide 100% among different reasons):

Left:  %

% I didn't know about the competition

% Not enough time

% No business idea good enough

% My business idea wouldn't do it against top teams

% My business would not be executed anyhow

% Not enough benefits compared with the effort

% Else, what?

Continue from section 5. [Other competitions and services](#)

**4.3 How different Venture Cup event did you participate in?**

Event \ Year	2000/2001	2001/2002
Kick-off and award ceremonies	<input type="text" value="Choose number"/>	<input type="text" value="Choose number"/>
Lectures and training sessions	<input type="text" value="Choose number"/>	<input type="text" value="Choose number"/>
Work shops and presenting training	<input type="text" value="Choose number"/>	<input type="text" value="Choose number"/>
Forums	<input type="checkbox"/> Entrepreneurs' Forum	<input type="checkbox"/> Idea Forum

**How would describe Venture Cup events and their contribution?**

	1	2	3	4	5	NA
I got new useful information from the training sessions concerning venture creation.	very little		. . .		very much	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The entrepreneurs who talked at the sessions increased my desire to become an entrepreneur.	not at all		. . .		a lot	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I met new interesting people at Venture Cup sessions.	not at all		. . .		a lot	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**4.4 Have you been reading the Venture Cup book "I deasta kasvuyritykseksi"?**

**How would you describe Venture cup book?**

	1	2	3	4	5	NA
The book helped me in writing the business plan.	not at all		. . .			a lot
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would recommend the book to a person with my professional and educational background.	not at all		. . .			surely
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**4.5 How often have you visited Venture Cup www pages?**

Choose

**For what purpose have you used Venture Cup www pages?**

- For searching information about Venture Cup and events
- For information searching to write the business plan
- To look at Seed Stage Directory's ideas (01/02)

Else, what?

**4.6 How would you describe the operations of Venture Cup organization?**

	1	2	3	4	5	NA
I am very with the support I have received from the regional Venture Cup coordinator	dissatisfied		. . .			satisfied
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very with the support I have received from Venture Cup office	dissatisfied		. . .			satisfied
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**4.7 Which year and which stages of Venture Cup competition have you participated?**

Stage \ Year	2000/2001	2001/2002
1. stage: Idea	<input type="checkbox"/>	<input type="checkbox"/>
2. stage: draft of the business plan	<input type="checkbox"/>	<input type="checkbox"/>
3. stage: completed business plan	<input type="checkbox"/>	<input type="checkbox"/>

**How many members there were in your team (including yourself) at the latest stage that you participated?**

(If you participated with more than one proposal, please use the most important one here)

2000/2001:

2001/2002:

**4.8 Reason for participating or for not to participate**

**If you participated in some stage of the competition, what were the most important reasons for it? (total 100%):**

Left:  %

% Venture Cup is an inspiring competition

- % To receive competent feedback concerning my business idea
- % Monetary prizes
- % To utilize free mentoring services and network
- % Business plan or its draft was already there
- % I was personally told to participate
- % My buddies or colleagues invited me to take part
- % Else, what?

**If you did not participate or you did not continue to the final stage, what were the most important reasons for this? Divide 100% among different reasons:**

- Left:  %
- % Not enough time
  - % No business idea good enough
  - % My business idea wouldn't do it against top teams
  - % My business idea wouldn't be executed anyhow
  - % Judging by the feedback I received it was not worthwhile continuing
  - % Not enough benefits compared with the effort
  - % The competition moved too slowly
  - % Else, what?

**4.9 How do statements below describe Venture Cup competition in general and your participation in the competition?**

	1	2	3	4	5	NA
The competition was important regarding my decision to work on my business idea.	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My business idea and the plan changed during the competition.	not at all		. . .		a lot	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The written feedback I received was regarding the development of my business idea.	useless		. . .		useful	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Students / researchers and professionals should have separate classes in the competition.	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recommend the competition to people with my professional and educational background.	would not		. . .		would definitely	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**4.10 Did you use the mentoring services provided by Venture Cup?**

yes      Continue below

no Continue at section 5. Other competitions and services

**How would you describe the mentoring provided by Venture Cup?**

	1	2	3	4	5	NA
There was mentoring available.	too little		. . .		enough	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The mentoring I received was regarding the development my business idea.	useless		. . .		useful	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mentors were interested in helping me with my business idea	not at all		. . .		very	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mentoring services the treshold to seek external help for developing my business idea.	raised		. . .		lowered	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**5. Other competitions and services**

**5.1 Have you participated in some other business plan or business idea competition?**

- Innofin (Keksintösäätiö)
- IIDA business plan competition (Tampere)
- eKiihdyttämö (Tampere)
- IDEKA business plan competition (Joensuu)

Other, which?

