

# **What enables new technology-based firms to grow into medium-sized firms?**

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## **Summary**

New technology-based firms (NTBF) have attracted growing interest in recent years, as they are considered important for creating the diversity in products and technologies that is central to long-term economic growth. The aim of this study is to increase the knowledge about what enables NTBF to grow beyond being a small founder managed firm, focusing on innovation, into being a professionally managed, medium-sized and growth focused firm. The empirical analysis is based on a combination of a cross sectional survey on the population of new technology-based firm in Sweden and a number of case studies of medium-sized firms belonging to that population. The results point to the importance of further studies on the willingness to accept growth, synchronization between professional management and technological development and the situation specificity of resource needs.

## **Introduction**

Following the acknowledgement of the important relation between technological change and economic growth (e.g. [1]) there has been a growing interest in understanding the nature of technological change and innovation. While technological change is considered to be an interactive, cumulative and path dependent learning process [2] where innovations follow a relatively ordered patterns along technological trajectories [3], diversity is needed in order to ensure long-term economic growth. This diversity is created in essentially in two ways; by the diversification of existing firms or by the starting-up of new technology-based firms (NTBF).

According to Schumpeter [4] entrepreneurs carry out innovations that have the possibility to eliminate the old, e.g. products or services, by virtue of their superior performance. Not only does this type of competition create new industries while making other obsolete, but it also creates winners and losers [5]. Some firms will be able to take advantage of new technological opportunities leading to their growth and prosperity while others will fail and suffer losses and decline. The conclusion is that a new, small, innovative firm can grow into a large firm, which is in agreement with empirical observations.

Growing into a large firm is nevertheless not a straightforward task. Small firms are often faced with some sort of a growth barrier when moving from early sales to reinforced growth where "internal pressures are

exerted for further growth" [6]. This growth barrier can be considered as the critical step from being a relatively small, founder managed, firm focusing on innovation, into being a medium-sized, professionally managed firm focused on growth.

A large number of empirical studies have been made on the subject of small firm growth. As this field is relatively new the theoretical development is fragmented using a multitude of approaches. There are thus a number of studies that are partly overlapping but which are difficult to compare because of the different assumption that are made within each approach. In addition, few of the studies address new technology-based firms.

The objective of this study is combine the approaches used for studying small firm growth in order to increase the understanding of the factors that enable new technology-based firms to transform itself from a small firm focused on innovation into a medium-sized firm focused on growth. First, a combined approach will be presented that will serve as a frame of reference for the study. Secondly, the method and the sample used will be described. Thirdly, the results of the study will be presented and finally, some conclusions will be made.

### **Frame of reference**

It has become acknowledged that the success of an innovation process is affected by many actors in the economy that take part in an interactive learning process. This has resulted in the development of an innovation system approach where the system consists of a network of actors that within a specific context are assumed to affect the outcome of the innovation process. The context can be national/spatial [7], technological [8] or sectorial [9] depending on the level of analysis.

Wiklund [10] has identified four different perspectives that will be used here: the resource-based perspective, the motivation perspective, the strategic adaptation perspective, and the configuration perspective. The different perspectives make different assumptions based on different economic, sociological and psychological theories where the biggest difference is the degree to which they assume that firm growth is determined by the environment or the individual.

While the resource-based perspective emphasizes how internal resources create incentives and opportunities for growth, the strategic adaptation perspective emphasizes that growth is dependent on the firm selecting the appropriate strategy and structure related to its environment. The motivational perspective emphasizes that firms will not grow if its owners or managers (often the same person in new firms) do not want

the firm to grow. In that case they will not plan for growth, nor select the appropriate growth strategy. The reason could be that they are not willing to accept the necessary configuration, e.g. increased formalization.

But are the different theoretical perspectives compatible with each other and with the innovation system perspective? The fact that the different perspectives have been used as a foundation for studies of closely linked phenomena, that is, innovation and entrepreneurship, suggests that it should be possible to combine them.

An innovation is an introduction of a new product or service on the market. In order for the innovation to be successful it has to be diffused on the market, that is be accepted by buyers. *Creating and expanding markets* is therefore a central element in a successful innovation process.

In order to be able to identify the opportunity to exploit and carry out the innovation, and the subsequent diffusion, *resources* are needed, e.g. knowledge and machines. Some of the resources are internal to the firm, but others are a part of its environment, i.e. the *innovation system*. The innovation system might also constrain the possibilities of exploiting a certain opportunity, as the firm might not be able to access the necessary resources.