**5.2 Have you used some other services for evaluating your business idea or for starting your own firm?**

- University professors and faculty
- University's innovation officer
- Keksintösäätiö
- TuLi-program's services
- TE-Center
- Business incubators and their services
- Municipal services, Jobs and Society

Other, what?

**6. Entrepreneurial status**

**6.1 Do you work or have you committed to work in your own firm alone or together with others?**

yes Continue below at section 6.2

no Continue at section 6.3

**6.2 Which of the following describe best your firm's situation ?**

Choose situation

Continue at section 7. Resources

**6.3 How likely it is that you will start a new firm of your own or with friends within the next five (5) years?**

% (Estimate the probability on a scale from 0 to 100%)

**6.4 How likely it is that you will work in your own firm within the next two (2) years**

**full-time ?** % (Scale 0 to 100%)

**part-time ?** % (Scale 0 to 100%)

**7. Resources**

**7.1 Estimate how following statements apply in your case. In case you have not started, or are not starting your own firm, imagine the as if you were in a situation like that. If you cannot answer please select NA.**

	1	2	3	4	5	NA
There is the technology or some other specific know-how needed to start a new firm at founders' disposal	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The founders posses full rights of the technology	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technology at our disposal provides us with clear competitive advantage	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The founders have necesary experience and skills to start and run a firm	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The previous experience of the founders is useful in starting a new firm	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The founders have the necessary financing to start a new firm	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is enough financial resources available to start a new firm	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The founders know people who will help in starting and running a new firm	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The contact network of the founders provides links to important directions (e.g. concerning marketing, financing, or technology)	disagree		. . .		agree	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

There is demand for our products or services in the market	disagree	. . . .	agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The competitive advantage of the products or services is good	disagree	. . . .	agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The founders have a vision how to reach their target group in the market	disagree	. . . .	agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The products or services will be easily launched in the market	disagree	. . . .	agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 7.2 Availability of resources

Are the factors listed below founders' own, available through the network of the founders, or externally available? If you have not started or are not starting your own firm imagine the situation. If are not able to answer please skip this section.

Technology / special know-how	<input type="checkbox"/> Own	<input type="checkbox"/> Through network	<input type="checkbox"/> External
Experience / skills	<input type="checkbox"/> Own	<input type="checkbox"/> Through network	<input type="checkbox"/> External
Financing	<input type="checkbox"/> Own	<input type="checkbox"/> Through network	<input type="checkbox"/> External
Market access	<input type="checkbox"/> Own	<input type="checkbox"/> Through network	<input type="checkbox"/> External

## 7.3 Rank factors listed below in the order of significance regarding how they affect your decision to start your own firm (1= the most important, 5= the least important, please use each number only once)

Technology / special know-how	<input type="text" value="Choose significance"/>
Experience / skills	<input type="text" value="Choose significance"/>
Financing	<input type="text" value="Choose significance"/>
Contact network, people you know	<input type="text" value="Choose significance"/>
Market access	<input type="text" value="Choose significance"/>

## 8. Feedback

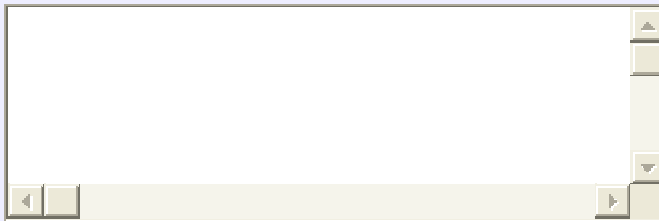
### 8.1 Did you find it easy to complete this questionnaire?