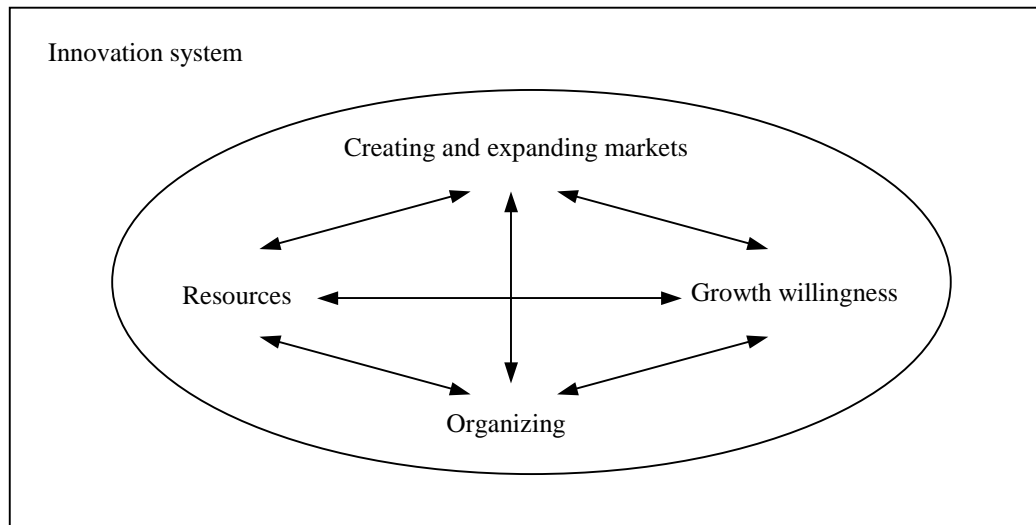
In order to respond to demand, to use its internal resources effectively and to get access to important resources in the innovation system the firm needs to *organize* its activities, both internally and externally. For this the firm needs resources in the form of an ability to carry out this organizing. These meta-resources might be termed management competence.

Growth will happen if a successful innovation leads to the accumulation of resources within the firm. That will not happen without *growth willingness* on the part of the managers of the firm. Even if growth willingness is an individual decision, it is also influenced by institutions in the innovation system, such as culture and legislation.

As the innovation process is a cumulative, interactive learning process firms will have to improve their products and services even after they have diffused them on the market. They will produce a stream of innovations, differing in type depending on the state of the industry and their own products and services.

The conceptualization of the growth process described above includes five fundamental elements: Growth willingness, creating and expanding markets, organizing, resources and the innovation system (Figure 1)

**Figure 1** Conceptualization of the growth process in new technology-based firms (NTBF).



All the elements described above are interconnected. Four of them, growth willingness, creating and expanding markets, organizing and resources, take place within the firm, but the firm is embedded in an innovation system. Even if it might be difficult in some cases to make a distinction between the firm and its environment, this separation into internal and external factors emphasizes the role of individual decisions taken within the context of the firm. While the innovation system affects all the elements that are placed within the firm, the individuals within the firm have choices to make. They also have different motivation profiles that affect the choices they make.

### **Method**

In this study the concept of new technology-based firms refers to a recently established firm whose competitive strength comes from the knowledge and skills of the employees within the fields of the natural sciences, engineering and medicine, and the subsequent transformation of this knowledge into products and services that can be sold on a market [11,12]. That includes firms both in manufacturing and industry related services.

Becoming a *medium-sized firm* is used in this study as a measure of a firm having grown beyond being small. The European Union's definition will be used, that is, medium-sized firms are firms with 50-249 employees [13]. Firms with fewer than 50 employees are termed *small firms*.

Because the knowledge about early growth in technology-based firms is fragmented and incomplete an exploratory approach has been selected for this study, leading to a combination of a survey study and multiple case studies. A survey study was selected in order to give information about the population of new technology-based firms. This was made possible by access to a database of the whole population of Swedish new technology-based firms. A case study approach was selected in order to capture the dynamics of the growth process, i.e. development over time. This design allows triangulation<sup>1</sup> between the survey data and the case data, where the two studies are compared with one another to support the validity of an argument.

The survey study is based on a database of new, Swedish, technology-based firms established between 1975 and 1993 that has been developed within the CREATE group at the Department of Industrial Dynamics at Chalmers University of Technology and is described in [15]

In 1993 around 1,350 firms were in the database. In January 1998 a postal survey was sent to all surviving firms in the database (1,190), containing questions on background, turnover and employment, internationalization, financing, cooperation, acquisitions and spin-offs. Additional information on e.g. technical orientation, educational data and localization was already in the database.

After a single reminder in April 1998, 344 firms had returned a completed questionnaire that could be used for analysis. Additional 20 completed questionnaires were returned after a telephone reminder and were used for analysis of the non-respondents. As no significant difference was found between respondents and non-respondents, the 20 answers were added to the 344 answers, resulting in 364 completed answers available for analysis.

Among the 364 answers were answers from 44 medium-sized firms. In order to increase the response rate for the medium-sized firms, a group of 73 medium-sized, non-responding, firms in the population were identified. These firms were contacted for telephone interviews using the original mail survey, resulting in 17 valid responses, and a total of 61 responses from the medium-sized group.

The case study firms were medium-sized firms selected from the NTBF population described above. In order to explore the effects of different technologies and industries the case firms came from different industries,

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<sup>1</sup> Triangulation is the process of combining multiple sources of evidence for developing a converging lines of inquiry aimed at corroborating the same fact or phenomenon [14].

were based on different technologies and offered different types of products and services<sup>2</sup>. Industrial classification of the firms (found in the NTBF database) as well as information from the Internet was used for selection.

Individuals in seven firms, in all but one case including the Managing Director, were interviewed at the company premises on the background and the development of the firm. In total 10 people were interviewed, each for 2-4 hours. The questions, which were open-ended, concerned organizational changes, products, markets, technology, financing and acquisitions. The interviews were complemented by secondary information, such as the firm's web pages, written material from the firm (financial statements and product descriptions) and articles from the business press.

## **Results**

In the following section the results from analyzing the empirical data will be presented. The analysis will be guided by the conceptualization of the growth process presented above. In order to identify factors specific to medium-sized firms the medium-sized firms will be compared with the small firms, and insights added from the case studies.

### *Growth willingness*

If management is not interested in creating new demand and hiring new employees to respond to that demand, growth is not likely to happen. According to previous studies few owner/managers of small firms want their firms to grow (e.g. [16]). One would therefore expect growth willingness to be a major growth barrier for new technology-based firms.

Even if there is a significant difference between the growth willingness in small and medium-sized firms, few firms indicate that they do not want to grow (Table 1).

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<sup>2</sup> Products and services included where: Information system for radiotherapy, Enterprise Resource Planning System (software), Development of pharmaceuticals, Industrial printers, Development of automotive electronics, Pick and place machines for printed circuit boards, Technical consulting.

**Table 1** Willingness for future growth in terms of the number of employees in small (STBF) and medium-sized technology-based firms (MTBF).

	Number of firms (Share of firms)	
	STBF	MTBF
Do not want to grow	56 (18%)	3 (5%)
Want slow growth	180 (58%)	23 (39%)
Want fast growth	73 (24%)	33 (56%)
Total	309 (100%)	59 (100%)

Chi-square test gives a significant difference between the two groups at the 95% level ( $p < 0.001$ ).

Does this indicate that there is a link between willingness to grow and actual growth and that in order to grow management in new technology-based firms need to have high growth willingness? This does not necessarily need to be so. It is important to notice that the growth willingness of the medium-sized firms does not give us any information on their growth willingness prior to becoming medium-sized.

Looking at the small firm group, more than half of the firms want slow growth while only 24% are striving for fast growth. It is difficult to interpret the attitudes towards growth of the owners/managers belonging to the group that want slow future growth. It is possible that this group represents those owner/managers that want to grow a little without losing control of the firm. It is also possible that this group represents managers who focus on other goals and who would accept growth if it would serve as a means to obtain their goals. In the former case the firm are less likely to grow. It is most likely both types of attitudes are represented in the group.

In six of the seven case firms the managers/founders had low growth ambitions from the start, even if all the firms strive for continued growth today. In most cases the founders/managers of the firms wanted their ideas to succeed on the market and it seems that they have accepted growth as a means for obtaining that goal. No one has been against growth even if they have been aware of the fact that growth is problematical.

It can be said that once the firms become medium-sized they become growth oriented, i.e. they aim for future growth. This is in line with Garnsey's [17] model which predicts that after an initial period where the company is preoccupied with mobilizing resources and gaining legitimacy on the market, the firm becomes more growth oriented as it has created its own ability and incentives for growth. That not all medium-sized firms are interested in further growth might be because they find growth problematic or that they are experiencing a growth reversal.

### *Creating and expanding markets*

A key issue for growing firms is to create and expand the markets for their products. In some cases the firms need to create a completely new market, but in most cases the market exists and can be identified. Even if firms may have accumulated sufficient resources to expand into medium-sized firms without generating any revenues, it will, sooner or later, have to start doing so, unless the firm is developed in order for it to be acquired by another industrial firm.

Earlier studies have shown that, in small countries, internationalization is an important mean for getting access to sufficiently large markets which can in turn lead to growth [18,19]. This is confirmed in Table 2 which shows that the medium-sized firms are more internationalized than the small firms.

**Table 2** Internationalization in small and medium-sized technology-based firms.

	STBF N=311	MTBF N=61	Difference p-value
Turnover from export (%)	18	27	<0,05 <sup>a)</sup>
Share of exporting firms (%)	54	72	<0,01 <sup>b)</sup>
Share of employees abroad (%)	1,6	9,9	<0,05 <sup>a)</sup>

a) T-test, b) Chi-square test

The importance of internationalization in medium-sized firms is apparent in all of the measured dimensions. The variation in the share of employees abroad is significantly higher within the MTBF group indicating that the medium-size firms use different types of distribution channels. This is also confirmed by the case firms as only one firm exclusively uses agents for distribution, while the others use a mixture of own subsidiaries and agents, only own subsidiaries, or sell directly to foreign customers. While firms that sell directly to foreign customers have no employees abroad, firms that have their own subsidiaries in many countries may have a high share of their employees working abroad.

It seems that export is more important for manufacturing firms than for the service firms. Of the 17 medium-sized firms that do not have any revenues from export, 13 are service firms. Around 80% of medium-sized manufacturing firms have more than 10% of their revenues coming from exports, compared to 43% of the service firms ( $p < 0,01$ , Chi-square test). This does not have to mean that the manufacturing firms do not have any domestic market, but indicates that manufacturing technology-based firms will not be able to grow into medium-sized firms without significant sales on foreign markets. The situation is different in the service firms, as they are

more likely to be able to grow into medium-sized firms by serving their domestic markets where there is a high demand for services such as technical consulting and computer related services. This difference between manufacturing firms and service firms is also evident in the case study firms.

Contacts from earlier employment were also found to be more important for manufacturing firms than for service firms. In the case firms these contacts create legitimacy for the firm and a possibility for cooperation with demanding customers during product development. In some cases the customers even bought the products early, before they were fully developed. As the contacts have even been international they have served as a base for internationalization. When looking at the population of NTBF about 75% of the medium-sized manufacturing firms had contacts with customers from earlier employment, which is a significantly higher share than for the small firms (43%,  $p < 0,05$ , Chi-square test). These contacts may not be as important for service firms as fewer firms have these contacts and there is no significant difference between the shares of small and medium-sized firms (51% and 57%,  $p = 0,52$ , Chi-square test).

Another factor reported by earlier studies to be important for internationalization in the case firms are relationships with a large firms [20,21]. The large firm can be an industrial firm that has acquired the small firm, a customer or a firm offering complementary products. The small firm gains access to the distribution network of the large firm as well as legitimacy on the market. This legitimacy is particularly important for entering markets that are important because of large size, but have a great geographical distance, e.g. the U.S. market. The importance of large firms for internationalization is also apparent in the database. Acquired firms have a significantly higher share of their revenues coming from exports than independent firms (32% vs. 17%,  $p < 0,01$ , T-test), both manufacturing and service firms.

### *Organizing*

As a small firm grows its dominant problems change [22] and in order to address different problems the organizational structure has to be transformed [23]. The number of employees increases, new tasks emerge, capacity increases, and different activities must be coordinated. In order to cope with these changes management has to be added and structures formalized. At the same time the firm needs to organize its relationships with the environment in order to get access to important resources such as, finance, technology and market knowledge.

But how does the organizational structure change as the firm grows? There is no detailed information about this in the database, but from the case study firms one can see a clear pattern of the increased use of formal structures as the firm grows. These formal structures nevertheless take on a different form in the case study

firms. Some, typically the manufacturing firms, have divided work in a traditional way into production, development, sales etc. Others develop small units, largely autonomous, based on a certain product or some specialization. The third group has developed a project based matrix organization where project managers rely on a number of supporting functions.

The development of supporting functions and the rationalization of operations has been important for the case study firms. When demand has increased more control and coordination is needed for delivering products to the customer with the appropriate quality. At the same time all the managers of the case study firms mention that there are conflicts between the technology culture of the development people and the business culture of the people working with day-to-day operations. A stimulating environment is thought to be important for technical employees, but this is not always compatible with the formal structures needed for rationalizing the daily operations. There is a need to "protect" the technical employees from the structural effects of the rationalization for two reasons. Technical development is important for the growth of the firm and as there is a high demand for technical employees on the market, they can easily change jobs if they are dissatisfied

Adding new owners can be a prerequisite for obtaining external financing and might in some cases give access to other resources that can affect growth, e.g. management experience, contacts and other resources necessary for growth. Adding new owners could also be seen as an acceptance of professional management practices, as new owners, such as industrial firms and venture capitalists, will emphasise these practices. Table 3 indicates a relationship between adding new owners and becoming medium-sized.

**Table 3** Ownership changes in small and medium sized new technology-based firms.

	Share of firms <sup>c)</sup>		Difference
	STBF	MTBF	p-value
Have added new owners (either minority or majority of shares)	47,2%	70,7%	<0,01 <sup>a)</sup>
Have both sold minority shares and been acquired	5,8%	11,9%	0,15 <sup>b)</sup>
Have sold minority shares	33,8%	50,0%	<0,05 <sup>a)</sup>
Have been acquired	18,1%	32,8%	<0,01 <sup>a)</sup>

a) Chi-square test. b) Fishers exact test. c) Percentages are related to the number of answers to each question.

While roughly 70% of the medium-sized firms have added new owners, either by selling minority shares or being acquired, this has happened in 47% of the small firms. About 50% of the medium sized firms have sold minority shares while almost 33% have been acquired. Of the medium-sized firms, 12% have both

sold minority shares and been acquired. A significantly lower share of the small firms have sold minority shares (34%), or been acquired (18%).

When looking at the effects of the acquisitions on growth, 67% of the acquired medium-size firms (12 of 18) report substantially increased growth as a result of the acquisition. This can be compared to 29% of the acquired small firms that report the same effect ( $p < 0,01$ , Chi-square test)<sup>3</sup>.

As the wish to stay independent is an important motive for the establishment of new technology-based firms in Sweden (e.g. [24]) one would expect that the willingness to grow is related to changes in ownership. Table 4 shows that the firms which have added new owners are significantly more willing to grow compared to those which have not added new owners.

**Table 4** The relationship between growth willingness and ownership changes (sold minority shares or being acquired).

	No new owners N=144	New owners N=146
Do not want to grow	18%	9,0%
Want to grow slowly	67%	47%
Want to grow fast	15%	45%

Chi-square test gives a significant difference at the 95% level ( $p < 0,001$ ) between the willingness to grow in those firms that have added new owners compared to those that have not.

It is possible that if owners/managers strive for the growth of their firms, they are prepared to accept new owners who could give access to the necessary resources, such as professional management practices. Another possible interpretation is that the owners/managers do not strive for growth because they know that they can not do so without adding new owners, which would counteract their motives for founding the firm. In the case studies, external financiers, such as investment firms, demanded a majority share of the firm in order to make an investment in the firm. If this is usual, it might mean that the institutional environment affects the growth willingness of entrepreneurs in a negative way by constraining financing possibilities for those founders who are not prepared to sacrifice the control of the firm.

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<sup>3</sup> Even if no correlation was found between the size of the buyer and post-acquisition effects on growth (Spearman  $\rho = 0,169$ ,  $p = 0,23$ ), only 2 of 12 medium-sized firms providing information about their buyer had been acquired by a firm with less than 250 employees. In comparison large firms had acquired 52% of the acquired small firms. As pointed out by Lindholm (1994), other factors than size are important for the success of the acquisition, as she that found the fulfillment of the buyers' and sellers' motives along with realization of technological synergies among the most important factors for post-acquisition growth in technology-based acquisitions.

## Resources

Without resources the firm is not able to develop, produce and deliver products and services to its customers. At the same time resources in themselves are not sufficient, as someone has to be willing to combine them into products and services. In many cases there are no other resources available to a new firm than those that reside within the founding individuals, i.e. their knowledge and social networks. The firm needs to use these resources in order to get access to more and other kinds of resources, e.g. capital for investing in machines and hiring people, and overcoming the "liability of newness" [25] facing new firms. In six of the case studies the founders had important market contacts and technical knowledge from the start. In the firms that are spin-offs from universities the most important resources the founders bring with them are technical knowledge and contacts within the research world. In the firms with their origins in industry the founders have both marketing contacts and technical knowledge. In five of the seven case study firms the founders are still the managers of the firms even if they did not have any experience of management prior to starting the firm. In the case study where the founder has left the firm due to disputes with management or owners, it has led to large problems, especially technical problems.

One type of resource that is of general interest to new firms is capital. Capital is a generic resource, and even though not all resources can be bought on a market, capital is needed in order to be able to pursue internal development or cooperate with other actors. Many studies judge lack of capital as the greatest barrier to growth in new firms, especially new technology-based firms (e.g. [26,27]). Lack of capital for expansion has also been found to be the most important reason for Swedish new technology-based firms to sell out to larger firms [28].

Looking at the difficulty in getting access to financing at different stages of development there is no significant difference between small and medium-sized firms (Table 5).

**Table 5** Difficulty in getting access to finances at different ages of the firm..

Stages of development	STBF	MTBF	Difference <sup>a)</sup> p-value
Start (≤5 years old) <sup>b)</sup>	2,3	2,7	0,068
Early (6-10 years old) <sup>c)</sup>	2,4	2,4	0,81
Late (>10 years old) <sup>d)</sup>	2,5	2,2	0,43

a) T-test b) STBF: N = 263, MTBF: N=43. c) STBF: N=200, MTBF: N=34.

d) STBF: N=123, MTBF=N=24.

Difficulty is measured on a scale 1-5, were 1 is very easy and 5 very difficult.

The firms rate it, on average, neither very easy nor very difficult to get financing from the sources they have tried to access. The medium-sized firms seem to have experienced more difficulties in getting access to financing than the small firms in the start-up phase, but less so as they grew older. The explanation could be that the medium-sized firms have greater ambitions from the start and need more capital. When they grow larger they might have more credibility than small firms because of their size making it easier for them to get access to financing. This effect is strengthened by the fact that the Swedish capital market has, until recently, focused more on late stage financing than seed/start-up financing [29,30].

One could suspect that even if the medium-sized firms, on average, do not have easier access to finance, they might have access to more competent sources of finance. Competent sources of capital, such as venture capitalists, could contribute with other resources apart from capital, especially knowledge resources such as business competence and contacts with important actors, which would positively affect growth. When looking at the difficulty they have in accessing various sources there is no significant difference between small and medium-sized firms.

When looking at the sources of financing, and how important the firms rate each source, the differences between small and medium-sized firms are also small (Table 6).

**Table 6** Financial sources in small and medium-sized technology-based firms.

	Share of firms <sup>a)</sup>		Importance <sup>b,c)</sup>	
	STBF N=293	MTBF N=60	STBF	MTBF
Own capital	87,7%	88,3%	4,15	4,33
Other private persons	9,2%	5,0%	3,24	3,00
Prepayment or loan from customers	21,2%	16,7%	3,63	3,85
Government grants or loans	27,6%	33,3%	2,99	3,38
Bank loans	57,0%	55,0%	3,66	4,11
Venture capital	22,9%	26,7%	3,83	4,31
Other	17,1%	16,7%	4,19	3,55

a) Chi-square test gave no significant difference between STBF and MTBF for any source. No p-value was lower than 0,25.

b) T-test gave no significant differences between STBF and MTBF for any source. No p-value was lower than 0,3.

c) Importance is measured on a scale 1 to 5, where 1 is very little importance and 5 is very high importance.

Self-financing and bank loans are the sources that most of the firms have used and they are sources of relatively high importance. About one fourth of the firms have received financing from the government, customers and venture capital. Of these sources venture capital is considered to be the most important and government the least important. Relatively few firms have received financing from private persons.

Information from the case studies does not give any indication of a link between growth and a certain source of financing. The case study firms have had very different types of financing. About half of the firms have been self-financed, i.e. they have generated their growth from their own revenues, while others have been externally financed. Some of the externally financed firms have only had external financing in the start-up phase when developing its products, while others have been externally financed for their whole life. Those firms that have been externally financed all their life are developing new, untested technologies in an established industry. Getting access to external finances has not been the largest problem in these firms.

In the case study firms external financiers have contributed with very little apart from capital and financial competence, which could be related to the immaturity of the Swedish venture capital market in the 80s and the early 90s [31]. In some of the firms an investor has increased the credibility of the firm and it has been easier to get continued financing. In the case study firm that has been acquired the parent company has contributed with technology resources.

### **Conclusions**

As this study has a very broad scope and is explanatory in nature no firm conclusions can be drawn from its results. The conclusions are more like pointers to issues that are of particular interest for further research.

One of the most important factor affecting growth has been found to be the willingness to accept growth. The willingness to accept growth is distinct from the willingness to grow in the respect that the founders/managers of small firms may not have high growth ambitions from the start but their growth willingness might change with time. The willingness to grow is therefore not a stable ambition of the founders and can not be used as a predictor of future growth. This is in line with earlier studies that have not found a relationship between growth willingness and future growth [32,33]. Related to the willingness to accept growth is the willingness to manage the consequences of growth. These consequences are among other things related to increased formalization, because of more professional management style, and difficulties in motivating the technical personnel. As pointed to by [34] new technology-based firms often develop a technology-focused culture that collides with the new culture brought by the new people responsible for the rationalization of operations. Somebody has to bridge the differences between these two cultures, i.e. take the role of a “synchroniser”. In this study the founders have in most cases played this role. Even if the founders are dispensable in most cases, the firms which get into conflict with its founders seem to end up having problems

with their technological development. Considering the importance of technological development for these firms the “synchronizing” role is of utmost importance for their continued growth.

Another important aspect of the willingness to accept growth is the willingness to add new owners. If the founders do not accept new owners it might prevent them from getting access to a number of important resources that might otherwise not be available. One could also change the logic of the relationship between the willingness to accept growth and the willingness to add new owners. If the founders want to stay independent, as is the case in many small, Swedish firms, and they see that they can not get the necessary resources for growth without adding new owners, it could make them less willing to accept growth. In that case one could argue that the economic environment is hindering growth in these firms by not providing access to the necessary resources without demanding ownership in the small firm. This would be true even if there were actors within the economy, such as large firms or venture capitalist firms that could provide the resources needed for growth. This is also related to the organization issues mentioned above as new owners are likely to demand a more professional management style.

For many technology-based firms internationalization is the only way to gain access to sufficiently large markets as to enable the firms to grow. This is especially true for a small country like Sweden with limited domestic markets. The medium-sized firms have internationalized in different ways with the help of different actors. For some of the medium-sized firms, especially manufacturing firms, contacts with customers from earlier employment have been particularly important. For others the relationship with larger industrial actors has been the most important factor, which is reflected by a higher degree of internationalization in acquired firms compared to independent firms.

There was no evidence found in this study that the medium-sized firms had better access to finance or to more competent sources of finance than the new technology-based firms in general. In fact Saemundsson [35] found no specific pattern of resource exchange or providers of resources that could explain growth. There are two possible, related, explanations for this. Firstly resources in themselves do not create value. It is their combination that is important, and in order to succeed with resource combinations, meta-resources, such as business- and management competence, are more important. This is in line with e.g. Wiklund's [36] main argument that entrepreneurial orientation has a moderating effect on how resources and the environment affect the growth of firms. Secondly, what resources are needed and the possibilities for accessing them are based on the situation of the small firm, e.g. the competence of the founders, the technology and the industry. Certain

industries might have easier access to venture capital [37], others might have to cooperate with other industrial actors such as large firms, etc. Because of this situation dependency there can be no specific patterns in the resource needs and the patterns of resource access for a whole population of new technology-based firms. Different sources of resources are also important from an economic perspective as increased variety will make the economy more flexible and open for the exploitation of new opportunities that might not be based on previous economic activity. In other words there would be lower risks of lock-ins in the economy, which in turn are conducive to long-term economic growth [38].

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