Yes

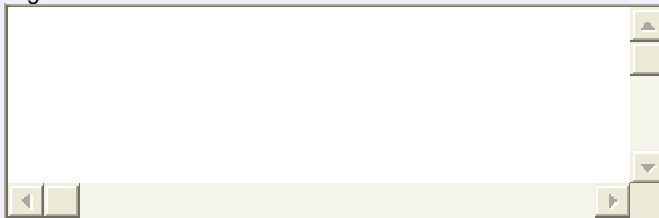
No

### 8.2 Your own words

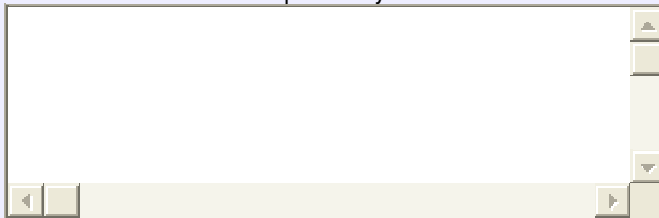
Comments to the author:



Suggestions for improvements concerning Venture Cup competition/ Comments to Venture Cup organizers:



Other comments. Please provide your contact information if you wish to be contacted.



## 9. Sending the form

All information on this form will be processed confidentially. The results of the survey will be exhibited as statistical summaries.

Thank you for your cooperation!

*Tuomas Maisala  
Helsinki University of Technology  
Institute of Strategy and International Business*

## Appendix B

### The interviews of the case studies

<i>Firm</i>	<i>Interviewee</i>	<i>Interviewer</i>	<i>Date</i>
Remtec Systems Oy	Mr Charles Sederholm, CEO	Henri Grundstén	6.10.1998
Oy Juvantia Pharma Ltd	Dr Juha-Matti Savola, CEO	Henri Grundstén	17.12.1998
Delisoft Oy	Dr Eero Hyvönen, CEO	Henri Grundstén	18.12.1998
Finnzymes Oy	Mr Pekka Mattila, CEO	Henri Grundstén	28.12.1998
Sitedesigner Technologies Oy	Mr Matti Lindroos, CEO	Henri Grundstén	7.1.1999
Aplac Solutions Oy	Mr Heikki Rekonen, CEO	Henri Grundstén	23.3.1999



## Appendix C

### The correlation matrices of the exogenous variables of the modified intention model

Table C-1. Affective environmental factors correlation matrix.

		1.	2.	3.
1. Social identification	Pearson Correlation	1	,127	,290*
	Sig. (2-tailed)	,	,052	,000
	N	235	234	224
2. Role models	Pearson Correlation	,127	1	,198*
	Sig. (2-tailed)	,052	,	,002
	N	234	267	250
3. Social Norm	Pearson Correlation	,290*	,198*	1
	Sig. (2-tailed)	,000	,002	,
	N	224	250	251

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table C-2. Rational environmental factors correlation matrix.

		1.	2.	3.	4.	5.	6.	7.
1. Financial expectations	Pearson Correlation	1	,081	,130*	,026	,002	,100	-,048
	Sig. (2-tailed)	,	,208	,045	,692	,975	,122	,457
	N	256	244	238	241	242	241	245
2. Perceived opportunity	Pearson Correlation	,081	1	,500*	,124*	,274*	,340*	,213*
	Sig. (2-tailed)	,208	,	,000	,048	,000	,000	,001
	N	244	258	250	254	254	252	258
3. Perceived technology availability	Pearson Correlation	,130*	,500*	1	,037	,107	,105	,151*
	Sig. (2-tailed)	,045	,000	,	,564	,094	,099	,017
	N	238	250	250	246	246	246	250
4. Perceived financing availability	Pearson Correlation	,026	,124*	,037	1	,314*	,132*	,110
	Sig. (2-tailed)	,692	,048	,564	,	,000	,037	,080
	N	241	254	246	255	253	249	255
5. Perceived social capital availability (contact networks)	Pearson Correlation	,002	,274*	,107	,314*	1	,177*	,319*
	Sig. (2-tailed)	,975	,000	,094	,000	,	,005	,000
	N	242	254	246	253	255	249	255
6. Perceived market access	Pearson Correlation	,100	,340*	,105	,132*	,177*	1	,284*
	Sig. (2-tailed)	,122	,000	,099	,037	,005	,	,000
	N	241	252	246	249	249	253	253
7. Perceived human resources availability	Pearson Correlation	-,048	,213*	,151*	,110	,319*	,284*	1
	Sig. (2-tailed)	,457	,001	,017	,080	,000	,000	,
	N	245	258	250	255	255	253	259

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed).