

Maria Lindqvist

INFANT MULTINATIONALS

The Internationalization of Young,
Technology-Based Swedish Firms

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Swedish Firms

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Maria Lindqvist



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As I entered the Institute of International Business (IIB) as the first female researcher, I wanted to find my own niche. That is why I decided to focus on small, technology-based, recently internationalized Swedish firms, as a complement to existing research at IIB, focusing mainly on large Swedish multinationals. This area turned out to be of interest not only to me, but also to others, and I would like to thank Ruben Rausing's Foundation for Research on Entrepreneurship and Innovation and the Foundation for Export Development for the financial support provided during the project.

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During the research process, I was engaged in an international research project "The Competitive Advantage of Nations", and in a Swedish project on the same subject in cooperation with Statens Industriverk (SIND). These projects have been useful sources of inspiration and I would like to thank Professor Michael E. Porter (Harvard

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Last, but not least, I would like to thank my son Niclas, who gave me the motivation required to conclude this phase of my life and enter a new challenging one, his father Björn, who made it possible for me to concentrate on the project during extended periods of time by taking care of our home, and the rest of my family, for their unfailing support.

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Maria Lindqvist

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1. INTRODUCTION

Introduction

This thesis studies internationalization of young, technology-based Swedish firms. Most of these firms are small or medium-sized. Their limited size, in combination with their technological base, is expected to impact on international behaviour.

Background

This section consists of two parts, i.e. a discussion of the importance of small firms and a presentation of the internationalization process of firms, as described in previous research.

The importance of small firms

According to previous research, small and medium sized firms may have several important roles in the social and industrial structure of society. One of the more general arguments often mentioned is the stabilizing effect of small firms on employment. In spite of their limited size, these firms often employ a large share of the total work force in a country. In Sweden, some 50% of the work force in private industry, excluding farming, are employed by firms with less than 200 employees.

Related to this argument is the unique possibility of small firms to offer a particular quality of working life. For entrepreneurial persons, the establishment of a new firm may be a way to fulfill personal ambitions for independence and self reliance. The working environment of a small firm may also be preferred by employees, valuing a small scale organizational structure.

Another argument is based on the concern of a high degree of market concentration. By introducing a certain degree of dynamism, the establishment of small firms may reduce the risk of economic inefficiency of monopoly or oligopoly.

A second line of discussion concerns the role of small or medium-sized firms during the process of technological development. There has been a lot of theoretical and empirical debate over what type of firms are most conducive to technical progress.¹

Schumpeter (1942), argues that large size companies in concentrated industries are the best innovators, since their range of activities and extensive human and capital resources make it possible for them to achieve economies of scale in R&D (research and development). Other authors argue that radical innovations seldom come from large firms. New concepts and inventions more often originate from small firms or independent inventors. It is also argued that small firms may have a comparative advantage in adapting to new demands. An informal decision structure and flexible production make it possible to change production much quicker than what is possible in larger firms, with formalized decision processes.²

Besides, the efficiency of the R&D function is sometimes claimed to be higher in small firms. According to Rothwell and Zegveld (1982), several studies of innovative behaviour in the U.K. indicate that the share of small firms in innovation has been considerably higher than their share in total industry-founded R&D expenditures. Another investigation indicates a lower gross expenditure on R&D per R&D employee in smaller firms (in this case less than 1000 employees) than in larger ones. This seemingly higher efficiency is partly explained by a lower expenditure on equipment and consumables. Quinn (1985) uses the expression "sweat capital" as one of the explanations for low costs of small firm R&D.

¹ For a more thorough discussion see Kamien and Schwartz (1975)

² Discussions concerning the technological advantage of smaller firms are presented, for example, Hamberger (1963), Jewkes et. al. (1958), Pavitt (1971), Quinn (1979), and Schon (1967)

The importance of small firms in technological development differs between industries. Small and medium-sized firms have a similar or even larger R&D intensity than larger firms in certain industries, (e.g. pharmaceutical and other chemical products, certain metal products, communication equipment, electronic components and scientific instruments). This could partly be a result of the industry structure, since the average size of firms differs between industries with different fixed cost requirements.³ In industries where capital intensity and development costs are low, small firms could be expected to have an important impact on technological development

Abernathy and Utterback (1978) argued for a complementary role of small and larger firms. While small firms may be more suited to participate during the initial phases of the innovation process, larger firms may contribute in the later development and gradual improvement of these new ideas. Besides, small firms may fill market niches considered too small to be of interest to larger firms.

However, when it comes to foreign sales, small firms appear to have some difficulties. In 1987, only 15% of all small Swedish manufacturing firms were engaged in export activities. In comparison, 88% of the larger firms had export experience⁴. This difference may, at least to a certain extent, be explained by a lack of managerial and financial resources among small firms. Moreover, lack of market information and difficulties to establish local contacts can be vigorous impediments to small firms considering to enter a foreign market. Overall, this indicates a need for further research concerning the opportunities for small, technology-based firms to exploit their technologies on an international scale.

The internationalization process

Following the behaviouristic research traditions of Aharoni (1966) and Cyert & March (1963), studies of the internationalization behaviour of Swedish firms were made by the

³ For a more thorough discussion see Håkanson (1980) and Rothwell & Zegveld (1982)

⁴ SHIO (1988)

so called "Uppsala-school" during the 1970s.⁵ The results indicated that Swedish firms minimized the risk of international expansion by following a sequential process. Initially, relatively limited investments are made in culturally and geographically close markets. Then, as the firm gains experience, it gradually increases its engagement and starts penetrating more distant markets. Such a sequential pattern of internationalization appears to be of particular importance to small firms, with limited financial and managerial resources.

The technology factor, on the other hand, may work in the opposite direction. High costs of R&D and short product life cycles force the firm to internationalize at an early point in time, in order to obtain necessary volume before the technology becomes obsolete or imitated by others. This is especially important for firms with narrow product lines and from countries with small home markets. Besides, in firms established to exploit firm specific advantages, e.g. technological advantages, arguments concerning opportunistic behaviour and market failure raised by several researchers indicate a need for internalized foreign entry forms, in order not to lose control over proprietary knowledge⁶. This, in turn, may further restrict the possibilities for a sequential process of internationalization. Based on the results of a study of small, technology-based Israeli firms, Ayal & Raban (1987) argue:

"The findings indicate that where high technology firms from small economies are concerned, much of the 'internationalization' literature may be quite irrelevant: If you have got to jump into icy waters and start swimming for your life right away, reliance on experience in your heated home pool, or 'gradual evolution', are far from the best strategies for survival." (p. 371)

⁵ E.g. Carlson (1975), Hörnell et. al (1973), Johanson & Vahlne (1977) and Johanson & Wiedersheim-Paul (1974)

⁶ E.g. Anderson & Gatignon (1986), Arrow (1962), Calvet (1981), Caves (1971), Hymer (1960), Magee (1977), Teece (1983), Vernon (1966) and Williamson (1975)

Still, the results presented by the researchers at the Uppsala University were not claimed to be equally applicable to all types of firms. Carlson (1975) expected cultural distance to have a different impact on different industries, during different time periods and on firms of varying size or with different product lines. Firms of limited size or producing technology intensive products, for example, were expected to be more influenced by cultural distance than other firms. Similarly, Johanson & Vahlne (1977) assumed that different factors could influence the process in different ways.

"Assuming that such factors as firm size, technology, product line, home country, etc. affect the character of the internationalization in different ways, we will investigate whether firms that differ with respect to those factors will also differ with respect to the pattern of internationalization."

A further investigation of these factors was, however, never made. In an attempt to continue the development of these theories, this study focus on one particular type of firms, i.e. young/small, technology-based firms from Sweden.

Research purpose

The purpose of this study is twofold:

First, to describe the international behaviour of young, technology-based Swedish firms.

During previous research, few attempts to combine a limited firm size and technology intensity to explain internationalization behaviour have been made. Therefore, it is interesting to describe the process of internationalization among small, technology-based firms.

Second, to investigate what factors might explain any observed differences in international behaviour. A special focus will be on the impact of technology characteristics.

Following the description of observed international behaviour, a comparison between firms with different internal characteristics will be made. International behaviour is also expected to be contingent on contextual variables, such as industry structure and local market characteristics. Therefore, an attempt to investigate the impact of such variables is also included in the study.

The **aim of this study** is to contribute to the development of new theories of internationalization, emphasizing internal firm characteristics, industry structure and local market characteristics. A further aim is to give managers in young, technology-based firms considering internationalization some ideas about what problems they may run into and how other firms have tried to solve them.

Definitions

The most important concepts for this study are the internationalization process, small firms and technology intensity.

The internationalization process

In this study, the process of internationalization is studied in three dimensions, i.e. speed of foreign entry, pattern of foreign market selection and choice of foreign entry form. These dimensions are all related to foreign sales. It is, of course, possible to use other dimensions of internationalization, e.g. the use of foreign suppliers, international financing, foreign R&D cooperation and international integration. It was, however, expected that foreign sales was the most important foreign activity of these firms. In retrospect, however, it is felt that a closer investigation of foreign R&D cooperations could have been interesting.

The speed of foreign entry concerns the time lag between the establishment of a firm and its first international activities and between subsequent market entries. This raises the following questions: How soon do small, technology-based firms, in fact, start foreign

activities? How rapidly are new foreign markets entered? The second question relates to speed as well as to pattern of foreign market selection.

The pattern of foreign market selection refers to the sequence of markets entered and penetrated by the firm. Based on the results developed by the researchers at Uppsala University, the sequence of foreign market selection could often be expected to be guided by the economic distance⁷ to a market. Such a sequence is in this study referred to as a "traditional" pattern of market selection. Still, market selection is expected to be affected also by other factors, e.g. the existence of technologically advanced customers, level of local competition and the size of the market niche. Throughout the text, such factors will be referred to as "strategic" factors.

Due to this, we may ask in what order are different markets penetrated? What markets are considered the most important ones for small, technology-based firms? What are the major motives for choosing certain markets? In how many markets are the firms represented?

The organizational form of international entry, is the third dimension of the process in this study. What forms are most commonly used? Does any changes in form take place in a market over time? In this study, focus has been on three types of entry forms, i.e. direct exports, local agents/distributors and foreign subsidiaries. Other forms included in the study are licensing, export cooperation and piggy-backing on larger Swedish firms.

Finally, it is important to remember that these dimensions are not independent. Rather, the internationalization decision is often the outcome of a combination of all three dimensions. However, in order to facilitate the following presentation, the three

⁷ A combination of geographic and cultural distance as defined by Hörnell et. al. (1973)

dimensions are presented and discussed one at the time. The difficulty to present a discussion of a process is described by Aharoni (1966), in the following way:

"Trying to describe a decision process is like cutting a stream of events at two arbitrary points in a multidimensional space"
(Aharoni, 1966, p. 32)

However, it is not the objective of this study to investigate the decision process per se. Rather, the actual behaviour of firms is described as the outcome of a conscious decision process.

Small firms

Concerning firm size, the definition of "small" firms tend to vary across nations and between industries⁸. In Sweden, there is some disagreement about what definition to use⁹. Still, one of the more generally accepted definitions is to classify firms with less than 50 employees as "small" and firms with 50-200 employees as "medium sized". Reitberger (1985) argues that this would approximately correspond to a definition of firms with less than SEK 100 millions as "small or medium sized".

Some firms may rapidly outgrow the general definitions of "small firms", either by means of internal growth or acquisitions. Due to this, a sample selection based on present firm size may exclude particularly successful firms, using firm growth as a proxy for success. In order to avoid this, age rather than size was used to identify the sample of firms included in the empirical part of this study. Still, these firms were all to be considered as small or medium-sized at the time of their first international moves.

⁸ Buckley (1986) discusses different definitions previously used. He refers to the 1981 Companies Act to define British small and medium sized firms in terms of turnover, balance sheet total and number of employees.

⁹ SHIO (1988), for example, considers Swedish firms with less than 50 employees as small and firms with 51 to 200 employees as medium-sized. Lindström (1975), on the other hand, refers to firms with less than 100-200 employees as small, and firms with 100-200 to 500-1000 as medium-sized, depending on industry. According to Mattsson (1985), the common limitation in Sweden is to consider firms with more than 500 employees as large.

Technology intensity

Since this study was interested in the impact of firm size and technology characteristics on internationalization, an attempt to identify critical technology variables was made. Among the most important concepts was level of technology. Unfortunately, there does not exist any generally accepted definition.

In a study by the U.S. Department of Commerce (1983), a number of different approaches have been summarized. Several authors have used product-based definitions of high technology, e.g. R&D expenditures by product field in relation to value of product shipment or direct expenditures on product development plus indirect R&D, contributed by inputs. Others have developed industry-based definitions of technology intensity, using e.g. R&D expenditures as a percentage of industry value added, level of scientific and engineering skills, or level of R&D efforts relative to sales, compared to other industries. Unfortunately, these approaches do not differentiate between technology intensive and non-technology intensive products within a certain industry.

Another alternative is to use a firm-based definition of technology intensity, using e.g. number of patents, level of R&D expenditures or other measures. Overall, a number of different criteria have been used to define "high technology" industries. Some of the most commonly used ones are¹⁰:

1. A large part of resources invested in R&D
2. Highly educated employees, many scientists and engineers
3. New technologies make older ones obsolete
4. Short product life cycles due to changing technologies, products and competition
5. World market products
6. High risk concerning technological success, commercialization and economic rewards

¹⁰ E.g. Riggs (1983), Rogers & Larsen (1984) and Shanklin & Ryans (1984)

Overall, the apparent difficulties to find an acceptable definition of "high technology" makes it relevant to use a less controversial concept. I have not tried to develop a general definition of "high technology", but the criteria mentioned above have been taken into consideration when choosing firms to be included in this study.

Selection criteria

The selection of firms to be included in the study was guided by the purpose to study the internationalization process of small technology-based firms in Sweden. Four major criteria for inclusion in the study were adopted:

1. The firms included in the study were all relatively small. For methodological reasons, however, the inclusion criterion was not size (e.g. in terms of turnover or number of employees), but rather year of establishment. By including firms established in 1965 or later¹¹, a number of successful firms had been able to outgrow the general Swedish definitions of "small or medium sized" firms.
2. All firms included must have at least some in-house research and/or development, in order to exclude pure subcontractors, trading companies, and other non-technology-based firms.¹²
3. A minimum of 20% of turnover generated from exports or foreign sales was used as an arbitrary level for inclusion, to enable a study of the process of internationalization.

¹¹ In older firms, it was expected that the possibility to identify persons involved during the initial phases of internationalization was lower, making the results less accurate.

¹² At this point, the extent of R&D-activities was not investigated. During the mail survey, however, R&D intensity was measured by number of patents, number of technicians or engineers as a percentage of total work force (excluding production), R&D-expenditures as a percentage of total sales and R&D-expenditures per employee.

4. Since the main interest was in small, independent Swedish firms, firms established as subsidiaries of larger Swedish or foreign firms were not included in the study. Neither were firms that had later been acquired by foreign firms, since this was expected to have a particular impact on the process of internationalization.¹³

The actual selection procedure differed slightly between the two empirical phases, and is more closely presented in the empirical chapters 3 and 5.

Research strategy

Based on a initial literature review, it was found that there have been few studies of the combined impact of a limited firm size and technology intensity on internationalization behaviour. In order to develop a better understanding of the process, personal interviews were made with managers of 15 small, technology-based firms. During the interviews, it turned out that the process was influenced by a number of factors other than size and technology, e.g. ownership structure, previous experience and industry structure. The findings were later summarized in 15 mini-cases, including one extended pilot study.

In order to further explore the possible impact of industry structure, two of the mini-cases were expanded into industry studies, including interviews with competitors and industry experts. The purpose of the industry studies was to develop a better understanding of the influence of industry related factors, such as stage of product development, customer structure and level of competition, on the process of internationalization and the possibility for small Swedish firms to succeed internationally.

¹³ It may be argued that this could be an interesting alternative for internationalization. One motive behind the decision to exclude this alternative, however, was that it is to a large part depending upon decisions made outside the firm. A similar argument could, of course, be used concerning the alternative of being acquired by another Swedish firm. Still, it is expected that contacts with other Swedish firms may be easier to establish and influence.

Based on previous research and the empirical observations made during the explorative phase of this study, a number of hypothesis concerning the possible impact of internal firm characteristics and industry structure on international behaviour was developed.

In a second empirical phase, a mail survey to a larger number of small, technology-based firms was used to complement the mini-cases and industry studies. In spite of an attempt to establish a relatively homogeneous sample, considerable variations in firm size, technology intensity and other variables were found. This made it possible to make cross-sectional analysis and use statistical methods of analysis to test the hypotheses developed. In this way, it was possible to reach a higher level of generalization within the results.

During analysis of the mail survey, it was felt that the material was rich enough to permit an analysis of international success. This was basically an excursion and not part of the initial research question. Still, it was considered to be of general interest to present the explorative results developed.

The structure of this thesis

The remaining part of this thesis consists of 8 chapters. The content of each chapter will be briefly presented below:

Chapter 2 summarizes the theoretical framework for this study. The main influence has come from two lines of research, i.e. behaviouristic theory and internalization theories. The focus is on the expected impact of a limited size and technological characteristics on the international behaviour of young Swedish firms.

Chapter 3 presents the international behaviour of 15 small, technology-based Swedish firms. Initially, a short presentation of the method, i.e. personal interviews, selection procedure and data collection is included. Then, the sample is described, after which three illustrative mini-cases are presented. Finally, an analysis of the internationalization behaviour of these firms is presented.

In chapter 4, 20 hypotheses concerning the expected impact of internal firm characteristics and industry structure on internationalization behaviour are developed. The hypotheses are based on previous research findings and the results developed during in the interview study.

Chapters 5 and 6 include a presentation of the mail survey. Chapter 5 contains the method of analysis, e.g. selection procedure, data collection and analysis of non-respondents, as well as a description of the questionnaire, before the sample is presented, in terms of internal firm characteristics and industry structure. Chapter 6 presents an initial description and analysis of the internationalization behaviour of the small, technology-based firms included in the mail survey.

In chapter 7, observed variations in internationalization behaviour are analyzed, using a number of internal firms characteristics as well as industry variables. Initially, a number of bi-variate analysis are presented, before certain multi-variate analysis are made.

In chapter 8, an attempt is made to identify critical success factors during the process of internationalization. This chapter, however, is more of an excursion than the other chapters. Still, it contains some interesting information and is therefore included.

Finally, in chapter 9, a concluding discussion about internationalization behaviour of small, technology-based firms is presented. Based on the material collected during the two empirical phases of the study, an attempt is made to assess the possible impact of firm size, technology intensity and other firm characteristics, as well as industry structure, on the process.

2. A THEORETICAL FRAMEWORK

Introduction

In this chapter, previous research on the process of internationalization, with a focus on small firms and technology intensity is summarized in order to develop a theoretical framework to be employed during the analysis of empirical data.

First, two areas of research of particular importance to this study are presented: behaviouristic theories and internalization theory. Second, a general framework, including the variables of importance to this study, is developed. Third, previous findings concerning the impact of a limited firm size, technology intensity, industry structure and local market characteristics on internationalization behaviour, in terms of speed of foreign entry, pattern of foreign market selection and choice of foreign entry form, are presented.

The process of internationalization

Over time, a number of different research traditions have dealt with the question of internationalization. Neoclassical trade theories compared factor endowment of countries to explain the patterns of capital and product movements across borders. Others used differences in local demand structure to explain patterns of foreign trade and investments. Burenstam Linder (1961), for example, argued that home market demand was the driving force in the development of potential export products. Once a product existed, export would be directed towards markets with a demand for these products, i.e. the more similar the demand structures, the higher the trade potential between the countries. This idea was further extended by Vernon (1966) in his product cycle theory.

International business research was interested mainly in the development of multinational corporations (MNCs) and the direction of their foreign direct investments (FDI). According to these theories, local market characteristics, as well as internal firm

characteristics, were important to explain the establishment of foreign subsidiaries. Later on, these theories were combined with theories of industrial organization, to investigate the impact of industry structure on foreign activities. Still, no single theory has been able to explain the entire process of internationalization. Calvet (1981), for example, argued that location theory, industrial organization theory and property rights theory must be used to explain the selection of foreign markets. Besides, a transaction cost approach is required to understand the choice of entry form.

In this study, the focus is on young, technology-based firms. Therefore, the main influence has come from two research traditions, i.e. behaviouristic theory and internalization theory. Using the arguments of these theories, a conflicting impact on internationalization behaviour of small, technology-based firms could be expected. A behaviouristic approach indicates the need for a sequential process of learning about foreign activities among young firms with limited resources and experience of foreign operations. Internalization theories, on the other hand, indicate the need for high commitment among technology-based firms, in order to overcome the risks of market failures, due to opportunistic behaviour and high transaction costs. Difficulties to evaluate technologies and specify contacts may favour internal exploitation of technological know-how to avoid imitation. Still, few studies of the combined impact of limited size and technology intensity have been made.

In the following, the main characteristics of different foreign entry forms are summarized, before the two theoretical approaches leading to the research model used in this study are presented.

Foreign entry forms

Concerning the choice of foreign entry form, there are a multitude of forms available for firms considering international activities. These forms, ranging from completely internalized ones, such as wholly-owned subsidiaries, to occasional contractual agreements, have very different impact upon the degree of commitment required by the

firm. In this study, the focus has been on the choice between direct exports to foreign customers, local representatives and the establishment of foreign subsidiaries.

In the following presentation, these three forms, as well as a number of other entry forms are briefly presented and the main advantages and disadvantages of each form are summarized. The first entry form, i.e. **direct exports** to foreign customers, is often most important during early stages of internationalization, when occasional sales takes place in response to perceived opportunities.

In this study, the term **local representatives** has been used to describe local agents as well as local distributors, i.e. two alternative ways of entering and serving foreign markets. Many writers use the terms interchangeably, but there is a certain difference, i.e. the agent act on behalf of the exporter, while the distributor is a customer.

Rosson (1985) discusses foreign distributors, and argues that they are particularly important to small or medium-sized manufacturers, selling industrial goods and lacking international experience. Beeth (1980) argues that the performance of foreign distributors is likely to differ. The problem is that there is often only a few good distributors for the manufacturer's products in a market, and they are not always easy to identify. Unless it is possible to find a distributor who is willing to commit himself to the product, it might be better to forget about it than to select a poor distributor¹⁴.

In order to better control their, many firms have traditionally chosen to establish their own **foreign subsidiaries**. By integrating vertically it is possible to avoid the costly and time-consuming negotiation over inter-firm contracts¹⁵. Besides, as Williamson (1975)

¹⁴ Narus and Anderson (1986) discuss three prerequisites to effectively plan and implement a distributor program: (a) to understand the distributor's needs, which requires a continuous, routine information collection, (b) to build a working partnership with the distributor, which can take time, since good partnerships "have to be earned, not merely declared", and (c) to ensure that operational promises are kept.

¹⁵ Using an agency theory approach, it is expected that the net costs of divergence of interest between parties is minimized by the specification of incentives, monitoring and bonding of an agent-principal relation. Still, given differences in risk attitude, the existence of private information on behalf of one of the parties and limited or costly observability, there will always remain some differences, resulting in an

argues, it is impossible to control all possible situations in a contract. The importance of control is often guided by product and technology characteristics of the firm. Among firms engaged in technological development, a wholly-owned subsidiary may be the only alternative to avoid technological leakage that may threaten the firm's competitive position.

In some cases, **joint venture arrangements**, i.e. when a firm has a share in the ownership of an enterprise abroad, have been initiated. During the 1980s, joint venture agreements became increasingly important¹⁶. Contractor (1986) argue that the wholly-owned subsidiary is no longer the predominant way to organize new overseas activities in U.S. firms. The propensity to use joint ventures is even greater in firms from Europe, Japan and Canada.

An alternative mechanism for transferring technology internationally is **foreign licensing**. Telesio (1984) defines this concept as "...the sales of manufacturing technology by a multinational enterprise to a non-controlled entity located outside the home country of the multinational enterprise." The remuneration to the licensor is usually in the form of a royalty payment, i.e. a small percentage of the licensee's sales generated by the technology. Another form is to use down payment fees, to commit the licensee, guarantee that the licensor will recover administration costs for the license and constitute a risk premium for doing business in a certain country. Other forms are acquisition of equity interest by the licensor in the licensee's organization, or a buy-back provision, so that the licensor may buy back goods from the licensee below production costs¹⁷.

Hamman and Mittag (1985) found that the licensor, i.e. the technology owner, often preferred licensees, i.e. technology receivers, with a high degree of preparation for technology implementation and marketing of products under the licensed technology, which were passive in their own R&D and had a high investment potential. They

"agency cost". See e.g. Alchian and Demsetz (1972), Tiessen & Waterhouse (1983)

¹⁶ Harrigan (1984), Killing (1983)

¹⁷ Davidson Frame (1983)

distinguish four different types of licence agreements: patent licenses, registered trade mark licenses, managerial and/or technical know-how licenses and mixed licenses. Concerning technical know-how licenses, these are divided into five sub-groups, depending on type of technology. The type of technology, in turn, influences the advantages and disadvantages of using license agreements. Licensing of spin-off, by-product or hang-over technology, i.e. technology that is not used by the licensor, does not threaten the main activities of the licensor. It may, instead, offer an opportunity to increase profit through royalties. Licensing of mainstream and up-and-coming technology, on the other hand, involves a risk of technology leakage. Still, a restrictive licensing policy cannot prevent this completely and might even compel the competitors to increase their own R&D efforts.

Even if the entry forms presented above are the most commonly used, there exists a number of other alternatives. One form of international organization available to firms with limited resources is the formation of **export groups**. These cooperative schemes are based on written or oral agreements between two or more companies, with similar product lines, concerning their export behaviour. Some activities that can be relevant to share are market analyses, information collection, jointly owned sales or production subsidiaries, storage, advertising, exhibitions, transportation, and sales administration. Cooperation can concern all products in all countries, certain products, certain countries or only temporary agreements.

This strategy has been recommended especially to smaller-sized companies by Joyst and Welch (1985). They point to the importance of having an external group coordinator involved during the initial phases while the companies learn relevant skills and develop their own knowledge. Other success factors mentioned in earlier research are the existence of complementary, not competing, products, equal size of group companies, not too large groups, similar customer and business goals among the participants, mutual trust and patience.

An alternative is to use an **export management corporation** (EMC), i.e. a generic term for domestic export middlemen. However, these can be of varying types. Brasch (1981)

classifies them according to degree of service offered, size, geographical areas served and product groups handled. The EMC works as a contracted export department, in its own or the client's name. It takes care of marketing research, planning, implementation and promotion, establishes distribution channels, reports and sometimes even takes financial risks. The compensation is based mainly on commission or rebates on goods purchased to be sold abroad. The initial contact is often taken at exhibitions or in advertisements.

Another alternative is to use **piggy-backing**, i.e. when the firm is able to use the marketing organization of another firm. This form concerns the long-term cooperation between two industry firms and is of particular interest to small firms, which lack foreign distribution networks.

Overall, there are a number of different advantages and disadvantages associated with the different entry forms. The main characteristics of each form are summarized in Table 2:1.

Table 2:1 Advantages and disadvantages of different entry forms

Foreign entry form	Advantages	Disadvantages
Direct export	Low costs of market entry	Limited market knowledge
Local representatives Beeth (1980), Naurus & Anderson (1981), Rosson (1985)	Low cost of market entry and operations Access to local market knowledge and contacts Almost immediate capability of stocking, promoting and selling Local selling support and services available Provide an opportunity to reach relevant markets	Control problems, resulting in agency costs Geographic distance, providing physical distribution strains Cultural differences, providing communication blocks Trade restrictions
Wholly-owned subsidiary Caves (1982), Dunning (1981), Hymer (1960), Williamson (1975)	Avoids costly and time-consuming negotiation over inter-firm contracts Reduces control costs Increases economies of scale by combining different functions Keeps technological or administrative abilities and secrets inside the firm	High capital investment costs Limited access to local market channels High vulnerability and low flexibility to environmental changes
Joint ventures Contractor (1986), Harrigan (1984), Killing (1983)	Low costs of market entry Reduce risk Economies of scale by pooling skills and resources Overcome host government restrictions Immediate access to local market knowledge Strengthen the strategic position in the industry	Conflicting goals and policies Cultural differences
Licensing Caves (1982), Contractor (1984), Telesio (1984), Davidson Frame (1983)	Earning returns of R&D efforts before a technology become obsolete Overcomes local entry barriers Requires limited market knowledge and capital investment	Risk of technology imitation Administrative requirements
Export groups SIND (1985:3), Östberg (1972)	Share costs and risks of internationalization Provide a complete product line or systems sales	Risks of unbalanced relationships
Export management corporations Bello & Williamson (1985), Brasch (1981)	Access to local market experience and contacts	Limited product experience Direction towards "wrong" geographical areas or industries Control problems

Overall, this summary indicates that there may be several aspects to consider when selecting foreign entry forms. In the following section, behaviouristic theory of internationalization treats the choice of foreign entry form as one important dimension of the process of internationalization. After that, internalization theory is used to explain the choice between foreign subsidiaries and other entry forms.

Behaviouristic theory

Following the traditions of Simon (1947) and Cyert & March (1963), a number of studies have used a behaviouristic approach towards internationalization. One of the first to view foreign investments as a sequential decision process was Aharoni (1966). In his study of 38 U.S. firms, he found that the foreign investment decision was triggered by different types of initiating factors. An important internal characteristic of firms attempting to grow internationally¹⁸, rather than through diversification, was the international outlook of high-ranking executives. Several factors were expected to influence this outlook, e.g. previous experience, level of education, age and extensive travelling. External stimuli influencing the decision were the reception of an outside proposal, fear of losing a market, a bandwagon effect (i.e. an attempt to follow the leader) or competition in the home market¹⁹. Apart from that, certain auxiliary factors were identified, e.g. a possibility to capitalize on know-how and spread fixed costs of, among other things, R&D.

¹⁸ The question of firm growth has been studied by several authors, looking at different motives for, as well as barriers against, growth. One line of reasoning is based on the neoclassic economics theory, looking at growth from a basically micro economic perspective. According to these studies, growth is usually associated with a profit maximizing or satisfying behaviour. In some cases, constraints to growth such as access to financial resources or lack of managerial skills (Penrose, 1956) have been introduced.

Another line of reasoning is based on sociological or psychological studies, looking at growth from an individual/entrepreneurial perspective. In these cases, growth is associated with the individual motives of members, particularly the management/founder/entrepreneur of a firm, e.g. control possibilities, personal ambitions, etc. These factors frequently have a negative impact on the attitude towards growth, due to risks of loosing control, etc. For a more thorough discussion, see e.g. Davidson (1989), Håkanson (1979) or Rothwell & Zegveld (1982)

¹⁹ This idea was further extended by Olson & Wiedersheim-Paul (1978), who distinguished between internal export stimuli, e.g. expansion goals, product characteristics or excess capacity, and external export stimuli, e.g. orders from foreign customers, market opportunities, competition, economic integration or government export stimulation.

Once the decision to internationalize has been taken, the actual behaviour follows a process of learning. In order to reduce uncertainty, decision-makers prefer to initiate international activities in geographic areas of which they have certain previous experience. Consequently, a sequential pattern of foreign market selection is expected. Similarly, learning has an impact on the selection of foreign entry form.

"There is a strong feeling that one should begin an investment program on a very small scale, learn from one's experience, and only after much more experience and expertise is gained increase the size of operations. If possible, the firm would prefer to 'test the market' by exporting to it before any investment program begins. The investment itself often starts with assembly or packaging operations, or in product lines in which size of the capital investment is low." (Aharoni, 1966; pp. 150-151)

The results developed by Aharoni were used as a starting point by a group of Swedish researchers at Uppsala University during the 1970s²⁰. A sequential pattern of internationalization, in terms of market selection and establishment form, was described as a gradual process of learning about foreign operations.

A basic concept of the school was the impact of "economic distance" on the pattern of foreign activities. The concept combined two factors; (a) psychic or cultural distance, i.e. information barriers such as differences in industrial development, education, language, business practice and culture, and (b) physical distance, i.e. barriers affecting product and cash flows between the firm and the market, e.g. geographical distance.

In their study from 1973, Hörnell, Vahlne & Wiedersheim-Paul presented a ranking of foreign markets according to economic distance from Sweden. The results were based on a previous study of psychic distance to 21 countries with at least 5 Swedish sales subsidiaries in 1969/70. In that study, a number of indicators were used to establish an

²⁰ E.g. Carlson (1975), Hörnell, Vahlne & Wiedersheim-Paul (1973), Johanson & Vahlne (1977) and Johanson & Wiedersheim-Paul (1974)

index of psychic distance.²¹ By including the impact of geographic distance, this ranking was later adjusted and resulted in the following ranking of the 15 "economically closest" markets, see Table 2:2.

In order to test this ranking according to economic distance on the establishment of foreign subsidiaries, the mean establishment rank of each market was defined as follows:

$$MR = \frac{\sum W_i R_i}{\sum W_i}$$

R_i = establishment rank (1st, 2nd, etc.)
 W_i = no. of establishments of each rank/ market
 ΣW_i = total no. of establishments/ market

Table 2:2 Ranking of countries according to economic distance from Sweden

Country:	Rank:
Denmark	1
Norway	2
Finland	3
West Germany	4
Great Britain	5
The Netherlands	6
Belgium	7
U.S.	8
Switzerland	9
Canada	10
Austria	11
France	12
Italy	13
Spain	14
Portugal	15

Source: Hörnell, Vahlne & Wiedersheim-Paul (1973)

The results were highly correlated (0.89), indicating a fairly good correspondence between the indices. Based on these findings, it was argued that economic distance influenced international establishment behaviour, through its impact on market uncertainty and cost of information. A firm was therefore expected to start operations in economically close markets, and then extend successively to more culturally and geographically distant markets.

Still, it was argued that factors other than economic distance may also affect the pattern of foreign market selection. Johanson & Wiedersheim-Paul (1974), for example, studied the impact of market size and economic distance on the foreign establishment pattern of four Swedish firms. It was indicated that market size was sometimes more important than distance in explaining the pattern of market selection. This was particularly true for the establishment of foreign subsidiaries. The results were summarized by Carlson

²¹ The indicators used to measure the levels of development and education were number of telephones per capita and per cent of students with a technological degree. Apart from that, language and business language were included in the study.

(1975), indicating a reduced importance of cultural distance over time, as market size became a more important determinant as foreign experience is accumulated²².

Moreover, technological innovations within the communications field have resulted in an increased economic integration over time, by providing better and less expensive transportation of people, products and information.²³ This development could be expected to reduce the impact of geographic and cultural distance on the pattern of foreign market selection.

Based on case studies of Sandvik AB, Atlas Copco AB, Facit and Volvo, a model for the establishment chain of firms was presented by Johanson & Wiedersheim-Paul (1974). Internationalization was viewed as a growth process where firms successively increased their commitment, usually while passing through the successive stages of no regular export, export through agents, sales subsidiaries and production subsidiary. In two of the firms it was even possible to identify a fifth stage, one of international cooperation and joint ventures.

Similar findings have been presented in a number of other studies. Bilkey & Tesar (1977) argue that the export behaviour of firms tend to proceed in stages of increased commitment. Newbould et.al. (1978) found that a route to an overseas production subsidiary via direct export, foreign agent and overseas production was the most commonly used in 43 smaller British firms. The success rating, however, increased with the number of stages passed.

The basic mechanism behind a successively increased commitment was introduced in a model by Johanson and Vahlne (1977). Market commitment, i.e. degree of specialization and the size of foreign investments, depended upon market knowledge, i.e. knowledge

²² A similar result was reached by Davidson (1980a/b), in a study of the influences of country characteristics and experience effects on the location of foreign direct investments. A highly significant correlation between market size, measured in terms of absolute GDP or per capita income, and position in the investment sequence was identified. However, during the initial stage of foreign expansion, a strong preference for near and similar cultures was exhibited. In later stages, when the firm had gained foreign experience, factors such as market potential, relative costs and investment climate became more important.

²³ E.g. Dunning (1984), Keegan (1984), Levitt (1983), Mansfield (1974) and Tornberg (1972)

about business climate, cultural patterns, structure of the market system and characteristics of individual customer firms and their personnel, gained mainly through experience in the market. The experience obtained, as well as the scale and type of operations, influenced the commitment decisions and investments were made as long as the risk-level was tolerable. When this is no longer the case the firm was expected to increase its interaction and integration with the market.

Still, some researchers argue that this sequential commitment, proceeding in "stages", inaccurately describes the international expansion of many firms.²⁴ According to their findings, a combination of entry forms may be used in a single market, rather than an evolutionary shift between different entry forms. The entry form is expected to differ with variables such as product or market characteristics, industry structure and internal firm characteristics.

Internalization theory

In the tradition of Hymer (1960), theories of FDI indicate that a multinational corporation (MNC) must possess certain firm specific advantages to overcome the information advantage of local firms, in order to succeed in a foreign market. These advantages, are often expected to originate from investments in know-how, e.g. process or product technology, patents or human capital. The problems of market failure and opportunistic behaviour, however, make it difficult to appropriate the returns of such investments on the market.

In these discussions, the question of foreign entry forms is often treated as a choice between licensing and wholly-owned subsidiary. Seven forces determining the choice between licensing and foreign direct investment are mentioned by Caves (1982):

1. Entry barriers: Licensing is encouraged where entry barriers deter foreign investment.

²⁴ E.g. Reid (1985), Turnbull (1987) and Valla (1985)

2. Lack of assets: Licensing is also encouraged when the firm lacks knowledge and experience about foreign markets, managerial skills, or capital.
3. Cost: Licensing is discouraged when physically complex products make it difficult to convey technical information. Similarly, the firm's unwillingness to license its core technologies without restrictions, due to control problems and risk of technology leakage, results in haggling over complex terms.
4. Lead time: Licensing is encouraged where the rents of intangible assets are short-lived because of rapidly changing technology. Due to this, novel technology becomes obsolete before possible competition from the licensee starts to hurt.
5. Risk: The limited capital commitment involved in licensing makes the firm less sensitive to the risk of expropriation, while increasing the risk of technology leakage.
6. Capital cost: When the opportunity cost of capital is higher in the recipient country, the licensee will value the expected rent from technology less than the owner, making licensing less attractive.
7. Reciprocity: Licensing is encouraged if some day the licensee might license a required technology to the firm.

Several other researchers have stressed the information properties of technology and other intangible assets in explaining the motives for using internal transfer rather than market solutions.²⁵ Valuation difficulties, transmission problems, e.g. a high tacit content restricting codification, and a character of "free goods", make it difficult for the creator of a new technology to capture the returns of the investment in the market place. This is sometimes termed the "appropriability problem". In order to avoid these problems, a firm is expected to prefer to exploit its proprietary knowledge in-house.

²⁵ E.g. Arrow (1962), Calvet (1981), Magee (1977) and Teece (1983)

One of the more well-known advocates of an appropriability theory is Magee. In a paper from 1977, he attempts to consolidate the theories of foreign direct investments (FDI) as a way to internalize proprietary advantages,²⁶ with the theories of creation and appropriability of information investments.²⁷ It is argued that appropriability is affected by the efficiency of the legal system and the industry structure, influencing the risk of imitation. Over the technology cycle, as products become older and technology diffuses, the costs of market transactions decline. In later stage, as information evaluation becomes easier, licensing becomes more common, while subsidiaries are important early in the cycle.

Similar results were developed by other researchers using different approaches. Anderson & Gatignon (1986), using a transaction cost approach, proposed a framework for analyzing the efficiency of different entry modes. A number of different entry modes had been clustered according to the entrants' level of control, since control was expected to be the single most important determinant of both risk and return. The optimal degree of control, in turn, was explained by four constructs: (a) transaction-specific assets, e.g. physical and human assets as well as proprietary knowledge in technology, (b) external uncertainty, or country risk, e.g. political instability, economic fluctuations, currency changes, pace of technological change, etc. (c) internal uncertainty, related to the possibility to assess an agent's performance, and (d) free-riding potential.

Teece (1983) integrates transaction costs and production costs in order to explain the licensing/FDI choice. It is assumed that complex technologies are most likely to be proprietary and have a tacit dimension. The more complex a technology, the higher the governance costs associated with licensing, while governance costs associated with FDI remain constant. Production costs increases with complexity for both alternatives, but the costs increase more rapidly for licensing. Making a joint consideration of governance and production costs, FDI is favoured as technological complexity increases.

²⁶ E.g. Caves (1971), Hymer (1960) and Vernon (1966)

²⁷ E.g. Arrow (1962)

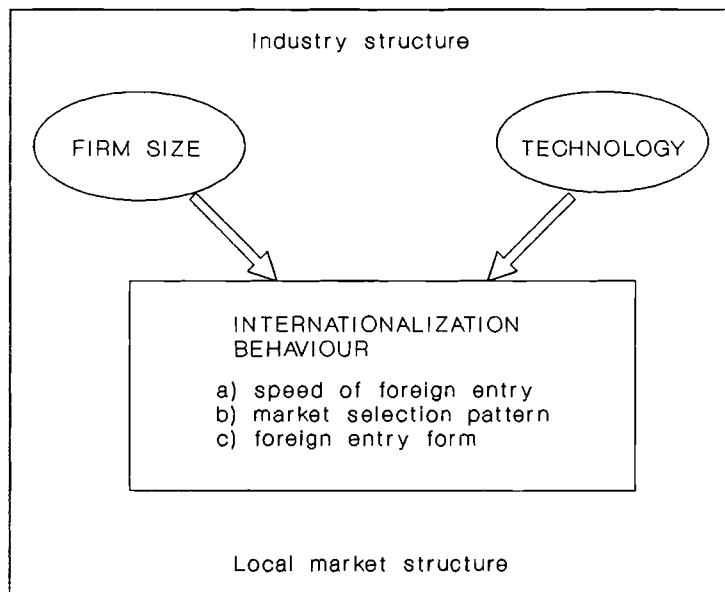
The influence of possibilities to control an agent on the choice between different entry modes was discussed further by Nicholas (1986). Using agency theory, he develops a dynamic model to explain why a move from one foreign mode to another takes place. As transaction frequency increases, a switch from agent to sales branches is expected, since market knowledge as well as cost for contract specification, monitoring, opportunism and inventory control, increases. Over time, the impact of transaction frequencies on transport costs, economies of scale and tariffs, may even result in a shift to foreign production.

Since this study focuses on small, technology-based firms, the technological characteristics of these firms may complicate the process of internationalization. Using an appropriability argument, the risk of technology leakage could be expected to favour the establishment of foreign subsidiaries for innovative products in an early stage of industry development. Besides, a rapid technological development may stimulate a rapid internationalization, in order to maximize sales before the technology becomes obsolete or imitated by others.

The framework

In this section, a general framework, including the variables of importance for this study, is presented. As indicated above, the decision to initiate international activities is a complex one, and a number of variables may influence the actual behaviour. In Figure 2:1, a general framework developed during studies of previous research on internationalization is presented.

Figure 2:1 A general theoretical framework



The process of internationalization will be described in three dimensions, i.e. speed of foreign entry, pattern of foreign market selection and choice of foreign entry forms. It is, however, important to remember that these dimensions are not independent. An export stimuli, e.g. the reception of an export order, may result in a collapsed decision to enter a specific markets, using a particular entry form. Besides, the selection of

foreign entry form is closely related to local market characteristics. Many studies have, for example, investigated different motives for selecting markets for FDI²⁸.

In the following presentation, an attempt is made to summarize previous findings on the impact of a limited firm size and technology intensity on the process of inter-nationalization. Still, a number of contextual variables, including local market characteristics, e.g. market size and growth, local demand structure, tariff and non-tariff trade barriers, and general industry structure²⁹, cannot be altogether neglected as determinants of the internationalization process.

In this study, however, focus is on the impact of firms size and technology intensity on the process of internationalization, and contextual variables will only be briefly discussed. The objective of this section is to develop a better understanding of the process, before the empirical study is initiated.

²⁸ Over time, several research approaches have attempted to explain the motives for selecting markets for FDI. Based on a summary of previous research, Hedlund & Kverneland (1984) made a classification of different types of motives for FDI:

1. Advantage exploiting investments, i.e. investments made to generate returns on **firm specific assets**.
2. Advantage seeking investments, i.e. investments made to get **access to new technology**.
3. Strategically motivated investments, i.e. investments made to match **competitors move**.
4. Trial or "**opportunistic**" investment, i.e. investments made to exploit opportunities, rather than as part of an investment plan. This type of behaviour is expected to be most common among small firms, during early stages of internationalization.

²⁹ Vernon (1966), for example, used two types of motives for explaining the switch from exporting to local production in foreign markets. First, he mentioned the economic motive, i.e. as long as marginal production costs plus transportation costs of exporting the goods is lower than the average cost of local production, the firms would prefer to use the export alternative. Second, a number of non-economic locational forces were presented, including levels of tariff protection, political situation in the country, threat of new competition, patents and military security.

Internationalization of small, technology-based firms

Since there have been few studies of the combined impact of limited size and technology intensity on internationalization of firms, previous findings have been classified into two sub titles, i.e. research concerning small firms and technology related research.

The impact of a limited firm size

Typical characteristics of small firms, as identified in previous research, are managerial limitations, limited access to skilled personnel, restrictions on financial resources and limited opportunities to achieve economies of scale in operations. Altogether, these factors could be expected to complicate the process of internationalization among small firms.

Buckley (1986), for example, argues that one of the most serious problems in small firms is inadequate managerial capacity. It is common that these firms are managed by technicians, with limited knowledge of other specialist functions, such as administration and marketing. This relates to the research of Penrose (1956), who emphasizes that the capacity of the managerial team to provide planning and coordination may constitute a serious restriction to firms growth.

In a similar vein, Horwitch & Prahalad (1976) mean that identification and exploitation of markets is perhaps the greatest difficulty for small technology-based firms. A new product may require substantial marketing investments to establish customer awareness and create brand preferences, especially if demand is limited or potential customers difficult to reach. However, many small technology-based firms lack marketing attention, due to the concentration on technological issues by top management.

Buckley (1986) indicates that these restrictions may be particularly severe during internationalization, since the high risks involved make the process management-intensive. Due to management's lack of knowledge about operating abroad and limited managerial time, the absolute and alternative costs of obtaining international market information are often high.

Another problem for small firms is their financial limitations. Many small firms have difficulties in obtaining bank loans and credits. Banks and other financial institutions are often less willing to offer financial support to small firms, since uncertainty regarding future revenues is great and the firms lack cash resources and assets to be used as collateral. In those cases, an alternative may be to invite external capital, usually coupled with some kind of managerial aid, either from larger firms or from the venture capital market.

In the absence of such investments, however, the limited managerial and financial resources available are likely to make small firms less prone to actively invest in foreign activates. Therefore, opportunistic behaviour, exploiting opportunities, rather than a planned strategy, is sometimes expected during early stages of internationalization. A study of 35 Nebraskan-based manufacturing firms by Lee & Brasch (1978) indicated that external export stimuli had a greater impact on export propensity among younger firms than had internal factors.

Once foreign activates are initiated, the actual behaviour could be expected to follow a sequential process of learning, as indicated by behaviouristic research. Concerning the choice of entry form, the possibility to use foreign subsidiaries may be restricted due to the higher costs associated with this entry form. Hirsch (1970) argued that small firms are likely to use indirect export channels, since a minimum level of operations is necessary to support investments in foreign subsidiaries. Besides, the use of indirect channels may provide the firm with immediate contacts on the market.

The most extensive Swedish study of new, technology-based firms in Sweden was undertaken by Utterback & Reitberger (1982). The results indicated that smaller firms are more likely to use agents, whereas larger firms tend to establish sales subsidiaries abroad. Besides, larger firms are more likely to use both subsidiaries and agents than just agents.

Similar observations have been made by others. According to a study of distribution methods and export performance among 116 small and medium-sized Canadian firms by Munro & Beamish (1987), smaller firms tended to depend exclusively on indirect

channels³⁰. Larger firms, on the other hand, used a mix of indirect and direct methods, including their own sales forces, exports to end-user/retailer and foreign affiliates.

Based on these findings, a fairly slow, sequential process of internationalization is expected as a default alternative among most small firms. During the development of new products, the home market is expected to be of particular importance among small firms, lacking an opportunity for "global scanning", as discussed by Vernon (1979). Once foreign activities are initiated, behaviour is expected to follow a sequential process of learning.

Technology characteristics

The second factor of importance for this study is the technological character of the firm. Closely related to technology level and R&D intensity is the question of product characteristics. Product characteristics, such as level of technological complexity and degree of "software" content, have sometimes been used to define technology intensity³¹. Several studies confirm the existence of a relation between R&D and international activities³². Since firm specific advantages are difficult to exploit on the market, firms active in R&D intensive areas are likely to be quick to engage in foreign activities.

One reason may be that the acceleration of technological development has shortened product life cycles and made product development more costly, especially for firms in R&D intensive industries.³³ During periods of rapid technological development, foreign sales may improve the possibilities to recover R&D expenditures before the technology developed becomes obsolete or imitated by other firms. Davidson (1980a) found that commercially and technically significant new products developed by U.S. firms during the

³⁰ Included among indirect export distribution channels were commissioned agents, independent distributors, export agents and trading houses.

³¹ See discussion in Hörnell et. al. (1973)

³² E.g. Caves (1971), Dunning (1972), Franko (1976) and Mansfield (1974)

³³ E.g. Dunning (1984), Terpstra (1985)

1970s tended to be introduced abroad much quicker than products developed in the early postwar period.

Besides, economies of scale associated with the R&D function make it too expensive for many small firms to engage in several parallel research projects. In the absence of diversification, internationalization may be the only way to increase sales volume and spread out the fixed costs of R&D. Severn & Laurence (1974) conclude that direct investors tend to be in research-intensive industries. By investing abroad, or exporting, they are expected to increase the expected return to research activities. This agrees with the results of other studies, summarized by Caves (1982).

This is particularly important when the home market is limited. The smaller the home market, the smaller the possibility to realize economies of scale in, for example, R&D, manufacturing or marketing without going abroad. Therefore, many specialized firms from small countries, such as Sweden, have been forced to go international at a relatively early stage.³⁴ In a study of 86 small, Swedish exporting firms by Kaynak et. al. (1987), it was found that more than half of the firms began exporting due to declining and/or saturated demand in the home market. This study, however, included a variety of firm types, active in different industries.

Another reason for a rapid internationalization may be that the attitude to international activities is more positive in technology-based firms. During previous research by Aharoni (1966) and others, several factors have been found to influence the international outlook of executives, e.g. previous experience with foreign markets, level of education, age and extensive travelling. Other studies indicate that some general characteristic of technological entrepreneurs are a high need for achievements, a high level of education and a relatively low age³⁵. Brynell & Davidson (1988), for example, indicate that the growth ambitions were higher in small high technology firms than in other small, entrepreneurial firms.

³⁴ Carlson (1979), Håkanson (1979) and Mansfield (1974)

³⁵ Hult & Odén (1979), Utterback & Reitberger (1982)

Besides, Olson & Wiedersheim-Paul (1978) argue that the more technologically complex and unique a product is, the smaller the number of potential suppliers. Hence, the higher the likelihood of receiving unsolicited orders. This, in turn, may increase the speed of internationalization as well as influence the pattern of foreign market selection.

The results of several studies indicate that firms offering unique products, in terms of a high technology content, tend to follow a strategy of market diversification, i.e. a rapid entry into several foreign markets, due to a limited number of potential customers in each market. In a study of 16 successful Swedish export firms by Forsman (1987), innovative, niche-oriented firms were found to rapidly enter a large number of foreign markets. These results were supported by Brynell & Davidsson (1988). In their study of small, entrepreneurial firms, a higher average export share and a greater geographical spread was found among high technology firms than among other firms.

According to another study of internationalization of small, technology-based Swedish firms, a fairly traditional sequence of market selection was found, i.e. the Scandinavian markets were the ones entered by most firms, followed by Western Europe, North American and more distant markets. Niche-oriented firms with unique products and considerable technical as well as marketing competence were found to rapidly introduce their products in several different markets³⁶. The results of Utterback & Reitberger (1982) indicated a correlation between technology and selection of foreign markets for FDI. Even if foreign subsidiaries were predominant in Western Europe, firms with subsidiaries in the U.S. and Japan were characterized as the most rapidly growing and innovative ones.

Concerning the choice of foreign entry form, several studies confirm the relation with technology level, as expected according to an internalization approach. In most cases, these studies have been concerned with technology transfer and the selection of entry form has been treated as a question of choosing between FDI and licensing. The results of Davidson & McFetridge (1985), for example, strongly supported the relation between FDI as technology transfer mode and the R&D intensity of the transferor. Contractor (1984) expect licensing to increase if the technology is less research-intensive, more

³⁶ Ds UD (1985:3)

codified, patented and transferable. Licensing may also be encouraged when a technology is short-lived, because of a rapid technological development. In those cases, the risk of technological dissemination is reduced since technological development is likely to rapidly make the technology obsolete.

Telesio (1984) argues that there are two main reasons to license abroad: to substitute for controlled foreign direct investment when licensing proves to be more profitable, and to gain access to technology of other firms through reciprocal grants of licenses, cross-licensing. In a linear multiple regression model he tries to explain how a number of factors influence the firm's decision to license³⁷. For multinational firms using licensing to supplement foreign direct investment, the amount of licensing was found to be greater for firms which spent more on R&D, were more diversified, smaller and had less international experience. The propensity to license did not seem to depend on whether the firm was based in the U.S. or not. Firms using licensing to gain access to technology, on the other hand, spent less on R&D, were relatively larger, highly diversified, and had limited international experience. Furthermore, multinational firms from outside the U.S. appeared to license relatively more than U.S. firms.

The selection of foreign entry mode could also be expected to differ with the marketing requirements of a product. In this case, however, the choice is basically between local representative and local subsidiary. Based on a summary of previous research, Hörmell et. al. (1973) argue that technology-intensive products are more likely to be sold through foreign subsidiaries, since high levels of complexity and software content are likely to increase the need for information about the local market, personal sales activities and services activities. In the empirical analyses made, the relation between technology level and choice of foreign entry form was supported³⁸.

³⁷ The variables chosen to indicate the strategies and resources of the firm were the following: (a) R&D expenditures as a percentage of total sales, a proxy for a strategy of innovation, (b) degree of product diversification, a proxy for a strategy of diversification, (c) relative size in the industry, a proxy for resources available to the firm, (d) per cent of total sales manufactured abroad, a proxy for foreign manufacturing experience, and (e) national base, i.e. whether the firm was based in the U.S or not.

³⁸ Correlation coefficient = 0.58. However, this study was undertaken on an industry level and not on a firm level.

Based on a summary of his own and others empirical studies, von Hippel (1978) argue that a considerable share of new product development is initiated on the initiative of customers. Even in cases where the initiative has come from the manufacturer, a close customer contact may be required for the successful development of new product ideas. This, in turn, may favour a subsidiary establishment, since direct customer contacts are easier to establish in a subsidiary than through local representatives.

Overall, previous research indicate that a relatively rapid entry into a large number of markets could be expected in firms with high levels of R&D intensity and products of high technology character. Concerning choice of entry form, a relatively high level of commitment is expected, unless a short product life cycle rapidly makes such investment obsolete. However, financial and managerial limitations of small, technology intensive firms are likely to concentrate FDIs to markets of strategic importance, e.g. large industrialized markets.

Contextual variables

Although the main purpose of this study concerns the impact of firm size and technology on internationalization, the context in which the firm is active must not be neglected.

Industry structure

According to Porter (1980), the evolution of an industry is closely associated with the traditional product life cycle³⁹. Because of the process of innovation and diffusion of new products, industry growth is expected to follow an S-shaped curve - through the stages of introduction, growth, maturity and decline. During the process, industry structure is likely to change, in terms of competitive situation and customer sophistication.

³⁹ This could result in some problems for large diversified firms, active in several product areas, with different positions on the product life cycle. In small firms, however, this approximation is less problematic, since these firms are often established to develop and commercialize one particular product idea.

Abernathy and Utterback (1978) present a model of innovative patterns in firms. During initial stages of technological innovation, radical product innovations are likely to originate in small, flexible organizations with superior functional performance and well developed external communication. Competition is based on performance, rather than cost, making it possible to achieve high profit margins. During this stage, economies of scale are of limited importance, since rapid technological development may soon make production technology obsolete.

However, as a "dominant design" developed, economies of scale in production become increasingly important. Since this stage is accompanied by increased price competition and an emphasis on process innovations, a dependence on high volume production to cover fixed costs is likely to result in larger, less flexible firms.

The difference in comparative advantage of small and large firms at different stages of the innovative process was discussed by Williamson (1975):

"An efficient procedure by which to introduce new products is for the initial development and market testing to be performed by independent inventors and small firms (perhaps new entrants) in an industry, the successful development then to be acquired, possibly through licensing or mergers, for sequential marketing by a large, multi-divisional enterprise."

Shanklin and Ryans (1984) divided the development of high technology industries into three separate phases, requiring different talents of the firms.

1. The patent-driven stage: During this stage, it is important to establish company presence on the market. New technological breakthroughs may be protected by patents.
2. The supply-driven stage: Since the buyer is usually less technically skilled than the seller, it is important to explain the advantages of the product. By having technologically skilled sales personnel, demonstrating possible applications of new products, demand is created.

3. The demand-driven stage: After a new product has been presented to the market, the risk of imitation increases and competition becomes more intense. At this stage, it becomes more important to offer customer-tailored problem solutions, requiring well-developed sales and services skills.

Overall, this indicates that small firms may have an advantage over larger ones during initial stages of product development, due to flexibility and a possibility to engage in the close customer contacts required for successful product adaptation and application development.⁴⁰ Therefore, a rapid speed of foreign entry would be preferred among these firms, in order to cover R&D expenditures before price competition increases or the technology becomes obsolete.

However, a rapid speed of foreign entry may not be possible. An intensive personal marketing investment may be required before foreign sales can take place, since buyers of technological innovations in general face a high level of strategic uncertainty. Besides, investments in product and application development may be needed before a technological innovation is transformed into a commercial product. This agrees with the findings of Mansfield et. al. (1971), i.e. that the last stages of product development, such as production and marketing, account for a considerable share of innovation costs.

The possibilities to provide different types of foreign marketing activities is likely to vary with the entry form used in a specific market. The relation between a product's stage of the life cycle and relative importance of different entry forms was studied by a number of researchers. In most cases, results indicate a preference for foreign subsidiaries as transfer form for technological innovations, but as the products matures, licensing becomes more important. For example, Vernon & Davidson (1979) found that subsidiaries were predominant in the first couple of years of the diffusion of an innovation, but that licensees then started to catch up. Davidson & McFetridge (1985) also found that the age of a technology was strongly related to entry mode, i.e. the older the technology and the more previous transfer of the technology, the more licensing. However, they did not gain support for the hypothesis that radical innovations are more

⁴⁰ Similar discussions are presented by Andersson (1975) and Quinn (1979)

likely to be internalized than others. Neither did they find that technologies based on innovations were more frequently internalized than imitations.

Mansfield (1974) argue that previous research has shown that differences in means of technology transfer between industries to be caused by differences in the extent of the technological lead enjoyed by the innovating firm, specialization of firms in different product areas and level of competition in the industry. The impact of level of competition was also studied by Telesio (1984), who found that firms are more inclined to use licensing rather than FDI when the level of competition is high. However, the propensity to use licensing rather than FDI as a mode of technology transfer was higher in smaller firms, with limited international experience and diversified product lines.

Overall, a relation between the industry stage of development, in terms of customer awareness and level of competition, and internationalization behaviour could be expected. Still, the impact of industry structure on internationalization behaviour is not clear. On the one hand, a rapid speed of foreign entry may be the preferred alternative among small, innovative firms, before competition increases. An undeveloped demand structure, on the other hand, may reduce the feasibility of a rapid entry. Concerning foreign entry form, a preference for foreign subsidiaries has often been identified among innovative firms. However, the higher costs associated with this entry alternative may explain the higher propensity to use licensing as technology transfer mode among smaller firms.

Local market characteristics

Over time, a number of different market characteristics have been found to influence the foreign activities of firms. As indicated previously in this chapter, initial activities have been found to take place in markets with a similar culture and a limited geographic distance. Over time, factor such as market potential and local industry structure have become more important to explain the pattern of market selection. In markets of limited size, minimum efficient scale in operations may restrict the possibilities to using FDI altogether.

The results of Johanson & Wiedersheim-Paul (1974) and of Davidson (1980), indicate that firms base their investment decisions on market analysis of potential, relative costs and investment climate, rather than on cultural differences during later stages of internationalization. However, both these studies found a greater importance of market potential on the establishment of subsidiaries than on the establishment of local representation.

In a study of foreign activities of Finnish firms, Loustarinen (1978) used three different market distance measures; (a) physical distance, e.g. geographic distance, (b) cultural distance, e.g. differences in language, education, level of development, etc., and (c) economic distance, e.g. size and growth of GDP, and size of population. The study indicated a higher propensity to use FDI in geographically distant markets, but a lower propensity in culturally distant markets.

The results by Davidson & McFetridge (1985), however, indicated a preference of FDI over licensing in geographically close as well as in culturally similar markets, e.g. with the same language and religion as the home country. The expected relations between the choice of subsidiaries and market size and sophistication⁴¹ was, however, not supported. Contractor (1984), on the other hand, found the ratio of U.S. licensing relative to investment to increase with technical capability of a country, but to decrease in relative importance with higher per-capita GDP and industrialization. Sometimes, access to local technology has been used to explain foreign market selection, even if several studies have found a low priority for such motives.⁴²

The results of Davidson & McFetridge (1985) indicate that an internal transfer of technology is more likely than licensing in countries where foreign direct investments are not restricted by government policy in terms of screening procedures, equity control or extensive exchange control. Similar results were received by Contractor (1984) in a study of the relative propensity among U.S. firms to use licensing versus equity investments. A weak support was received for the idea that the proportion of licensing increases with

⁴¹ Indicators of market size and sophistication used in the study were population, GDP per capita, electric power consumption, the proportion of the population living in urban areas and literacy rate.

⁴² E.g. Hedlund & Kverneland (1984) in their study of FDI in Japan

government scrutiny and regulation of foreign direct investments, and decreases as concession and incentives for FDI are offered⁴³.

Summary

Overall, a large number of variables could be used to explain the international behaviour of firms. Still, the explanatory variables of greatest importance to this study are firm size and technology intensity.

Using a behaviouristic approach, it is argued that a slow, sequential process of internationalization could be particularly important among small, newly established firms. In these firms, with limited financial and managerial resources available for strategic market evaluation, uncertainty is expected to be reduced by selection of foreign markets of limited economic distance, i.e. markets of which the individual managers could be expected to have more experience. Once foreign activities have been initiated, a successive increase in foreign commitment, proceeding from direct exports, to local representation and local subsidiary, is expected.

Among technology intensive firms, on the other hand, a quite different approach to internationalization is presented by eh internalization theorists. In order not to loose control over proprietary knowledge, due to market failures and opportunistic behaviour, these firms are expected to exploit firm specific advantages in-house, rather than on the market, e.g. through representatives or licensees. This, in turn, reduces the possibilities for sequential learning about foreign operations.

Technology characteristics are also expected to influence internationalization in a number of other ways. The speed of internationalization, for example, could be expected to be high, due to high costs of R&D, a rapid technological development and a limited home market niche. In order to recover R&D costs before the technology becomes obsolete or imitated by others, a rapid speed of internationalization may be necessary. A rapid

⁴³ Government export stimulation may also affect the international activities of firms. It is sometimes argued that governments in developing countries are more favourable to the activities of firms in technology intensive industries, since an international transfer of technology is expected to have a positive impact on economic development.

internationalization may be further stimulated by a positive attitude towards foreign activities within the firm, as is common among many small, technology based Swedish firms.

When looking at pattern of foreign market selection, a market diversification strategy is common among many niche-oriented, technology based firms, since the number of customer in each market is limited. The actual market selection may be guided either by strategic consideration, e.g. access to important customers or competitive considerations, or by opportunities, e.g. the reception of unsolicited orders. Still, if local subsidiaries are the preferred entry form, a concentration to a limited number of strategically important markets may be necessary.

This indicates that a limited firm size and technology intensity may have a conflicting impact on the process of internationalization. Following a behaviouristic approach, a fairly slow and sequential approach to foreign activities could be expected among small firms, while technology intensity is expected to influence internationalization behaviour in a different direction. Strategic considerations and competitive structures, as indicated by industrial organization and internalization theories, are likely to reduce the feasibility for sequential learning.

3. INTERNATIONALIZATION OF 15 SMALL, TECHNOLOGY-BASED FIRMS

Introduction

In this chapter, the internationalization behaviour of 15 small firms, included in the interview study, is summarized. First, a general description and analysis of the case firms is found. Second, three case studies have been selected to illustrate different patterns of internationalization. Third, important issues and their possible influence on internationalization behaviour are presented. These results have later been used to complement previous research on internationalization of small and/or technology-based firms, in order to develop a research model to be used in the subsequent analysis of survey data.

Interview studies

During the first phase of the empirical study, 15 small, technology-based firms were interviewed, in order to develop a basic understanding of their internationalization behaviour. By making personal interviews, it was possible to explore this relatively complex process and the impact of firm and industry characteristic over time.

The first interview study, Analysinstrument AB, could be regarded as a pilot study, since a more extended case was developed. The remaining 14 interviews were made to develop illustrative mini-cases, including certain basic information about the firms and their internationalization processes. Two of these cases were later followed up by more in-depth industry studies, in order to further investigate the possible impact of industry characteristics.

Selection procedures

15 firms, fulfilling the inclusion criteria defined in the introduction chapter, were selected for the interview study. These firms were identified by the use of the Swedish Export Directory 1985 and the business catalogue Kompass. After an initial contact, all the firms agreed to participate in the study.

The selected firms differed in terms of size, product types, industry classifications, and levels of internationalization. They also represented a geographical spread, even if most firms were located close to major transportation routes, for convenience reasons. By selecting firms of different types, it was possible to develop an understanding of how different firm and industry characteristics could influence the process of internationalization. This was also expected to facilitate the interpretation of the results based on the survey.

For industry studies, two industries where small Swedish firms were considered to be internationally successful were preferred. Using the initial interview studies made, it was possible to select two industries that fulfilled this criteria. The industries selected, e.g. communication products for visually impaired and condition monitoring systems for industrial machines, were both characterized by a relatively early stage of development and a domination of young, technology-based firms⁴⁴. In these studies, the impact of structural characteristics of the industry, e.g. product characteristics, technology types, customer characteristics, competition, production, marketing and R&D activities, as well as industry history, e.g. development of the industry and the actors within it over time, were further explored.

Overall, these studies gave an initial understanding of the process of internationalization among these firms, that was used during the development of the questionnaire. The case studies were later used to interpret and illustrate some of the results achieved during the mail survey.

⁴⁴ SIND (1988:1)

Data collection

Data collection was based on several different types of data sources, consisting of primary as well as secondary material. First, interview data was collected during semi-structured personal interviews, covering a list of important topics. The interviews normally lasted between one and two hours, and the relatively open interview structure made it possible to further explore unexpected answers. Interviews were normally conducted with one single person, usually the president, who was often also the founder of the firm. In some of the older firms, however, the founders had left the firms and interviews were conducted either with the new president or other senior managers. In some cases, more than one interview was conducted with the same person, and in other cases, more than one person was interviewed.

Based on the interviews, 15 "minicases" were developed⁴⁵. The cases were relatively focused, but since the firms were relatively small, with a limited number of decision makers, a less in-depth study was considered enough to establish a good understanding of their internationalization⁴⁶. In many cases, the firms lacked specialized personnel, dealing with specific functions. Therefore, the number of persons involved during the process of internationalization was usually restricted. Often, there was only one or two persons responsible for most strategic decisions taken by the firms.

During the pilot study, personal interviews were conducted not only with representatives from the firm, but also with representatives of some of its foreign distributors, usually a senior executive in the sales or marketing department. For the industry studies, the primary data collected during interview studies were complemented with semi-structured personal or telephone interviews with senior executives in competing firms and with a large number of industry experts.

⁴⁵ After 15 interviews, it was considered that an expansion of the number of cases would add only a limited amount of information.

⁴⁶ See Valdelin (1974) for a more thorough discussion about the case method.

Second, primary material in written form was studied. This material had been developed either for internal use, e.g. project descriptions, distributors' agreements, marketing and competitive studies, or for external use, e.g. annual reports, company descriptions, product information, written speeches presented at seminars or trade shows, booklets and technical magazines.

Third, when available, secondary information sources were collected. Some types of secondary material used were statistical material, books and newspaper articles, as well as research papers, firm and industry studies made by other researchers, students or consultants. However, since these firms were relatively young and small, they were often relatively unknown to the public. Besides, a minimum of bureaucracy and formalization made them unwilling to complete official questionnaires. Due to this, secondary data on these firms was relatively scarce, and analysis was based mainly on primary data.

The sample

The firms included in the interview study differ in a number of aspects. Even if the mini-cases were intended to study relatively young, technology-based firms, age as well as absolute size differed. (Table 3:1)

Table 3:1 Year of establishment, size (1985 or 1986) and product type

Instruments/optics	Year of establishment	No. of employees	Turnover (million SEK)	Product type
Analysinstrument	1973	14	9	blood analysis instruments
Fluid Inventor	1973	7	9	fluid measuring instruments
Icor	1984	8	12	medical instruments/disposable
Owoco	1968	8	5-10	hand tools, density measuring instruments
Scanditronix	1965	135	80	medical instruments/systems
Selcom	1971	80	36	laser-based measuring instruments
Sensitron	1976	9	2-5	wind & temperature measuring systems
SPM Instrument	1970	100	40	condition monitoring instruments
Tecator	1967	150	150	analysis instruments for food and feed
Electronics:				
Gewa Rehabteknik	1973	8	10	communication systems for disabled
Infovox	1982	13	8	synthetic speech modules
Inter Innovation	1973	576	347	automatic cash counters
Scan Coin	1966	200	157	coin counting systems
Spine Robotics	1979	35	?	industrial robots
System 3R	1968	300	190	moulding components

Source: Interview data

Internal firm characteristics

Looking at **firm size**, five firms had managed to grow into medium-sized rather than small firms, with 50-200 employees. Two had even outgrown this definition and become large firms, according to Swedish standards. These firms were in general slightly older.

Another seven firms had remained small. Within this group, two firms (Icor, Gewa Rehabteknik) indicated a negative attitude towards growth, in order to avoid bureaucracy and inflexible management methods. The limited growth of other firms in this group (Owoco, Sensitron, Fluid Inventor) could partly be explained by the extensive period of product development required before a commercially viable product was presented to the market.

In Spine Robotics, finally, growth in terms of number of employees was extremely high during the first years. Still, sales were limited and the financial resources available were used for technological development. During 1987, negotiations for financial capital were initiated and a reconstruction resulted in a reduction of employees from approximately 80 to 35 persons. However, these attempts failed and the firm went bankrupt.

Looking at **ownership structure**, three categories of ownership types were identified, purely privately owned firms, firms with purely corporate ownership, including investment firms as well as venture capitalists and other firms, and firms with mixed ownership. (Table 3:2)

Table 3:2 Ownership structure (1985 or 1986)

Ownership structure	Firm names
Purely private	Analysinstrument, Gewa Rehabteknik, Icor, Owoco, Scan Coin, SPM Instrument, System 3R
Mixed ownership	Fluid Inventor, Infovox, Inter Innovation, Scanditronix, Selcom, Spine Robotics
Corporate ownership	Sensitron, Tecator
<u>Source:</u> Interview data	

Two firms, i.e. Sensitron and Tecator, were initially founded by a number of private persons. However, in order to raise financial capital for an international expansion, they were acquired by larger company groups. Among the privately owned firms, on the other hand, several firms (Gewa Rehabteknik, Icor, SPM Instrument) had a very negative attitude towards acquisition.

The firms differed also according to mode of **establishment**. Four firms were established by persons not previously engaged in the present business area of the firm. Two of these firms, i.e. Owoco and Tecator, acted as agents for products of other manufacturers before they started to develop their own technology-based products. Gewa Rehabteknik was the result of a technological innovation, a page-turner for the mobility disabled. In this case, the inventor lacked previous industrial experience within the area, but had general knowledge about product needs, based on personal experience. Inter Innovation, finally, was initially established as a pure development firm, with the ambition to undertake contractual development projects for other firms. One of these projects, however, resulted in the development of the automatic cash counter, which later became the main product of the firm.

Five firms (Fluid Inventor, Infovox, Scanditronix, Selcom, Spine Robotics) were established to commercialize technological innovations developed within universities. Selcom and Spine Robotics, for example, were based on contacts with Chalmers Institute of Technology in Gothenburg, while the other three were established as spin-offs from the Royal Institute of Technology in Stockholm. The remaining six firms, (Analysinstrument, Icor, Scan Coin, Sensitron, SPM Instrument, System 3R) firms were developed as spin-offs from established firms, when an idea did not fit into the existing structure or due to internal conflicts within the firms.

The type of establishment seemed to cause certain differences between firms. Firms established as a spin-off, either from universities or other firms, were more likely to have previous experience with the product or the industry. This, in turn, seemed to facilitate technological development and improve market contacts. Besides, firms established as

university spin-offs appeared to be more inclined to invite external parties to share ownership, while firm spin-offs were more likely to remain privately-owned.

Related to the establishment of the firm was the question of different types of **managerial competence**. Since most firms in the study were established by persons with a technological background from universities or previous employments, some of them became technology-dominated (Analysinstrument, Sensitron, Spine Robotics). These firms were heavily engaged in product development, making limited efforts to initiate marketing activities.

Other firms (Inter Innovation, Scanditronix, Scan Coin, Selcom, SPM Instrument, System 3R, Tecator), developed a mix of marketing and technology competence over time. Even if most of these firms were initially technology dominated, a professional management team was engaged as the firms expanded. Over time, some of these firms developed highly efficient marketing strategies. Tecator, for example, even received an award as "Export Promotor". SPM Instrument made large investments in marketing during its first years, since the undeveloped demand structure made customer education particularly important.

Related to the need for marketing activities was the question of **product characteristics**. Within the sample, a number of different product types were included, ranging from specific instruments to complete systems. Some of these were standard products or systems, while others were adapted according to specific customer needs. Eight firms were involved in cooperative development projects with customers in Sweden or abroad. (Analysinstrument, Icor, Infovox, Inter Innovation, Scan Coin, Selcom, Sensitron, SPM Instrument). Sometimes, this resulted in adapted systems that could later be sold to other customers. In other cases, entirely new products or application areas were developed.

When looking at **technology intensity**, considerable differences were found. Using R&D expenditures as a per cent of turnover, many small firms were found to have high levels of technology intensity. (Table 3:3)

In two cases, i.e. Analysinstrument and Gewa Rehabteknik, this measure gave a somewhat confusing result. In spite of a high R&D expenditure as a per cent of total turnover, the level of technological development was relatively low. These firms were basically involved in market oriented product development, incorporating existing technologies developed by other firms.

Table 3:3 R&D expenditures as a percentage of total turnover

R&D expenditures/ turnover	Firm names
5-10%	Fluid Inventor, System 3R
11-20%	Scan Coin, Scanditronix, Inter Innovation
over 20%	Analysinstrument, Gewa Rehabteknik, Icor, Infovox, Selcom, Spine Robotics, SPM Instrument
unclassified	Owoco, Sensitron, Tecator

Source: Interview data

A higher subjective level of technology development could be expected among firms working with technological innovations. Nine firms were based on technological innovations which initially gave them first mover advantages on the market (Icor, Infovox, Scan Coin, Scanditronix, Selcom, Sensitron, Spine Robotics, SPM Instrument, System 3R). In order to keep these positions, considerable investments in product development were considered necessary. To complement internal technology development, Scan Coin and Tecator acquired technological innovations from other firms.

An alternative measure of technology intensity was the number of patents of firms. (Table 3:4) In comparison with R&D expenditure as a percent of total turnover, this gave a somewhat different picture of technology intensity within the sample. One reason for this may be variations in the attitude towards patenting. Scanditronix and System 3R, for example, considered patents to be very important, to keep control over technology. Other firms indicated other motives. SPM Instrument found a patent search to be valuable before a new product was launched, in order to make sure that a product/process does not already exist and avoid future patent processes. According to Icor, patents have an important value as marketing arguments.

Fluid Inventor and Gewa Rehabteknik argued that even if patents were important, the costs of keeping them were too high. Others considered patents to be more or less worthless. Sensitron, for example, avoided patenting since the openness required during the process made imitations possible. At Owoco, the only patent could never be defended, since the firm could not afford to enter a patent process once imitation occurred.

Table 3:4 Numbers of patents

No. of patents	Firm names
0 patents	Analysinstrument, Owoco
1-5 patents	Fluid Inventor, Gewa Rehabteknik, Icor, Selcom, Sensitron, Spine Robotics
>5 patents	Inter Innovation, Scanditronix, System 3R
unknown	Infovox, Scan Coin, SPM Instrument, Tecator

Source: Interview data

Overall, the apparent difficulties in defining technology intensity makes it necessary to employ a number of complementary measures in order to separate firms of different technology character.

Industry structure

In the initial sample presentation, the products were classified into two industries, i.e. instruments/optics or electronics. However, this definition was not altogether obvious, since many products included a number of different technologies. Therefore, many of these firms could be classified into more than one of these industries. Besides, there are a number of different sub-industries within each group, all with specific characteristics. Still, an attempt to investigate industry structure was made⁴⁷.

⁴⁷ For a more complete discussion of the possible impact of different industry structures, two industry studies undertaken, i.e. communication products for the visually impaired and condition monitoring equipment for industrial machinery, see SIND 1988:1

Looking at industry **stage of development**, the need for customer education was used as a proxy. Six of the firms (Analysinstrument, Fluid Inventor, Owoco, Scan Coin, System 3R, Tecator) entered existing industries, with relatively well established structures. Products and applications were known to the customers, reducing the importance of market development and customer education.

Another eight firms entered emerging industries (Gewa Rehabteknik, Icor, Infovox, Inter Innovation, Selcom, Sensitron, Spine Robotics, SPM Instrument), where the industry structure was more unclear. Products were based on technological innovations or directed to new customer groups, which made it important to actively stimulate sales and create the market.

Scanditronix, finally, entered an industry characterized by an emerging demand and few competitors. Over time, however, the number of competitors increased and the industry approached a more established structure. In the future, this could be expected to happen to many of the firms presently active in emerging industries.

In emerging industries, **competition** between firms appeared to be less important. Sometimes, competition even helped to improve customer awareness and stimulate market growth. Among three firms entering emerging industries (Gewa Rehabteknik, Sensitron, SPM Instrument), the competitive structure could be characterized by cooperation, rather than traditional competition.

In the industries focusing on the disabled, for example, mutual representation between manufacturers was common and several agreements of this type had been made by Gewa Rehabteknik. Similarly, Sensitron entered a mutual representation agreement with one of its American competitors. The industry for condition monitoring equipment for industrialized machines required heavy marketing investments from several competitors to take off. During this stage, SPM Instrument was able to cooperate with other Swedish firms in the area. Still, traditional competitive means such as price competition, complete product ranges and first-mover advantages were by no means considered to be unimportant.

In established industries, the competitive situation was more traditional. Competition was sometimes based on price (e.g. Analysinstrument, Fluid Inventor), while in other cases, Swedish firms had been able to charge higher prices due to a perception of better performance or higher product quality (e.g. Scan Coin, Tecator).

Customer structure also varies, depending on product type. For firms manufacturing laboratory instruments or systems (Analysinstrument, Icor, Scanditronix, Tecator), customers were basically private or public laboratories. Industrial electronic components or instruments, on the other hand, were usually sold to other industrial firms, using the products directly (Selcom) or incorporating them as components in their own products or systems, as OEM⁴⁸-customers (Fluid Inventor, Infovox, Owoco, SPM Instrument, System 3R). The automatic cash counters offered by Inter Innovation could either be employed directly, by banks and financial customers, or indirectly, in automatic tellers developed by large machine manufacturers.

Within the group of firms providing complete systems (Gewa Rehabteknik, Scan Coin, Sensitron, Spine Robotics), customer types varied. Gewa Rehabteknik and Sensitron, for example, often sold their products to large public customers, such as hospitals and airports. For Scan Coin, the customer structure was very diverse, ranging from large banks to small candy stores, while for Spine Robotics, the only customer type reached was large car manufacturers.

How stable the development of a firm had been could partly be explained by the customer structure. In firms with narrow product ranges, the possibility to use a product portfolio strategy to reduce risk was limited. Spine Robotics, for example, depended on one particular customer type, a large car manufacturer. Consequently, as the automobile industry reduced its investments in automation, the firm was severely struck.

To reduce this dependence, some firms had developed several complementary product for their customers, (e.g. Icor, System 3R, Tecator), or introduced products directed to different customer groups (Owoco). Others adapted the product for several different

⁴⁸ Original Equipment Manufacturers

application areas (Fluid Inventor, Gewa Rehabteknik, Inter Innovation, Scan Coin, Selcom, Sensitron, SPM Instrument).

Overall, the number of products, potential customer groups and application areas influence the size of the home market niche. For firms with a limited home market, the need for international activities is expected to increase.

Three illustrative cases

In this section, a short presentation of three young, technology-based firms and their internationalization process, can be found. These firms have been selected, since they represent three different types of internationalization behaviour. The first one, Gewa Rehabteknik AB, followed a relatively sequential pattern of internationalization. The second one, Icor AB, followed an almost reversed pattern of internationalization and the third one, SPM Instrument AB, was able to draw upon international experience of other firms to facilitate internationalization.

Gewa Rehabteknik AB

Internal firm characteristics: Gewa Rehabteknik AB was established in 1973 by a man who had invented a page turner for his disabled father, and his partner. Over time, a business strategy of becoming the best within the communication area for the disabled had emerged. Gewa offered a full product range for mobility disabled, but some products for the visually impaired and hard of hearing had also been included.

In 1986, Gewa's own products accounted for approximately 30% of total sales, while remaining products were purchased from other manufacturers. The firm had 8 employees in Stockholm and around 10 persons working at the production unit and turnover was approximately SEK 10 million.

During the first years, considerable investments in product development were made. This became very expensive and a decision was taken to concentrate efforts on selling existing

products. In 1986, about 5 persons were working with product development. The firm usually applied existing technologies when developing new products for the disabled. In total, around 100 different products had been developed, but only the first one, the page turner, had been patented.

Sales were usually handled through direct sales. Gewa also participated in exhibitions and seminars, both nationally and internationally. In Sweden, Gewa Rehabteknik also participated in the so called TUFFA-project, a consortium established by Swedish manufacturers of communication products for disabled persons. By cooperating, the firms could facilitate the procurement process for the centralized purchasing agent for communication systems for work adaptation, AMS⁴⁹.

Industry structure: During the second half of the 70s, sales of equipment for the disabled expanded. The last decade's computerization has made communication increasingly important and the spreading use of PCs opened up a working possibility for many disabled persons.

In an international perspective, Sweden was considered to be one of the more advanced countries when it came to providing the disabled with different types of aids. An ambition to integrate the disabled into society had stimulated the development of several types of products for the disabled and a centralized distribution and financing structure had resulted in a widespread use of these products. In the future, a similar development was expected to follow abroad.

The majority of firms active in the market for communication aids were small, specialized firms, but there were also some larger firms with a wider range of medical products. In the late 1980s, Gewa considered itself a leader on the European market, due to its compete product range in the area. The major competitor was another small, Swedish firm, offering a similar product range.

⁴⁹ Arbetsmarknadsstyrelsen

Internationalization: During the first years, efforts to expand international activities were limited. Still, the firm had some international contacts already at an early stage, resulting in occasional sales. One reason for this was the interest in the unique page-turner that existed in several countries. Another reason was the fact that Gewa itself acted as an agent for several foreign manufacturers of products for the disabled.

One of the first markets where Gewa established a distributor agreement was the U.K., a country that had previously been a leader within the disabled area. Initially, Gewa acted as an agent of a firm that had been active on the market ever since the 1950s. The U.K. firm became interested in the page-turner developed by Gewa, and in 1973, it agreed to become a distributor of Gewa's products in the U.K. However, only a limited number of page-turners had been sold.

During 1974-76, the firm identified distributors in several other countries. Most contacts had been established during international exhibitions for equipment for the disabled. Since more or less the same firms participate in these exhibitions, the firms got to know each other. However, several of these distributors were rapidly replaced. In Holland/Belgium, for example, the initial distributor did not sell any products, and another one was identified. After a few years, that firm went bankrupt and a larger distributor was found, but sales never became more than marginal. The only markets, except for the U.K., where Gewa kept its initial distributors were Denmark and France. In Denmark, a mutual distribution agreement had been signed, but imports by Gewa exceeded the volume exported. In France, a good personal relationship had been developed with a small distributor, and sales were going relatively well.

In Norway, the first distributor was a large firm, but due to limited sales, the relationship was terminated in 1985. A split-off from the initial distributor resulted in the establishment of a small firm. Since Gewa had a good personal relationship with one employee, the newly established firm was appointed new distributor. Later, the same person received the right to use Gewa's name in marketing when he decided to establish a firm of his own. In Finland, similar changes of distributors have taken place since 1975.

In West Germany, the firm established a good personal relationship with a distributor around 1974-75. After some time, however, this person moved to Switzerland and developed a market there. Sales went well until the initial distributor retired and sold off the firm. Since then, the Swiss activities had been almost non-existent. In West Germany, a new distributor was appointed, but after a limited period of time, this firm went bankrupt. In 1986, search for a new distributor resulted in a contact with another firm.

In the U.S., the firm made some attempts to establish representation via the Swedish Trade Council in Chicago. In 1979, this resulted in a contact with an American partner, and the establishment of a joint sales subsidiary. Due to financial problems on behalf of the partner, this did not work out and the joint venture was closed down. Instead, a cooperation with a small, U.S. manufacturer, with a similar business attitude was initiated and a mutual distributor's agreement was signed. In 1986, U.S. sales corresponded to the amount imported from the U.S. firm by Gewa and sold on the Scandinavian market.

Since then, the firm has also established distributors agreements in Saudi-Arabia, Iceland and Austria. In Saudi-Arabia, the first distributor was a Swedish firm, selling medical equipment. After some time, however, the firm went bankrupt and sales were taken over by another firm. In the other markets, Gewa was contacted by local firms interested in selling its products.

In 1986, Gewa was still in a relatively early phase of its internationalization. The firm had 12 foreign distributors, covering 14 countries, but in most of these countries sales were limited. Export share was 20-25% of turnover, or SEK 1,5-2 millions, but the export share was expected to increase in the future as the market expanded. The only foreign markets with somewhat higher sales volumes were Norway, France and the U.S. In the Benelux-countries, the U.K., Germany, Switzerland, Finland, Denmark, Saudi-Arabia, Iceland and Austria, sales were either very limited or non-existent.

Gewa preferred to use small distributors, since the complexity of their products required a relatively flexible organization. Several of the distributors were small firms, with sales

and some production in the disabled area. In many cases, a mutual distributors agreement had been established. For example, distributors in the U.K., Denmark and the U.S used Gewa as distributor for their own products in Scandinavia. To work with larger firms, on the other hand, was considered more difficult.

Contacts with foreign distributors were relatively informal. It was considered more important to have a good personal relationship with foreign distributors than to use a formal report system.

Icor AB

Internal firm characteristics: Icor was founded in 1984 by two persons with previous experience from the medical technology area from their earlier employments. The idea was to develop innovative, high technology products for existing or emerging market niches that were judged to have a high annual growth and a large future market potential.

The firm had three different products lines. The most important one was disposable hygroscopic condenser humidifier. This product was used to humidify respiratory gases, e.g. during anaesthesia in operating rooms, with lung ventilators in intensive care units, or on patients breathing through tracheostomy. The second most important product was an indirect closed-circuit calorimeter to measure oxygen uptake and resting energy consumption of patients. The third application area was monitoring instruments for halogenated agents, used during inhalation anaesthesia.

In 1986, sales had grown to SEK 12 million and the firm employed 8 persons. The firm still perceived a growth potential, but was not interested in becoming larger than approximately 20-30 persons, due to the risk of higher inefficiency in larger firms. Ownership was split between the two founders, who also took a large part in running the firm.

Even though only one of the founders was the only person working full-time with product development, R&D-expenditures accounted for approximately 20% of total turnover. When a project was initiated, external consultants in electronics, mechanics and programming were contacted. The firm also cooperated with research and development departments of other medical companies in some special projects. Prototypes were tested at hospitals, in Sweden or abroad, where the founders had close relationships with competent doctors.

A development project was not allowed to take too much time, in order not to present an obsolete product. A medium-sized project took approximately 1 year, engaging 5-6 persons full time, and a large one about 2 years and 20 persons, which was considered much shorter than the average for larger firms. The firm invested in a patent as soon as a new product was developed. In 1986, the firm had 4-5 different patents in 6-7 countries. However, the value of patents as protection was considered to be limited, since the firm could not afford patent litigation. The only way to defend a product was therefore to continuously improve it.

Production was subcontracted out, and the firm provided approximately 20 persons employed by the subcontractors with work. Icor had no intention of taking up production itself, but kept quality control and final testing of the products within the firm.

Marketing activities were important, and the firm participated at trade shows, published semi-scientific articles and produced sales material. Trade shows were considered to be important for two reasons: first, it made it possible to study what new products had been developed, second, it offered a possibility to meet the other firms in the area. However, Icor did not sell anything under its own brand name, but used the distributors' name.

Industry structure: The international market for medical technology was limited. In spite of large hospital sectors, only 3% of total expenditures were medical equipment and disposable. The market was very segmented, and Icor did not compete with, for example, pharmaceutical firms. So far, competition had been limited and Icor had been able to charge relatively high margins. In the future, however, competition was expected

to increase as the product markets expand. In those cases, the strategy was to continue product development and keep a first mover advantage or leave the product segment.

Since there did not exist any international standards for medical technology products, there existed a number of local rules, particularly in the U.S., but also in West Germany, the U.K., France, and Japan. Even smaller countries like Sweden sometimes established their own standards in this area. This has sometimes made it necessary for Icor to differentiate its products.

The most important customers were doctors at larger hospitals. In spite of a complex purchasing process, involving nurses, purchasers and politicians, the doctors had a unique bargaining position when it came to deciding what to buy.

Internationalization: The Swedish home market for medical equipment and disposables was very small, and since the firm was active in a narrow market niche, internationalization was important even from the start. Consequently, like most firms in the medical technology area, Icor had a high export share. In this case, exports accounted for over 99% of turnover, and sales in Sweden were based more on requests from old acquaintances than on actual marketing.

Initially, potential distributors in the important markets were actively investigated, using the existing contact network of the founders. The first market to enter was the U.S., accounting for almost 45% of world demand of these products. In 1985 a firm, with a President who was an old friend of the founders, wanted to complement its product line with the disposable humidifiers. The next contact established concerned the calorimeter. Icor contacted some doctors, who had themselves tried to develop a similar product. Later, some employees at a larger firm were convinced to establish a firm of their own, to sell Icor's products. At an exhibition, Icor made contact with a large anaesthesia firm, for which Icor developed a gas monitoring machine. The U.S. firm receives exclusive sales rights for the world, while Icor retained the right to use and sell a certain component.

The second most important market was Japan, with 10% of the world market. Soon after the first U.S. contact, Icor started to investigate the market, but due to trade regulations, it took about a year before sales could start. The firm had old contacts with the owner of a company group, which had a Japanese sales firm as its headquarters. A contract to sell disposable humidifiers and calorimeters was signed, and later, the firm started to negotiate sales of the gas monitoring machine.

Approximately 45% of the market was Europe, with West Germany as the single largest market. To find a distributor for disposables in West Germany, the firm contacted some firms during a trade show, and one contact led to a contract. As distributor of the calorimeter, Icor chose a subsidiary of a Danish company group, where the founders knew the President. Through this company group, Icor found a British subsidiary to represent the firm in the U.K. Since then, Icor has expanded its activities in Europe, for example in France, Spain and Italy.

Later on, requests have come from less important market, like Scandinavia and other smaller markets, but no active search for representatives has taken place in these markets. The ambition was to cover all industrialized countries, which became possible for disposables, where the firm was just about to start sales in Australia and New Zealand. The calorimeter, on the other hand, was not sold in smaller markets, like Sweden and Austria. The component in the gas monitoring machine distributed by Icor was sold to manufacturing firms in for example the U.K., Brazil, Mexico, West Germany and Japan.

All international activities of Icor were based on agreements with independent distributors. Most distributors were relatively small, manufacturing firms, since they were expected to be more dedicated to the products than larger ones. In the U.S., Japan and West Germany, the distributors were import firms, who sold the product to local dealers. In the U.S. and West Germany, this was necessary due to geographic distances in the country, and in Japan, it could not be avoided due to the complex culture. A disadvantage with this system was that it was expensive, since margins were required at each stage.

To regulate the distributor agreement, Icor used standard contracts, but the contracts were adapted according to different market needs. Normally, the distributor had exclusive sales rights for certain products. The firm offered its distributors a margin above the minimum level on their products, that were found in the low to medium end-user price range. In large firms, however, it was also considered important to have personal relations with the distributor's personnel. This worked out well in Europe and in Japan, but in the U.S., Icor had problems with the high rate of personnel turnover. To be able to keep up the personal contacts, representatives from Icor visited the U.S. every second week. This in turn, was expensive and the firm has considered placing a contact person in the U.S. permanently.

The firm did not consider it to be a problem to receive feedback about the products. Icor had, to a high degree, direct contacts with the end customers, i.e. the doctors, whose opinions were considered to be more relevant than the ideas raised by the distributors. The firm was also actively involved in customer education.

SPM Instrument AB

Internal firm characteristics: During the second half of the 1960s, a group of consultants developed a new technology for monitoring the condition of ball and roller bearings - the SPM-method. The method was patented all around the world and a prototype of an instrument using the method was developed. In 1970, the firm SPM Instrument AB was established to commercialize the idea.

In order to implement the SPM-method, it was necessary to develop data concerning changes in the measuring values of roller bearings over their life times. This, was a difficult task, since there were many different types of roller bearings. Besides, manufacturers of roller bearings were often unwilling to distribute the information needed, e.g. the diameter and number of rollers in a roller bearing.

By entering a cooperation with SKF during the initial years, SPM Instrument was able to tap into the considerable knowledge about roller bearings of SKF and develop an

initial instrument with pre-set threshold SPM-values. SKF was even willing to purchase the patent, but SPM Instrument did not want to sell it. Instead, the firms entered an agreement to the effect that SPM Instrument was to take care of production, while SKF received the exclusive sales right for the instrument. The initial cooperation with SKF included a three-year sales agreement, were SKF received the exclusive right to sell the product. In this way, SPM Instrument got access to SKF's sales and after-sales service organization all over the globe.

SPM Instrument invested in production facilities, to be able to supply SKF with the instrument in the quantities required. Since then, the firm has manufactured everything but standard electrical components itself, in Sweden or in the U.S. unit. This has made SPM Instrument somewhat different from most other small instrument manufacturers in Sweden, who normally subcontracted production to other firms. To reach scale economies in production, SPM Instrument produced certain components and instruments for other firms. Approximately 25-30% of total production was used to meet external demand.

However, due to different opinions concerning the estimated market development, the cooperation with SKF did not fulfil the expectations of the firms. After the first three years, the agreement was cancelled, and SPM started to establish a distribution organization of its own. The firm invested in sales personnel for the Swedish market and started to market the product.

Over time, SPM Instrument has made large investments in marketing and built up an internal information department. The firm has also developed educational materials on preventive maintenance of machines for schools and published semi-scientific articles in the area. Another important marketing activity has been courses in preventive maintenance organized by the firm. In 1986, the firm had established seven subsidiaries, including five foreign sales subsidiaries, and a sister organization in the U.S. Turnover was approximately SEK 40 million, excluding a turnover of SEK 25 million in the U.S. In total, the group consisted of 140-150 persons, of which 60-65 were employed by the Swedish firm.

Industry structure: One important type of elements in a rotating machine of the manufacturing industry was ball and roller bearings. If a bearing should fail, this could seriously damage associated machine parts and cause considerable production losses. Since bearings had a limited life span, it was necessary to replace them regularly in order to prevent failures.

During the 1970s, it became more common to use systematic monitoring of ball and roller bearings in order to identify the optimal time for replacement. To deal with this, several analysis methods were developed, but the SPM-method was the only one developed exclusively for monitoring of bearings.

Since the condition monitoring equipment was a relatively new product area, customers had limited knowledge about the advantages of using systematic condition monitoring. This required considerable investments in marketing and long term education of customers during the 1970s. One of the driving forces in establishing the Swedish market was Idhammar Konsulting, a Swedish consulting firm, specialized on condition monitoring. SPM Instrument had a considerable advantage in being able to cooperate with Idhammar Konsulting, by participating in seminars etc.

Internationalization: Almost from its start in 1970, SPM Instrument intended to sell its products internationally. The main reason was the narrow market niche in which the firm was active. During the first three years, international activities were handled by SKF, through its international sales and after-sales service network. However, after the agreement with SKF had been terminated, SPM Instrument contacted the local offices of SKF around the world to investigate the possibilities of continued cooperation. This resulted in a continued agreement with SKF's local offices in Canada, Australia and New Zealand.

To speed up establishment in the important markets of the U.K. and West Germany, sales subsidiaries were established during 1974 by sending out personnel from Sweden. However, once local distributors had been identified in each country, they took over the sales responsibility and the sales subsidiaries were closed. Another important market was

the U.S., and the firm spent a lot of time searching, before a local distributor was found in 1974.

To further expand international activities, the firm entered a cooperation with a Japanese subsidiary of another Swedish firm, which was later acquired by the Johnson Group. During 1974-77, this resulted in a number of contacts with local offices and representatives of the Johnson Group in, for example, Austria, Portugal, South Korea, Hong Kong and Singapore.

In the late 1970s, SPM Instrument started to investigate Latin America as a potential market. Through contacts with local offices of SKF and some local distributors, the firm covered a large part of the market. A distributor was located also in India, and through the Swedish multinational ASEA, in Israel. During the same period, the firm decided to expand its activities in the U.S., partly to increase sales, partly to gain access to technical knowledge on micro electronics and start R&D within new application areas. The firm was also looking for a possibility to expand production. In 1978, an independent production unit, SPM Instrument Inc, was established.

The Nordic markets were initially covered from Sweden, but to increase sales, a Norwegian distributor was identified. Later on, they also took over the Finnish market. However, due to changes in the ownership structure of the distributing firm and increased competition in the Finnish market, the firm decided to establish sales subsidiaries in both countries in 1980 and 1986 respectively. In 1982, the distributor in Austria changed its activities in a way that no longer fulfilled the needs of SPM Instrument. As a result, SPM Instrument took over the personnel that had worked with its product and established a sales subsidiary. One year later, SPM Instrument became a 50% owner of its distributor in Belgium, since the Belgians had run into financial problems.

In 1986, SPM Instrument had distributors in 26 countries, sales subsidiaries in Norway, Finland, the U.K., Austria and Belgium, and a production unit in the U.S. The export share of the Swedish firm accounted for almost 90% of total production. The European market represented approximately 50% of the exports, and the most important

markets were West Germany, the U.K. and Scandinavia. About 20% of total sales went to the U.S., 15% to the Far East and 5% to India. The export share of the U.S. organization was slightly higher than 65%.

Analysis of internationalization behaviour

As noted in the presentations above, internationalization behaviour may differ considerably among small, technology-based firms. In order to investigate what factors may explain these observed differences, an analysis of the 15 case studies was made.

A number of observations concerning the impact of different factors on international behaviour were made. In this section, the main issues raised are summarized under three different headings, i.e. speed of internationalization, market selection pattern and foreign establishment form.

Speed of internationalization

All firms in the sample had rapidly engaged in international activities. This, of course, was partly an outcome of the selection criteria. Still, some differences in the speed of internationalization could be observed. (Table 3:5)

Among the firms that rapidly engaged in international activities, an important motive was

Table 3:5 Age at first foreign sales

Age	Firm names
0-1 year	Analysinstrument, Gewa Rehabteknik, Icor, Infovox, Scan Coin, Scanditronix, Sensitron, SPM Instrument
2-4 years	Fluid Inventor, Inter Innovation, Selcom, Spine Robotics, System 3R
5- years	Owoco, Tecator

the **limited home market potential**. In six firms (Analysinstrument, Icor, Infovox, Scan Coin, Scanditronix, SPM Instrument), an almost immediate internationalization was considered necessary. These firms had made considerable R&D investments to

developed specialized products, directed towards narrow customer segments. Due to the limited number of potential Swedish customers, foreign sales were initiated in order to obtain necessary sales volumes. In cases where products were purchased infrequently, in small quantities or as complete systems, for medical or industrial application, a rapid internationalization was particularly important.

Another factor that appeared to have influenced the speed of internationalization for some of the firms was the presence of an "**international vision**", i.e. an ambition to cover not only the home market. This vision stimulated an early direction towards international markets and also the development of internationally acceptable products.

One example of a firm with an "international vision" was Inter Innovation, manufacturer of automatic cash counters. Already during its initial years, as a development firm, Inter Innovation accepted development projects in Sweden as well as abroad. Since then, the firm has continued to work closely together with foreign customers during development of new products and applications.

Another example is Infovox, a small manufacturer of synthetic speech modules. Through close contacts with the Royal Institute of Technology (KTH) in Stockholm, the firm established relations with international researchers in the field all over the world from the start. In cooperation with a number of foreign universities, the firm made considerable investments in developing a synthetic speech for several languages from the start. In that way, the firm developed an advantage compared to its American competitors, who had initially concentrated on their home market and not until later started to develop synthetic speech for other languages. In a few years, Infovox was able to capture a large part of the European as well as the U.S. market for synthetic speech.

In many cases, **previous experience** of different types made rapid internationalization possible. Five firms were established as firm spin-offs, while another two were spin-offs from university research. Since persons in these firms had been engaged in international seminars and exhibitions, this gave them access to an international contact network. This,

in turn, speeded up the internationalization process by facilitating the identification of potential customers or representatives abroad.

In some cases, a possibility to **tap into the international experience** of other Swedish firms made it possible to speed up internationalization and facilitate the establishment of an international sales organization. One example of this was SPM Instrument. By cooperating with SKF and the Johnson Group, the firm quickly managed to establish representation in a number of important markets all over the world. In this way, the firm was able to establish a strong international position while competition was still limited.

Contacts with internationally active Swedish firms may also facilitate the identification of potential customers in foreign markets. For Inter Innovation, for example, early contacts with another Swedish firm, Meteor, resulted in a development contract with a British firm. In a similar way, early cooperation with another Swedish firm, Data Saab, led to the initial contacts with a American bank.

In SPM Instrument, a further motive for a rapid internationalization was the early investment in **production** facilities. Once these investments had been made, foreign activities were considered important to spread out the fixed costs. In System 3R, production facilities were not established until after a few years, but could at that time be expected to have speeded up the process of internationalization.

Among the firms that started international activities within 2-4 years after establishment, some time was required before **technological innovations** could be transformed into a commercial products. These firms invested a few years in the development of products and applications before international sales became possible. Besides, when the product existed, it took time to identify and convince potential customers, which further reduced the speed of internationalization.

Two of the firms, i.e. Selcom and Spine Robotics, could also be regarded as **technology dominated**. Due to a concentration on technological aspects, e.g. product development and improvement, these firms made limited investments in sales and foreign market

investigation. This, in turn, was likely to have reduced the speed of internationalization somewhat.

In Gewa Rehabteknik, foreign sales were initially very limited, in spite of an early internationalization. The unique character of the initial product had resulted in occasional requests from abroad, but no active sales had taken place. One reason was the **emerging demand structure** of communication products for the disabled, as innovative products and inexperienced customers made a period of customer education necessary before foreign as well as domestic sales could take off. The emerging structure also made it difficult to identify foreign representatives with the necessary product knowledge. To overcome these problems, this industry was characterized by a period of cooperation rather than by competition, in order to create customer awareness and increase total demand.

The two firms that were slowest to initiate international activities were Tecator and Owoco. The reason for this, however, was the change in **product line** that took place. As the firms started to develop their own products, rather than acting as agents for products of other manufacturers, the interest in international activities increased and a process of internationalization was initiated.

Pattern of foreign market selection

Within the sample, firms were active in a large number of foreign markets. The markets where most firms were active were relatively large, industrialized markets, such as the U.K., the U.S., West Germany, France, Italy and Switzerland. Other fairly common markets were certain distant markets, like Japan and Australia, as well as closely situated markets, e.g. the Scandinavian countries and some smaller European markets. In some cases, activities had been initiated in culturally or geographically distant markets, such as Eastern Europe and the Far East. Activities in less developed areas, finally, were rather unusual.

This indicated a fairly traditional pattern of foreign market selection, although with some variations due to **market potential**. Closely situated markets, such as the Scandinavian markets, were sometimes entered later than what could be expected, due to a limited market potential. Certain distant markets with large market potential, e.g. the U.S. and Japan, were entered relatively early, on the other hand. In Icor, for example, an almost reversed pattern of market selection was found. The firms started its activities in large, important markets, such as the U.S., West Germany and Japan. Over time, other relatively large European markets were entered, while in Sweden, sales were not initiated until requests from potential customers were received.

Overall, the domination of industrialized countries could be expected to reflect the combined effect of **product characteristics and local market characteristics**. Since most firms had developed technologically advanced products, potential customers were usually located in industrialized countries. Sales of certain types of products, such as Fluid Inventor's measuring instruments, Owoco's hand tools and System 3R's components, reflected the distribution of important customers, mainly large manufacturing firms.

In several cases, market selection depended on access to sophisticated customers, together with whom the firm initiated joint development projects, in order to improve the product or develop new product applications. For example, when Inter Innovation failed to sell its initial products to the Swedish banks, the firm started to cooperate with large international OEM-customers, like IBM and Olivetti. Similarly, both Icor and Selcom considered the U.S. to be an important markets for the firms' products, and joint development projects were initiated with local customers.

In less developed markets, however, the demand for advanced technological products was more limited. For example, automation equipment, e.g. Scan Coin's coin counters and Spine Robotics robots, was less suitable in markets with low labour costs. Similarly, the demand for sophisticated medical equipment, e.g. Scanditronix', Analysinstrument's, Icor's and Tecator's advanced instruments, and certain measuring instruments, e.g. Selcom's optocator and Sensitron's sodar system, was limited in markets with low level of education.

Still, some firms had also been able to identify certain customer segments in less developed countries (e.g. Scan Coin, Scanditronix). Others extended the product line with products that were less expensive and better suited to less developed markets (Analysinstrument's and Tecator's smaller analysis instruments, Icor's hospital disposable, SPM Instrument's hand held measuring instruments).

In the study, there were indications that the actual sequence of market selection followed a **process of learning**. Initially, an opportunistic pattern of market selection, based on established contacts, requests or other opportunities, was common. (Analysinstrument, Fluid Inventor, Scan Coin, System 3R and Tecator).

To some extent, the propensity to use established contacts was related to the background of the firm and its founders. Previous experience of the industry, for example, in firms established as spin-offs from other firms or universities, sometimes stimulated entry into particular markets, based on established contacts with potential customers or representatives. In Fluid Inventor and SPM Instrument, the international networks of larger Swedish firms were used for initial distribution of the firms' products, which made it possible to draw upon the previous experience of foreign activities developed by these firms. In other cases, specific markets were entered after requests from potential customers or representatives during trade shows or exhibitions.

Over time, however, the process often became more planned, with careful market selection and evaluation procedures. This resulted in decisions to enter important markets and to close down less profitable ones. Besides, the selection of important markets appeared to follow a more strategic planning procedure than the selection of peripheral markets (Icor, Scanditronix, Sensitron, SPM Instrument).

Occasionally, the selection of markets to enter was guided by the **competitive structure** of foreign markets. Analysinstrument and Scanditronix, for example, avoided certain markets due to extensive competition, while Owoco was forced out of the U.S. market by a local competitor. In other cases, decisions to enter a market, or increase

commitment in a market, were taken in order to pre-empt local competitive moves (SPM Instrument, System 3R).

Foreign establishment forms

In this study, a variety of foreign establishment forms was used, e.g. direct exports, independent representatives, subsidiaries and licensing. (Table 3:6)

To some extent, the results support previous studies of the establishment chain. Direct exports, for example, were often used as an initial entry alternative, before agreements with local agents or distributors were signed or sales subsidiaries established (Gewa Rehabteknik, Scanditronix, Selcom, Sensitron, Spine Robotics). The actual selection of entry forms, however, was influenced by a number of factors, including firm size, technology characteristics and general market characteristics.

First, a relation with **firm size** was found. Small firms, with limited financial resources, tended to rely on entry forms requiring limited investments, e.g. local agents, distributors or direct export. Larger firms, on the other hand, were more likely to have foreign subsidiaries or joint ventures. In general, these firms also had more marketing competence, which could eventually explain the higher commitment to international activities.

Second, certain indications that **technology** would influence the selection of entry form were found. Among firms working with technological innovations, an emerging demand structure seemed to favour the use of highly committed entry forms. If customers lacked product experience, the need for customer education and active marketing was high.

Table 3:6 Foreign establishment forms used

Establishment forms	No. of firms
Direct exports	9
Independent representatives	
a) local distributors	12
b) local agents	2
c) Swedish distributors	4
Subsidiaries	
a) wholly owned	8
b) joint ventures	6
Licensing	3

Similarly, a need for product adaptation according to customer needs tended to stimulate the investment in local subsidiaries, particularly among firms engaged in joint development projects. Besides, foreign distributors of innovative products were sometimes non-existent, making foreign subsidiaries the only entry alternative.

Third, the influence of general **market characteristics** on the choice of entry form was investigated. According to these findings, the geographic distance to a market appeared to have a smaller impact than market potential on the choice of entry form. In markets of large potential, a high degree of commitment, e.g. local subsidiaries and joint ventures, was common even in distant markets. In markets of limited potential, on the other hand, most firms preferred to use less committed forms.

In some markets, a **combination** of entry alternatives was used. Independent distributors or agents, for example, were sometimes complemented by local sales subsidiaries in markets of strategic importance. In other cases, direct exports to important customers were combined with distributor agreements.

In the following, a short presentation of the most important observations related to each entry form is found.

Direct exports: For most firms in the study, direct exports were of limited importance. None of the firms intended to depend exclusively on this entry form. Often, actual sales investments were limited and sales were based mainly on established contacts or unsolicited orders.

Still, for Infovox and Inter Innovation, direct exports to important customers were an important part of foreign activities. Both firms acted as sub-supplier of specific components to be included in complete systems provided by large OEM-customers. To some extent, this is an advantage, since the firm may cover a larger number of foreign markets, as their products are re-exported as components in large systems. At the same time, there is a risk of being substituted in the future, as the OEM-customer learns enough about the component to start manufacturing itself.

Three firms, i.e. Scanditronix, Sensitron and Tecator, used direct exports mainly in distant or difficult markets, like East Europe, India and China. In those markets, suitable distributors were difficult to find and the possibilities to establish sales subsidiaries limited.

Independent representatives: In this study, three different types of independent representatives were used, i.e. local distributors, local agents and Swedish distributors. The main motive for using these alternatives was the limited cost of market entry.

The single most important alternative was **local distributors**. Only three firms did not use this alternative, i.e. Spine Robotics, Scanditronix and Sensitron. In the first case, foreign sales had been negligible and not motivated any distributors' agreements. In the two latter cases, the character of the products, e.g. project sales, need for customer adaptation, order based production, sales team, etc., made it more suitable to use **local agents**. The agents were not customers, but worked on a commission basis, helping the firms to identify potential customers. Besides, they did not hold inventories and were only partially involved during the actual sales process.

Three firms, i.e. Analysinstrument, Fluid Inventor and SPM Instrument, followed an initial strategy of **piggy-backing**, that is using the international distribution and after sales network of other Swedish firms. However, none of the firms was satisfied with the outcome and the agreements were terminated. Still, both Fluid Inventor and SPM Instrument were able to use the previous contacts to facilitate the establishment of their own distribution networks. Contacts were taken with foreign subsidiaries and/or representatives of the former partners and a number of independent distributor agreements were signed. Since the firms were able to tap into the established international experience of these firms, international establishment was speeded up.

In Selcom, piggybacking was not an initial strategy, but developed over time. During its first years, Selcom cooperated in several development projects, including a joint project with ASEA Robotics. Together, the firms developed an application for industrial robots, which was later sold through ASEA Robotics, with Selcom acting as a sub-supplier.

Independent representatives were used in virtually all **countries**, except for China and certain Middle East countries. Several firms were also represented in third countries by local distributors or even customers. (Analysinstrument, Gewa, Scanditronix, Selcom, Sensitron, SPM Instrument) This was particularly common in smaller markets, e.g. Portugal and Belgium, and in distant markets, e.g. the Far East and Eastern Europe.

In other markets, where local representatives were difficult to identify, Swedish distributors sometimes were used to represent the firm. Analysinstrument, for example, had a Swedish distributor in East Europe, while Scan Coin covered part of the Far East via a Swedish distributor.

Concerning the **formal agreements** with representatives, a number of observations were made. In most cases, agreements included geographic exclusivity, with a right to represent the firm's products in one particular market or area. Among firms with several product types, exclusive product agreements were sometimes used. Two firms, Scanditronix and Gewa Rehabteknik, had entered mutual representation agreements with foreign manufacturers of similar products. By cooperating rather than competing, direct competition was reduced and the firms were able to expand the product lines in the home market, while exporting their own products.

During early stages of firm development and in less important markets, documentation of representatives' agreements was sometimes limited. Rather, relations were based on personal relations and "gentlemen's agreement". In most case, this worked well, but occasionally a formal contract was valuable to solve conflicts. Analysinstrument, for example, was able to turn to the contract in order to solve a problem with a foreign distributor.

Scan Coin, on the other hand, ran into trouble, due to limited documentation. In Brazil, a joint production unit had been established in cooperation with a local partner. However, as the agreement was broken by the Brazilian counterpart, no formal contract existed to give Scan Coin compensation for this. After this lesson, the firm engaged an

external consultant and considerable investments were made in developing an extensive standard contract for distributors' agreements.

In many cases, the success of a representative relationships was influenced by the type of **representative** used. In three small firms (Analysinstrument, Fluid, Gewa), cooperations with large local distributors had sometimes failed and the firms had come to prefer to cooperate with small or medium-sized distributors. Similarly, neither Fluid Inventor nor SPM Instrument was satisfied with the outcome of their initial cooperation with Swedish distributors. The partners were large firms, with broad product lines and low commitment to the products. Therefore, sales efforts were considered to be too limited and the relationships were terminated.

As foreign activities increased, three firms (Scan Coin, Selcom, SPM Instrument, Tecator) had outgrown their local distributors in some markets and attempted to replace them. Particularly in important markets or markets where factors such as political power and credit demands were important, somewhat larger distributors were preferred. Icor, on the other hand, found the size of the distributor to be of less importance than his business direction. The firm preferred to cooperate with manufacturing firms, since it was considered to be easier to convince a manufacturing firm of the values of a new product type, than a pure distributor.

The use of **pre-evaluation** of potential partners before selecting a representative appeared to change over time. Initially, many firms (Analysinstrument, Fluid Inventor, Gewa Rehabteknik, Scan Coin, Selcom, System 3R, Tecator) used established contacts or accepted requests from foreign firms about representation, with limited evaluation of the partner.

Over time, however, these firms became more conscious about the need to evaluate a distributor before an agreement was entered, particularly in more important markets. Two firms, i.e. Tecator and Scan Coin, had even developed sophisticated methods for evaluating distributors before entering a new agreement or replacing existing distributors. In both cases, visits were made, educational courses arranged and trial agreements signed

before a new distributor was engaged on an important market. In less important markets, evaluation procedures remained somewhat less formal.

To keep **control** over local market development, different ways of monitoring foreign distributors were used. In four small firms (Analysinstrument, Fluid Inventor, Gewa Rehabteknik, Owoco), control mechanisms were relatively limited and monitoring largely based on personal relations of the founder. In some larger, more marketing oriented firms, such as Scan Coin, Tecator, Scanditronix, SPM Instrument and Selcom, foreign markets were more carefully monitored. These firms used a number of different control tools, such as visits, representatives meetings and seminars, trade shows, information systems and yearly budgets.

To a certain extent, these firms also had some direct contact with the end-users at trade shows, at seminars or during joint visits with the distributors. Among firms involved during the process of installation and testing of product systems, e.g. Scanditronix, Selcom and Sensitron, close customer contacts were established.

Foreign subsidiaries: The propensity to establish foreign subsidiaries varied with **firm size**. All firms (Inter Innovation, Scanditronix, Scan Coin, Selcom, SPM Instrument, System 3R, Tecator) that had foreign subsidiaries in 1986 were at least medium-sized.

None of the small firms had foreign subsidiaries, although three of them had made initial attempts to establish foreign subsidiaries in the U.S. In the first case, a joint venture had been established in the U.S., but due to problems with the local partner, the venture was soon closed down. In the second case, a U.S. sales subsidiary was established, but as sales never took off, the subsidiary never got started. Finally, the attempt to establish a U.S. subsidiary was stopped by Swedish financial restrictions.

It was also clear that the use of subsidiaries was related to **local market structure**. In markets of large potential, e.g. the U.S., West Germany and the U.K., the number of subsidiaries was highest.

The **motives** for establishing foreign subsidiaries/joint ventures differed. To be able to handle customer contacts on distant markets, like the U.S. and Japan, some firms decided to enter these markets with foreign sales and services subsidiaries rather than with independent distributors (Scanditronix, Selcom, Scan Coin, System 3R, Tecator). In this way, expenditures on travelling could be reduced and continuity in relation to important customers improved.

In two firms (System 3R, SPM Instrument), the basic motive for establishing sales subsidiaries was the observation of competitive moves in certain markets. In order to better be able to observe and react to competitive threats, a sales subsidiary was a logical choice. A somewhat different approach was used by SPM Instrument. In order to speed up internationalization and start developing the immature condition monitoring industry, the firm established subsidiaries in the U.K. and West Germany. These subsidiaries, however, were later replaced by local distributors as such were identified.

Usually foreign subsidiaries were established by replacing the independent distributors initially used. Sometimes, the main reason was financial problems of local distributors, in other cases, changes in the business direction or ownership structure of the distributor made him less suitable to the products supplied by the firm. In most cases, the Swedish firms were able to take over the local representatives and his contacts (Scan Coin, SPM Instrument, Tecator, System 3R). The only greenfield investment, made by Scan Coin in the U.S. market, was later considered to be a mistake. Due to the size of the market, the firm initially decided to make heavy investments in a local sales, marketing and services organization. However, the large number of local as well as European competitors and a centralized demand structure, requiring different types of products, resulted in a loss. The firm decided to concentrate on a number of specific customer segments and a reorganization took place. A small branch office was developed, to adapt standard products according to individual customer needs.

Occasionally, a **joint venture agreement** with previous distributors was signed. However, several firms attempting to use this alternative were less successful, partly because the underlying problems within the distributing firms remained.

The only firm with an intentional strategy of using joint ventures was System 3R. To be able to better motivate the local partner and increase product commitment as well as continuity in relation to customers, the firm favoured joint venture agreements, with local partners having a 33% ownership share. In France and Italy, joint venture agreements were based on the initiative of local distributors, who favoured such arrangements.

In most cases, the main **function** of foreign subsidiaries was to provide local sales and after sales services. Sometimes, a local subsidiary was used to administer a network of complementing distributors. The U.S. and Swiss subsidiaries of Scanditronix, for example, were responsible for coordinating sales and services within their respective geographic areas. In three cases (Selcom, SPM Instrument, Tecator), a U.S. subsidiary was used to coordinate local distributors and increase market coverage.

Three firms (Scan Coin, Scanditronix, SPM Instrument), had established foreign production subsidiaries, but only one of them continued the production function. Scan Coin terminated the production function as problems with the joint venture partner occurred. Scanditronix decided to concentrate production to the Swedish unit, since the high technology character of the product required knowledge in several technologies. It was considered better to concentrate this knowledge to one site, and thereby improve product quality.

In SPM Instrument, the initial U.S. distributor was replaced by a production subsidiaries as ambitions to increase production capabilities developed. The condition monitoring industry was becoming increasingly computerized, and by establishing a production unit with an R&D function in the U.S., access to technological competence in microelectronics was improved.

Licensing: Among the firms included in the sample, only three had used licensing as a form of foreign activities. Both Analysinstrument and Scanditronix argued that the main motive was to receive some compensation for their technology investments before imitation occurred. Besides, due to exchange problems and bureaucracy in the East European market, Scanditronix had entered a license agreement with Czechoslovakian

firm. However, to avoid any possible negative spill-over effects on the firm's reputation, sales were restricted to certain geographic areas.

Infovox, finally, licensed its technology to large OEM-customers, since the firm could not afford to develop these complete systems itself.

Summary

To some extent, the results support the findings of previous research. The smaller firms in the study were more inclined to follow a traditional internationalization process, in terms of a fairly slow speed, a sequential market selection pattern and limited foreign commitment. However, in cases where external corporate owners provided capital for foreign expansion, the process was speeded up and the market selection pattern was more diversified. Similarly, in firms with executives having industry experience from previous employments, a more rapid speed of foreign entry and a less traditional market selection pattern was found. A rapid entry into a large number of foreign markets was sometimes facilitated by a possibility to tap into the international experience of other Swedish firms, even in cases where the initial contacts were later terminated.

Making use of previous experience of executives or to draw upon the experience of other Swedish firms appear to be an important way to overcome one of the main problems for small, technology based firms: to identify suitable foreign representatives. In other cases, a strategy of acting as sub-contractor to large OEM-customers has resulted in an indirect spread to a large number of foreign markets, as the product is re-exported as a component in a larger system.

With regard to technology intensity, a high level of R&D expenditure, short product life cycles and a narrow customer niche appeared to increase the speed of foreign entry. Among firms providing high technology products, the actual market selection pattern was often guided by strategic consideration, e.g. access to advanced customers or the local competitive situation. In order to provide personal sales and after sales services, local training and customer education, a foreign subsidiary was sometimes considered

important. In some cases, a foreign subsidiary was considered the only alternative when a rapid foreign entry was considered important and no local representatives were available.

However, among firms providing technological innovations, a certain time was required for market creation before sales took off. In the industry for communication products for the disabled, for example, an immature demand structure slowed down the speed of foreign entry. Among firms providing condition monitoring instruments for the manufacturing industry, an increased level of competition was considered advantageous, in order to increase customer awareness and develop the market. Still, Swedish firms active in these industries had been able to establish strong international positions, by initiating foreign activities earlier than most foreign competitors.

Overall, there appears to be a relation between internationalization behaviour and the stage of development in the industry. During the early stages of industry development, competition is usually limited. During this stage, a firm providing innovative products may be able to influence standards and establish a position before competition increases. However, actual sales may be limited, due to a immature demand structure. Therefore, an increased level of competition may be advantageous, in order to increase customer awareness and develop the market.

4. FACTORS INFLUENCING INTERNATIONALIZATION: 19 HYPOTHESES

Introduction

In this chapter, interview data about the internationalization of small, technology-based firms is combined with the results of previous research, in order to develop a research model to be employed during analysis of survey data. In this model, a number of hypotheses concerning the relation between internationalization and possible explanatory variables are presented.

The explanatory variables are classified under two headings, i.e. internal firm characteristics and contextual variables. For each variable, the expected impact on speed of internationalization, pattern of foreign market selection and choice of entry form is presented.

Internal firm characteristics

In spite of an attempt to account for firm size and technology intensity by including only young firms with some in-house R&D, firm size as well as technology intensity has been found to differ considerably. In this section, an attempt has been made to investigate what factors may be responsible for observed variations in internationalization behaviour. Since it is difficult to assess the combined impact of different firm characteristics, hypothesis concerning the possible impacts of firms size, ownership structure, previous experience of firm executives, technology intensity and product characteristics are presented one at the time.

Firm size

In previous research on small firms, a lack of internal resources is often considered to be an important constraint to growth.⁵⁰ These restrictions are expected to be particularly severe during the process of internationalization.⁵¹

Since small, technology-based firms can be expected to have less resources than medium sized ones, the process of internationalization could be expected to be even more difficult among those firms. This has resulted in the following hypothesis concerning the impact of firm size on internationalization behaviour.

Hypothesis 1: The speed of foreign entry tend to be lower in small, technology-based firms, than in larger ones.

A shortage of managerial resources in small firms may be an important impediment during internationalization. Many of the small, technology-based firms in the case studies were established by persons with a technological rather than marketing background. Therefore, a concentration on technological aspects, e.g. product development and improvement, had sometimes resulted in limited investments in foreign market investigation.

Due to the limited access to financial and managerial resources in small firms, a strong internationalization stimulus may be required before foreign activities are initiated. However, small firms may be less likely to encounter certain types of stimuli. Unsolicited orders from abroad, for example, may not be received, unless the firm already has an international contact network. Moreover, many small firms lack the legitimacy required to convince local representatives about their products.

⁵⁰ Penrose (1956)

⁵¹ Buckley (1986), Horwitz & Prahalad (1976)

This indicates that many small firms would prefer an initial growth in the home market, and a relatively slow internationalization would be expected as a default alternative.

Hypothesis 2: Small firms tend to follow a more traditional pattern of internationalization than larger ones.

According to previous studies, small firms are expected to follow a traditional market selection pattern, starting off with a limited number of geographically as well as culturally "close" markets.⁵² In order not to spread their limited resources too much, small firms are expected to favour a concentration on a limited number of markets, rather than a diversification strategy.

The actual market selection pattern may be the outcome of a learning process, where the firm initially engages in a relatively ad hoc market selection, based on previous experience, established contacts, requests and other opportunities. Financial limitations may restrict the possibilities to afford necessary investments in foreign market information and the extensive travelling expenditures required for successful market evaluation. Besides, a lack of international experience and tools for gathering and interpreting appropriate information may complicate foreign market evaluation.⁵³

Over time, however, the process becomes more planned, as the firm takes up important markets and closes down some less profitable ones.⁵⁴ This, in turn, is expected to correlate with the growth of the firm, since larger firms are expected to have a stronger financial base.

Hypothesis 3: Small firms are likely to use foreign entry forms requiring limited commitment.

⁵² Bilkey & Tesar (1977), Carlson (1975), Hörnell et. al. (1973)

⁵³ Buckley (1986), Horwitz & Prahalad (1976)

⁵⁴ Aharoni (1966), Davidson (1980), Johanson & Wiedersheim-Paul (1974)

In most studies concerning small firms, a preference for entry alternatives requiring limited financial and managerial investments, e.g. direct exports, licensing or local representation by commissioned agents or independent distributors, is indicated⁵⁵. The limited risk associated with these alternatives, due to low requirements on financial investments and local market knowledge, are the main arguments for using these forms.

Over time, however, the firm is expected to increase its commitment in a specific market. As competence is accumulated, the use of local sales subsidiaries may increase. This is expected to coincide with the growth of the firm, but also with an increased experience in foreign operations. Still, some of the case studies indicated that small, innovative firms may have difficulties to convince potential representatives about their future existence, due to limited legitimacy. Therefore, they have been forced to establish their own local subsidiaries in markets where a rapid entry was considered important.

An exceptions to the sequential internationalization of small firms may occur in firms where strong external owners are able to provide a favourable access to external capital or managerial resources. Therefore, they have been forced to establish their own local subsidiaries in markets where a rapid entry is considered important. Similarly, previous experience of firm executives may influence internationalization behaviour. The two variables, ownership structure and previous experience, have therefore been included in this study.

Ownership

One way for small firms to overcome the problems of financial limitations during internationalization is to invite external, corporate owners to provide the additional capital required. In some firms, corporate owners were even able to provide the firm with managerial support, thus further reducing the risk of engaging in international activities. In two of the case firms, for example, international penetration was made

⁵⁵ Caves (1982), Mansfield (1974), Munro & Beamish (1987), Rosson (1985), Telesio (1984) and Utterback & Reitberger (1982)

possible by the capital received as the firms were acquired by larger Swedish company groups.

Overall, this indicates that the invitation of corporate owners may reduce the impact of a limited firm size on internationalization. Therefore, the following hypothesis have been developed.

Hypothesis 4: The speed of foreign entry tend to be higher in small firms with corporate owners than in small, privately owned firms.

Hypothesis 5: Small firms with corporate owner tend to follow a less traditional pattern of foreign market selection than small, privately owned firm.

Hypothesis 6: International commitment tend to be higher in small firms with corporate owners than in small, privately owned firm.

Previous experience

Another factor that has been found to influence the process of internationalization of small firms is the opportunity to make use of previous experience of executives in the firm. One reason for the existence of such experience is that the firm has been established as a spin-off, either from a university or another firm⁵⁶. In the case studies, it was found that university spin-offs were often established in order to commercialize a technological innovation. In those cases, industry experience was limited or non-existent, but an international contact network had sometimes been developed during exchange of technological ideas.

⁵⁶ Hult & Odén (1979), Utterback & Reitberger (1982)

Firm spin-offs, on the other hand, were usually established in order to exploit an idea developed in another firm. In those cases, general industry experience or a network of business contacts were sometimes available to facilitate the internationalization of the firm. Based on these findings, the following hypothesis were developed.

Hypothesis 7: The speed of foreign entry tend to be higher in firms with previous industry experience than in other firms.

In firms established to commercialize an existing product idea, the time required before a prototype can be presented to the customer may be reduced. Several case firms, for example, were able to use technologies developed during previous activities, either during university research or as employees in other firms.

Previous industry experience may provide firms established as firm spin-offs with foreign contacts networks or favourable contacts on the financial market. Several case firms were able to use established contacts in foreign markets during the initial selection of foreign markets. Overall, this could be expected to have speeded up the process of internationalization.

Hypothesis 8: Firms with previous industry experience or local experience tend to follow a less traditional pattern of foreign market selection.

If executives within the firm have previous industry experience of specific markets, this may facilitate the identification of potential customers and suitable foreign distributors, thus influencing the pattern of market selection. Small Swedish spin-off firms, for example, have been found to enter more geographically distant markets than other small firms.⁵⁷

⁵⁷ Ds UD 1985:3

A similar observation was made in the case studies. In three firms, following a relatively traditional pattern of foreign market selection, an initial lack of foreign experience among executives was noticed. In four other firms, an initial contact network with researchers, competitors and other firms made it possible to rapidly initiate a diversified market selection. These networks had often been established through participation on international trade shows and technology seminars, during previous employment in other firms in the same industry or in cooperation with other Swedish firms.

Consequently, a less traditional pattern of foreign market selection could be expected in firms with relevant previous experience.

Technology intensity

Another factor of importance to this study is the technological character of firms. Based on previous research, a fairly non-traditional pattern of internationalization could be expected among R&D intensive firms. Therefore, the following hypothesis concerning the impact of R&D intensity on the process of internationalization have been developed.

Hypothesis 9: A high level of R&D intensity tend to increase the speed of foreign entry.

In R&D intensive firms, a fairly rapid speed of internationalization is expected. A combination of a limited range of specialized products with few home market customers, high costs of R&D and a short product life cycle, is expected to force many small, technology-based firms to go international at an early stage. In this way, they may be able to increase sales volumes, before rapid technological change makes the product commercially obsolete or imitation erodes the value of R&D investments.

Technology-based firms have also been found to have a more positive attitude towards foreign activities than other firms. This may partly be an outcome of a generally higher

average level of technological education among "high tech" firms.⁵⁸ Similarly, an international exchange of technological information via seminars and trade shows appear to have stimulated the international direction of many firms in the case study.

Consequently, technology may act both as a push and a pull factor, increasing the speed of internationalization.

Hypothesis 10: A high level of R&D intensity tend to result in a less traditional pattern of foreign market selection.

The impact of technology intensity on the pattern of foreign market selection is somewhat less clear. Previous Swedish studies indicate that firms offering unique, high technology products are more likely to follow a strategy of market diversification⁵⁹. One reason for this may be a limited number of potential customers in each individual market. Other motives are an instant demand for sophisticated products, reducing the need for local marketing activities, and a short technological lead time. The latter would favour a diversification strategy in order to spread R&D costs and increase economies of scale in manufacturing firms before the technology matures and becomes public knowledge.

However, a strategy of geographical concentration is sometimes expected among high technology firms, in order to prevent, or slow down, technology leakage⁶⁰. Besides, if important customers are concentrated to a few industrialized countries, the number of potential markets may be limited.

Overall, the actual pattern of market selection is expected to be explained by factors other than cultural and economic distance, e.g. the location of technologically sophisticated customers, local industry structure and general market potential.

⁵⁸ Brynell & Davidson (1988), Hult & Odén (1979) and Utterback & Reitberger (1982)

⁵⁹ Ds UD 1985:3 and Brynell & Davidsson (1988)

⁶⁰ Magee (1977)

Hypothesis 11: The level of commitment tend to be higher among firms of high R&D intensity than among other firms.

According to several studies, a positive relation between research intensity and the propensity to use foreign direct investments could be expected. In order not to lose control over proprietary technology, internal exploitation of the technology is usually expected to be preferred.⁶¹ The main argument for this is the "appropriability problem", i.e. the risk for market failure due to opportunistic behaviour and difficulties to specify contracts concerning the exploitation of proprietary technologies.

In some studies, however, certain conflicting results have been presented. High levels of R&D and short product life cycles, for example, are sometimes expected to increase the use of licensing, rather than FDI.⁶² Still, it is expected that R&D intensity is more likely to result in the use of more committed forms of foreign activities. This, in turn, is partly explained by the related question of product characteristics.

Product characteristics

A product may be characterized in a large number of ways. In the following presentation, a "high technology" product has been characterized by a high level of complexity, with high software content and a great need for customer adaptation.

Hypothesis 12: The speed of foreign entry tend to be higher for product of "high technology" character.

As indicated by previous research, the exposure to external export stimuli is often important to explain the initial export behaviour of firms⁶³. The presence of such stimuli may, to some extent, be influenced by product characteristics. Firms offering

⁶¹ Arrow (1962), Buckley & Casson (1976), Calvet (1981), Caves (1982), Magee (1977), Teece (1983)

⁶² Telesio (1984)

⁶³ Aharoni (1966), Kaynak et. al. (1987), Lee & Brasch (1978) and Richardson (1971)

unique products, for example, are more likely to receive unsolicited orders or government export stimuli, since the number of potential suppliers is limited⁶⁴. Besides, since R&D intensity is likely to be higher among "high technology" firms, the hypothesised impact of R&D intensity is likely to affect "high technology" products to a larger extent than other products. Overall, this is expected to increase the speed of internationalization in these firms.

However, new products are sometimes expected to be tested in the home market, where close customer contacts are easier to maintain, before foreign activities are initiated⁶⁵. Still, several case studies indicate that the limited number of advanced customers in Sweden has forced firms to initiate product development in foreign markets at an early point in time.

Hypothesis 13: The pattern of foreign market selection tend to be less traditional for "high technology" products.

The next hypothesis concerns the impact of product characteristics on the foreign market selection pattern. If close cooperation with sophisticated customers is required to develop the product or its applications according to customer needs, the actual customer distribution is expected to determine the pattern of market selection. Among some of the more innovative case firms, it was considered important to rapidly enter certain markets of great geographical distance, like the U.S. and Japan, to be able to make product adaptations and provide important customers with technical service and education. Similar findings have been presented by other studies of small, technology firms, providing innovative or unique products.⁶⁶

⁶⁴ Olson & Wiedersheim-Paul (1978)

⁶⁵ Burenstam Linder (1961), Vernon (1966)

⁶⁶ Utterback & Reitberger (1982)

Overall, this indicates that firms providing "high technology" products are more likely to select foreign markets based on market potential and demand structure, rather than on cultural or geographic distance.

Hypothesis 14: **The level of foreign commitment tend to be higher for "high technology" products.**

For products of "high technology" character, technological complexity may favour the use of FDI, to avoid market failure due to difficulties in monitoring contractual arrangements.⁶⁷ Similarly, a high software content may require product customization. In particular, firms engaging in joint development projects with foreign customers may need local subsidiaries to keep in close contacts with sophisticated customers.

Marketing requirements

Related to the technology character of the product is the need for different marketing requirements. Products of a high technology character, for example, may require close personal contacts in order to provide information and achieve product customization. In many cases, local adaptation of the product may also be required. For innovative products, an immature demand structure may require considerable investments in market creation and development, including the development of specific product applications and extensive customer education.

Hypothesis 15: **The propensity to use foreign subsidiaries tend to increased with the importance of personal marketing activities.**

An important argument for local subsidiaries frequently raised is the need for personal contacts, in order to provide local services and training⁶⁸. Within the case studies,

⁶⁷ Magee (1977), Teece (1983), Williamson (1975)

⁶⁸ Hörnell et. al. (1973)

several firms have established local subsidiaries in order to maintain close contact with foreign customers during product development, installation and customer education. Overall, the propensity to use foreign subsidiaries is expected to increase when the importance of after-sales service, customer education and local product adaptation increases.

Industry structure

In this presentation, industry structure is described in terms of industry stage of development, market niche potential and level of competition. In the following discussion, the impact on the process of internationalization is somewhat less clear than in the above section. Conflicting results of previous studies have sometimes made it difficult to specify any expected results. In those cases, a short discussion, rather than any hypotheses, is presented.

Industry stage of development

The first explanatory variable included in this section is the stage of development of the industry. It is expected that this will correspond to the life cycle stage of the firm's most important product. However, the impact on speed of internationalization is unclear.

On the one hand, the speed of internationalization may be reduced by the time required for identification and development of different product application areas during the early stages of industry development. One example is Selcom, with a new, sophisticated measuring method based on laser technology, but lacking initial application areas. Due to this, time-consuming investments in customer education and market creation were necessary to convince the customers about the product's value. Besides, it may be difficult to identify foreign distribution channels with the necessary knowledge to sell the product. In Gewa Rehabteknik, for example, an immature demand structure for communication products for the disabled made international sales difficult and reduced the speed of international penetration.

On the other hand, it may be argued that the need to achieve first mover advantages makes it important for many innovative firms to establish an international position early on. Among smaller firms, the possibility to establish a position might be greater during early stages of industry development, when competition is still limited. In the case study, two examples of first mover advantages were found. First, Infovox was able to establish a strong position in the European market by offering a multi-language syntactic speech long before its American competitors. Second, Swedish firms were able to influence standards and establish strong positions by being among the first ones to start foreign sales of advanced condition monitoring equipment.

Due to this, no hypothesis concerning the impact of the stage of development on speed of internationalization was developed. Rather, this could be regarded as an open question that may be interesting to explore. However, in case of pattern of foreign market selection and choice of foreign entry forms, hypotheses were developed.

Hypothesis 16: Firms tend to follow a less traditional pattern of foreign market selection during early stages of industry development than later on.

Initial foreign activities of small, high technology firms are likely to be initiated in highly developed countries, with an early demand for new, advanced products. However, it is argued that an extended period of customer education and product adaptation may be required before sales actually take off. The costs involved during this process may favour concentration on a limited number of foreign markets. Overall, this may favour a less traditional pattern of foreign market selection, concentrating on a limited number of strategically important markets.

Hypothesis 17: Firms are more likely to establish foreign subsidiaries during early stages of industry development than later on.

During early stages of industry development, the use of highly committed forms of foreign entry may be higher than during later stages. Several studies indicate a higher propensity to use FDI during early stages of development among innovative firms, in order not to lose control over technology⁶⁹. This could partly be explained by previous discussions concerning the need for local subsidiaries in order to keep a close contact with important customers during product development or due to difficulties to identify suitable agents/distributors in an immature industry.

Market niche size

Another industry factor that is expected to influence the process of internationalization is the size of the market niche, which in turn, is influenced by market growth and the absolute number of potential customers and application areas.⁷⁰ As in the previous section, no hypothesis concerning the impact on speed of internationalization was developed.

Among firms active in narrow product niches, with specialized products, an almost immediate internationalization may be necessary to obtain a minimum level of operations. Many products of high technology characters are purchased infrequently and in smaller quantities, such as complete systems for medical or industrial applications, reducing the absolute size of the home market niche. This is particularly important for firms with small home markets, such as Sweden. In the case study, an almost immediate internationalization was considered necessary among several firms with narrow customer segments.

However, in case of high market growth, the home market may be large enough to sustain the growth ambitions of a firm for a somewhat more extended time period. Due

⁶⁹ Davidson & McFetridge (1985), Vernon & Davidson (1979)

⁷⁰ Carlson (1979), Håkanson (1979), Kaynak et. al. (1987)

to this, the question concerning the possible impact on speed of internationalization remains open.

Hypothesis 18: A diversified market selection pattern is more likely among firms with narrow product market niches, than among other firms.

For firms active in narrow product market niches, the absolute number of potential customers in each market may be limited. Innovative Swedish firms, with narrow product ranges and few potential customers, have been found to use a strategy of market diversification.⁷¹ This was considered necessary in order to increase sales volumes and spread out the costs associated with product development.

Hypothesis 19: Firms with narrow market niches are less likely than others to make foreign direct investments.

Since a minimum sales volume may be required to support a local subsidiary, small firms with narrow market niches may not afford to establish local subsidiaries. Therefore, these firms could be expected to rely on other types of entry forms, e.g. licensing, direct exports, independent agents or distributors.

Competition

Level of competition could, to a certain extent, be expected to differ with industry stage of development and size of the market niche. During the early stages of industry development, actual competition may be limited. In two of the case studies, for example, early stages of development were characterized by cooperation rather than by competition. By cooperating, the firms were able to increase customer awareness and then expand the absolute size of the market niche. In this section, no hypotheses have

⁷¹ Forsman (1987)

been developed, since number of competitors could be expected to influence internationalization behaviour in different ways during different circumstances.

Concerning the speed of foreign entry, there are two contradictory observations. First, as an industry approaches a more mature development stage, one could expect a higher level of competition. This may reduce the speed of internationalization, since it becomes more difficult to get access to local distribution channels and the search process becomes more time consuming. Particularly for small firms, it may be too expensive to compete with larger competitors.

However, a higher degree of competition might actually speed up the process, since customer awareness increases and reduces the need for customer education and market creation. Strong competition in the home market, either from domestic or foreign firms, has been expected to work as a push factor, forcing the firm out internationally. Competition may also act as a pull factor, stimulating the firm to follow their competitors internationally⁷².

Similarly, during early stages of development, a firm may have a temporary monopoly position, before competition increases. During this stage, the pattern of market selection is likely to be determined by access to potential customers rather than by competitive structure. As the industry matures, competition could be expected to become more important, since the risk of imitation increases.

Still, the observations made in the case study point in two different directions. One of the firms, for example, avoided the U.S. market, since it was considered too expensive to compete with the main competitors in their home market. Another one was forced out of the U.S. market after a local firm had imitated the product and started to compete with the Swedish firm. In other cases, it was considered necessary to enter markets where important competitors were active, to keep informed about their activities or pre-

⁷² Aharoni (1966) and Knickerbocker (1973) discuss this "band wagon effect" or "follow-the-leader" behaviour, particularly among relatively large, oligopolistic firms.

empt competitive moves. Still, in all these cases, the decision to enter or leave a market was based on strategic considerations concerning the competitive situation.

Finally, conflicting observations have been made concerning the choice of foreign entry form. On the one hand, a high level of competition may restrict the possibilities for a small firm to find local representatives, if competing firms have entered exclusive contracts with suitable agents/distributors. This may force the firms to establish their own distribution networks, based on local subsidiaries, in important markets. On the other hand, during periods of extensive competition, it may be very expensive to enter a market, making it difficult to recover the capital invested in local subsidiaries.

Summary

In this section, the results of previous research and experience developed during case studies have been combined in the development of a number of hypothesis concerning the process of internationalization of firms.

Concerning the impact of internal firm characteristics, a number of conflicting hypothesis have been developed. Based on these hypothesis, a fairly traditional internationalization is expected among firms of a limited size, due to limitations in resources available for foreign activities. These expectations, however, are somewhat altered in cases where external corporate owners or previous experience of executives are present.

In firms of high technology intensity, measured by R&D intensity as well as by product characteristics, e.g. complexity, need for adaptation and software content, a less traditional process of internationalization is expected. An increased speed of foreign entry, a less traditional pattern of foreign market selection and a higher propensity to use foreign subsidiary is hypothesized.

Finally, the impact of industry structure on the process of internationalization is discussed. In this case, however, the expected impact is less clear. Due to this, a number of questions, rather than hypotheses, were discussed.

Below, the expected influence of explanatory variables on internationalization behaviour is summarized in Table 4:1. Overall, a dilemma between limited resources, favouring a concentrated, sequential market selection, and technology related characteristics, with varying implications on the process of foreign market entry, is presented. This makes it particularly interesting to more closely investigate the actual behaviour of young, technology-based firms.

Table 4:1 Hypotheses regarding internationalization behaviour

HYPOTHESIS	EXPECTED IMPACT		
	Explanatory variables	Speed of foreign entry	Pattern of market selection
Internal firm characteristics			
Limited firm size	H1: lower	H2: more traditional	H3: lower commitment
Corporate ownership	H4: higher	H5: less traditional	H6: higher commitment
Previous experience	H7: higher	H8: less traditional	
High R&D intensity	H9: higher	H10: less traditional	H11: higher commitment
High technology products	H12: higher	H13: less traditional	H14: higher commitment
Personal marketing requirements			H15: higher commitment
Industry structure			
Early stage of development		H16: less traditional	H17: higher commitment
Narrow market niche		H18: less traditional	H19: lower commitment

5. THE MAIL SURVEY

Introduction

In order to investigate the internationalization behaviour of small, technology based firms on a larger sample, a mail survey was undertaken. First, a general description of the mail survey, including selection procedures, data collection and analysis of non-respondents is found. Second, the questionnaire and the variables included are presented. Third, the sample is described, in terms of internal firm characteristics and industry structure.

The mail survey

During the second empirical phase, a mail survey was sent out to a large number of firms. In this way, it was possible to reach a large number of respondents at modest costs.

A mail survey is often used as a complement to more holistic methods, e.g. in order to test a number of hypotheses previously generated. In this study, a mail survey was used to test some of the hypotheses raised during previous research and in the interview study, but also to describe the process of internationalization in a more systematic way. By doing so, the number of respondents and, consequently, the possibility to draw more general conclusions, increased.

Selection procedures

Since firms fulfilling the selection criteria presented in chapter 1 were of a limited size, public registration of these firms was rather incomplete. It was particularly difficult to assess export intensity and it was therefore difficult to establish exactly how many firms fulfill these criteria.

Initially, the survey was mailed to all members of the Swedish Association of Electronics Industries, established after 1964 and with a turnover of at least SEK 5 millions or a minimum of 10 employees.

Using this sample frame for a first mailing, the number of firms included amounted to 102. Of these firms, 22 firms fulfilled the four inclusion criteria of the study previously described. Within this group, 14 questionnaires were completed and returned by the firms, representing a response rate of 64%. Remaining firms indicated that they did not fulfill the inclusion criteria, either by returning the screening survey used or during telephone interviews.

In an attempt to increase the number of respondents, a second mailing was made. By using several alternative sources for identifying potential candidates for inclusion, the sample frame developed was expected to be relatively representative. This was considered important, since the possibility to generalize from the results is highly dependent on the characteristics of the sample.

The following alternatives were used to develop a sample frame for the questionnaire used in the second mailing.

First, all firms listed in the Swedish Export Directory 1987 established after 1964 were included, unless they were known to be subsidiaries of other Swedish or foreign firms.

Second, all firms listed under the headings of "hydraulic equipment", "electronics", "control equipment", "measuring instruments" and "optics" in the Swedish Telephone Directory 1987 were included if they were established after 1964 and had at least some exports according to the business catalogue Kompass.

Third, firms listed among the Swedish export companies presented in Liber 1985, established after 1964 and with an export of at least 20% where added to the list.

Fourth, several non-systematic sources, such as news paper articles, individual interviews, Kompass business catalogue, etc. were used to identify potential sample cases.

The sample frame for the second mailing amounted to a total of 332 firms. Among these, 126 firms fulfilled the criteria for inclusion once the screening procedure had taken place. However, contact could never be established with another 7 firms. Since it is not known whether these firms fulfilled the criteria or not, they have been excluded in the following presentation. Within the group of 126 firms, 71 questionnaires where correctly completed and returned, representing a response rate of 56%.

In a final attempt to increase the response rate, an abbreviated version of the questionnaire was distributed. Including the ten abbreviated questionnaires received after this mailing, an overall response rate of 64%, i.e. 95 respondents among 148 potential candidates, was achieved.⁷³ A general description of the sample frames is found in Appendix I.

Data collection

The first version of the questionnaire was tested on two pilot firms that agreed to fill in the questionnaire. After the questionnaire had been completed, the firms were contacted for a telephone interview. During the interview the questions and answers were discussed in order to identify misleading or difficult questions. Finally, the questionnaires were returned by the firms and certain corrections were made before the first mailing took place.

⁷³ Including 14 questionnaires from the first mailing, 71 complete questionnaires from the second mailing and 10 abbreviated questionnaires.

The first mailing was distributed in late October 1987 and resulted in 14 completed questionnaires. After analyzing the responses received, a few changes in the questionnaire were made. The second mailing was distributed in January 1988. A cover letter, the final version of the questionnaire and a separate paper, including certain questions to screen out firms not fulfilling the inclusion criteria, were included. (See Appendix II) The mailings were addressed personally to the President or other senior executives.

Both mailings were followed up approximately three weeks later. All firms that had neither returned the questionnaire nor the separate paper received a new letter, including a new questionnaire and screening questions. Firms that did still not respond, were then contacted by telephone. This resulted in the exclusion of several firms that did not fulfill the inclusion criteria. The remaining firms were sent a third questionnaire. In some cases, contacts could never be established. Some reasons for this may be that the firm had gone bankrupt, moved or changed name.

Approximately four months after the first two mailings were made, all firms that had not yet responded were sent a fourth letter, including a new letter and a questionnaire, before the abbreviated version of the questionnaire was distributed⁷⁴.

Analysis of non-respondents

After the last reminder, an analysis of non-respondents was made in order to establish whether a bias in the results may be caused by differences between respondents and non-respondents. Overall, a number of 46 firms did not respond to the survey, eight of them included in the first mailing, 38 in the second. The distribution according to age, size (number of employees or total turnover) and industry classification was similar among respondents and non-respondents, except that non-respondents were slightly smaller⁷⁵.

⁷⁴ Questions included in the abbreviated version of the questionnaire are indicated with an (A) in appendix II.

⁷⁵ An analysis of non-respondents is found in Appendix III.

Among 18 non-respondents who were contacted by telephone, the extension of international activities was investigated. Of these firms, eight firms indicated foreign sales of 20-50%, while the remaining ten firms had an export share of more than 50% of turnover. This was exactly the same distribution as among responding firms. Overall, there appear to be no systematic differences in general firm characteristics between responding and non-responding firms. Therefore, it is hypothesised that the results achieved may be regarded as representative also for non-responding firms.

One problem is that small, technology based firms often lack specialized personnel to deal with public relations and information. Therefore, the questionnaire was usually completed by the founder and/or President. However, these are often busy people, with a lot of responsibility, and a questionnaire of this type does, of course, not have their highest priority. The motive most frequently cited for not participating in the study was lack of managerial time. In a few cases, this was explained by present expansion, but in most cases, negative managerial attitudes towards researchers appeared to be the main reason.

The questionnaire was also rather long, and approximately 20-30 minutes were required to complete it. As a consequence of this, the response rate is not as high as I would have liked it to be. Still, an overall response rate of 64% within the actual population of study has to be considered a satisfactory result.

Comments on the method

It is sometimes claimed that the main weakness of a mail survey is its limited use for study of complex processes. In this study, this question is of minor importance, since the mail survey was complemented with an interview study, giving a more complete picture of the process of internationalization. The intention of the mail survey is rather to describe actual behaviour and to further investigate some of the questions previously generated.

Another problem concerns the possibilities to make any generalizations out of the results. The size of the total population of firms fulfilling our inclusion criteria is unknown, due to methodological problems of identifying firms of this type. One reason for this is the general tendency for smaller firms to avoid formal registration and bureaucracy. Looking at statistics from the Swedish Statistical Bureau (SCB), it is obvious that firms of less than 50 employees are extremely difficult to study.

However, in this study, a number of different selection procedures were used in an attempt to include as many young, technology based firms in Sweden with international activities as possible. Altogether, this resulted in 144 firms fulfilling the selection criteria out of a sample frame of 440 firms. Besides, an analysis of non-respondents indicate a similar distribution in terms of size, turnover and industry classification among respondents and non-respondents. Overall, this would indicate that the sample for this study is relatively representative for this type of firm.

The questionnaire

The motive of the mail survey was twofold. First, the intention was to provide a good description of the sample and the internationalization behaviour of these firms. Second, the ambition was to test the hypothesis and questions developed in chapter 4.

In order to provide a complete explanation of the internationalization process, a wide range of internal and contextual variables were included. Variables of internal character were divided into two sections, i.e. general firm characteristics and internationalization behaviour. Contextual variables were basically related to industry characteristics.

When possible, an absolute measure of explanatory variables (e.g. SEK, number or year) was used. In some cases, variables were only classified on a nominal scale, while remaining variables were measured on a 5-point Likert scale.⁷⁶

⁷⁶ The advantage of using a Likert scale, where the firm indicate either to what extent they agree to a statement or where on a scale between two extremes they would place the firm, is that it simplifies the answering for the respondent. In a questionnaire of this size, this was considered an important argument.

General firm characteristics

Firm size was measured in three different dimensions (question 1.3), i.e. total turnover (SEK), number of employees in Sweden and number of employees abroad. These dimensions were measured at two different point in time, i.e. in 1982 and 1987 (1981 and 1986 in the first mailing), in order to permit an analysis of export growth over these five years.

Ownership structure (question 1.1), in terms of percentage of firms shares held by private owners, financial investors, e.g. venture capitalists or investment firms, and other corporate owners, was recoded into two categories, i.e. firms with purely private ownership and firms with mixed ownership or purely corporate ownership.

R&D intensity was measured by R&D expenditures (SEK) in 1987 (question 1.7)⁷⁷, number of patents approved overall and number of patents in use in 1987 (question 1.8). Apart from that, three other R&D intensity measures were developed; (a) R&D expenditures as a percent of total turnover in 1987, (b) R&D expenditures per employee in Sweden in 1987, and (c) the number of employees working with R&D as a percent of total work force, excluding production (based on question 1.5).

Product characteristics are closely related to technology intensity. To study product characteristics, six different variables were employed. These variables were all subjectively measured on a five-point Likert scale, where the extreme values indicate different product characteristics. The first five were based on question 5.1, i.e. level of technology (high vs. low), level of innovation (innovation vs. well known technology), level of standardization (customized vs. standardized), software content (only software vs. only hardware) and level of complexity (high vs. low). The last variable was based on question 4.1f, i.e. transportation costs (high vs. low).

⁷⁷ To define R&D-expenditures is difficult, since different approaches as how to classify R&D-investments, e.g. in building and equipment, personnel and larger projects may be used. In this case, however, other measures are used to complement this one.

Marketing activities included a number of different aspects, including average order value, measured in SEK, (question 5.2). Importance of different marketing activities, i.e. after sales services, technological sales personnel, customer education, local product adaptation, credit, high quality, low price and brand name (question 5.3) was measured on a five-point Likert scale, with the extreme values indicating a very high or very low importance. A similar Likert scale was employed to measure importance of different marketing channels, i.e. trade shows and fairs, seminars and symposia, articles and other publications, direct mail and personal salesmen (question 5.4). Other measures concerned the average number of agent or distributor contacts per year (question 5.5) and level of direct customer contact (question 5.6).

Other variables included in this section were year of establishment, product spread (question 1.2), perceived profitability⁷⁸ (question 1.4), number of employees in different functions (question 1.5), production strategy (question 1.6) and R&D cooperation strategy (question 1.9). Using a five-point Likert scale, the attitude towards growth and patents was included in this section (question 6.1) The impact of these variables on internationalization was, however, not explicitly investigated. Rather, they were used to give a general description of these firms.

Internationalization variables

Export share: The first internationalization variable, i.e. export share (question 1.3) was measured in 1987 as well as in 1982, to permit an analysis of export growth over the time period. The result of such an analysis is presented in chapter 8.

The internationalization process: Question 2.1 in the questionnaire was the key question, concerning the process of internationalization. In this question, year of first entry (using either direct export, agent/ distributor or subsidiary) into the 20 "economically" closest markets to Sweden was indicated.⁷⁹ The main motive for using this format was to

⁷⁸ measured on a five-point Likert scale

⁷⁹ as defined by Hörnell et. al. (1973)

facilitate the comparison with the results developed by the Uppsala school during the 1970s.⁸⁰ As a complement to this question, an indication of whether activities in any of these markets had later been terminated, and in that case during what year, was included.

The dependent variables used in the analysis of chapter 7 are based mainly on the response to this question. Three groups of dependent variables are used, i.e. variables related to speed, pattern and form of foreign involvement. As noted before, these variables are not independent, but to facilitate the following presentation, they were presented one at a time. An operationalization of dependent variables is found in the section about methods of analysis in chapter 7.

Other entry forms: Question 2.2 concerned the use of licensing, export cooperation, indirect exports and other alternatives in 1987. This question, however, did not tell us whether these alternatives had previously been used.

In question 3.1, the geographical distribution and turnover in 1987 (SEK) of foreign subsidiaries was presented. Included in this question was also an indication of whether the firms was wholly-owned or a joint venture, and whether production or R&D activities were undertaken.

Question 3.2 included the sales volume of the firms products (SEK), approximate number of employees and production strategy of the three most important foreign agents/distributors. The following question (3.3) indicated whether the firm had used different contact channels for identifying foreign agents/distributors, i.e. the Swedish Trade Council, local Chambers of Commerce, personal contacts, trade shows, travelling abroad, outside proposals and other channels. The importance of each channel was measured on a five-point Likert scale, ranging from a very high to a very low.

⁸⁰ It would have been interesting to have a complete time series of sales to these countries for each firm. A question like that would, however, require so much effort from the respondent that the response rate would be likely to diminish considerably. Instead, firms were asked to indicate sales volumes of subsidiaries (question 3.1) and the three largest agents/distributors (question 3.2) in order to give an indication of the importance of specific countries.

In question 3.4, the firm indicated how often different types of contract specifications, e.g. concerning market exclusivity, product exclusivity, trial agreements and brand name were used in agent/distributor agreements. The frequency was measured on a five-point Likert scale, ranging from never to always. Finally, a similar Likert scale was employed to measure how often small or manufacturing agents/ distributors were used (question 3.5).

Market selection motives: To complete the description of market selection pattern, a question concerning the three most important foreign markets according to the firm and the main motives for entering those markets (question 2.3) was included in the questionnaire.

Previous experience: In order to establish whether the firm had been able to make use of previous experience of firm executives, question 6.3 was included. In this question, the firms indicated if contacts with foreign agents or distributors, financial contacts, local market experience or general industry experience had been available during internationalization.

Evaluation of foreign activities included a number attitudes, concerning the importance of the home market, a rapid internationalization and personal contacts during initial internationalization (question 6.1). In the following question (6.2), problems to find financing and difficulties to find suitable representatives or local market knowledge were measured on a five-point Likert scale, ranging from none to very large.

Perceived profitability of foreign activities (question 6.4) was measured on a five-point Likert scale, ranging from very good to very poor. In the following question (6.5), the result was compared to expected result, on a five point Likert scale, ranging from much better than expected to much worse than expected. In question 6.6, the expected development of the firms sales volume, export share and number of foreign markets was investigated, using three different response categories, i.e. increase, remain or decrease. Finally, two open ended questions were used to study the expected development of foreign organization and if the firm had any regrets concerning the way foreign activities had been handled so far.

Industry characteristics

Industry classification: Based on the SNI code of products, firms were classified into different industries. In five cases, products could not be classified, using the SNI code. Remaining firms provided machinery, instruments/optics, electronic product, chemical products, other metal products, transportation equipment or wooden product. The number of observations in the three last categories, however, was limited and restricted the possibilities for any statistical analysis.

Classifications based on product type may be criticized, particularly in cases of large diversified firms, active in several product areas. In this study, however, firms are relatively small and the product line relatively narrow.

Industry structure was measured on a five-point Likert scale, indicating how the firms characterize the industry structure concerning the firms' most important product (question 4.1). Five variables were used, i.e. perceived market growth (rapid growth vs. rapid decline), level of customer awareness (established demand vs. need for demand creation), number of application areas (few vs. many), number of end users (few vs. many) and no. of competitors (few vs. many).

Firm position: Apart from that, the firm's market share (question 4.2)⁸¹ and expected risk of future imitation, based on a five point Likert scale (question 4.3), were included in this section. The apparent difficulty to define market share, however, made it impossible to use this variable in any further analysis.

The sample

For the mail study, the sample consisted of 95 firms, of which 10 firms had responded to the abbreviated version of the questionnaire. Even if all firms could be regarded as

⁸¹ In this question, firms were asked to make their own definition of market share. However, since differences in definition resulted in considerable variations in market shares, this variable was not further used.

small and technology based, some variations in internal firm characteristics as well as industry structure were found. In this section, a general presentation of the sample is made. A more detailed description is found in Appendix IV.

Internal firm characteristics

Looking at general firm characteristics, the **age** of firms varies between 0 and 22 years, with an average of 12 years. In total, 38 firms were between 0 and 10 years of age, including 8 firms less than 5 years old, and 32 firms were more than 15 years of age. Most firms provide a limited number of products, often related to each other.

When looking at **firm size**, most firms would fulfill the usual Swedish definitions of small and medium-sized firms, based on number of employees. In the sample as a whole, the average number of employees in Sweden was 56. About 69% of the firms would be regarded as small firms, i.e. with less than 51 employees. Among these firms, approximately two thirds, or 42 firms, would be considered very small, i.e. with less than 20 employees. Approximately 27% of the firms are classified as medium-sized, using the definition 51-200 employees. Apart from that, only 3 firms had outgrown this definition of small or medium-sized, with between 232 and 750 employees in Sweden in 1987 or 1986.

Looking at size in terms of turnover (millions of SEK), the average firm size is 69.5 MSEK. Defining firms with a turnover of 50 MSEK or less as "small" would give a total of 73% firms classified as small. Of these, approximately two thirds are very small, having a turnover of less than 20 MSEK. In the medium-size category, about 23% of all firms were found, and only 2 single firms were classified as large, having a turnover of more than 200 MSEK.

Related to firm size are the questions of entrepreneurial attitudes towards growth and production strategy employed. The sample is fairly evenly divided according to **attitude towards growth**, with 44% of the firms indicating a preference for remaining small and

36% preferring to grow. As could be expected, growth was considered less important among firms of smaller size⁸².

Below, firms have been classified according to number of employees and production strategy, i.e. in-house production, subcontracting or a combination of the two. (Table 5:1)

Table 5:1 Relationship between firms size (no. of employees) and production strategy. (Frequency, row percent)

Firm size (no. of employees)	Production strategy			Total
	Sub-contracting	Both	In-house production	
-20 employees	19 (53%)	11 (31%)	6 (17%)	36
20-50 employees	8 (36%)	7 (32%)	7 (32%)	22
>50 employees	3 (12%)	12 (48%)	10 (40%)	25
Total:	30	30	23	83

No. of observation = 83
Pearson chi-square = 11.266 (4 d.f.) **

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

Altogether, a number of 53 firms, representing 64% of the total sample, are engaged in production. Still, 74 firms have at least one person engaged in production or assembly, indicating that also non-manufacturing firms may be responsible for some part of assembly, testing or quality control.

Subcontracting appears to be particularly common among the smallest firms, of which almost 53% rely exclusively on this production strategy. Consequently, the expected relation between firm size, in number of employees, and production strategy appears to

⁸² Kendall's Tau-B = -0.182 ** and -0.240 ***

hold true. There is, however, no relation between production strategy and size in terms of turnover.⁸³

The type of **ownership** has been divided into two categories; purely private ownership and corporate ownership. The most common ownership type among these firms is private ownership. At least 10% of the shares are owned by private persons in 76% of the firms. Still, 50% of the firms have corporate owners, either as sole owners or as a complement to private ownership. In this category, venture capital firms, investment firms and other institutional investors as well as corporate - non financial - owners, are included. Among firms with purely corporate owners, most firms belong to another non-financial company. A mixed ownership, including private as well as corporate owners, is more common among financial investors. Ownership structure is also closely related to firm size. (Table 5:2)

⁸³ Chi-square value = 2.421

Table 5:2 Ownership structure by firm size (column percentages)

Firm size (turnover)	Ownership structure	
	Private ownership	Corporate ownership
0-20 MSEK	28 (67%)	9 (21%)
20-50 MSEK	10 (24%)	16 (38%)
>50 MSEK	4 (10%)	17 (40%)
No. of observations = 84		
Kendall's Tau-B = -0.450 ***		
Firm size (no. of employees)	Ownership structure	
	Private ownership	Corporate ownership
0-20 persons	24 (57%)	12 (29%)
20-50 persons	13 (31%)	10 (24%)
>50 persons	5 (12%)	20 (48%)
No. of observations = 84		
Kendall's Tau-B = -0.354 ***		

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

When investigating the **technology intensity** of firms, four different measures have been employed; (a) percentage of the employees working with R&D related to total work force, excluding production and assembly, (b) R&D expenditures as a percent of total turnover, (c) R&D expenditures per employee and (d) number of patents held.

When looking at the correlation between the four different R&D intensity measures, a relatively high level of correlation is found between the first three ones, but not with the number of patents received. (Table 5:3)

Table 5:3 Pearson correlation coefficients of technology variables.

	R&D personnel/ work force	R&D costs/ turnover	R&D costs/ employee	No. of patents
R&D personnel/ work force	-	-	-	-
R&D costs/ turnover	0.670 ***	-	-	-
R&D costs/ employee	0.621 ***	0.818 ***	-	-
No. of patents	0.050	-0.101	0.024	-

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

In terms of the number of employees working within the R&D function, 61% of the firms have a research department consisting of 1-5 persons. However, to describe R&D intensity, the number of persons working with R&D has been related to firm size. Since firms engaged in production have been found to be larger, in terms of the number of employees, they are likely to have a lower percentage of persons working with R&D, in spite of a similar size of the R&D department. To correct for this, the number of persons working with R&D are compared with the total number of employees, excluding persons working with manufacturing or assembly.

Overall, an average of almost 25% of the work force, excluding production, engaged in R&D functions indicates a relatively high level of R&D intensity among the firms in the study. When using R&D expenditures as a percent of total turnover or per employees as indicators of R&D intensity, a similar picture is presented. The average R&D expenditures as a percent of turnover was 8.6%, and the average R&D expenditures per employee was 73.000 SEK.

In terms of number of patents, the average number within the sample was 3 patents. Most firms in the sample have at least one or more patents, but approximately 36% of the firms lack patents altogether. This may partly be explained by the attitude towards patenting within the firms. As could be expected, the correlation between the number of patents and the attitude towards patenting indicates that firms with a more negative attitude towards patenting also have less patents than other firms.⁸⁴ Another factor influencing the number of patents held is firm size, in terms of turnover⁸⁵ and number of employees,⁸⁶ i.e. larger firms are more likely to have more patents than smaller ones.

Concerning R&D strategy, 70 firms (82%) were engaged in R&D activities in cooperation with external parties. In most cases, R&D activities took place in cooperation with customers, either in Sweden or abroad. As many as 33 firms (66%) indicated a cooperation with foreign customers. R&D activities were also undertaken in cooperation with external consultants or universities. In those cases, however, the partners were usually Swedish.

Closely related to the technology intensity of a firm is the **characteristics of their products**. In this study, six different product characteristics have been employed, i.e. level of technology, level of innovation, need for customer adaptation, software content, level of complexity and transportation costs. The correlation between these variables indicate that some combinations of product characteristics are more likely than others. (Table 5:4)

⁸⁴ Pearson correlation coefficient = - 0.341 ***

⁸⁵ Pearson correlation coefficient = 0.647

⁸⁶ Pearson correlation coefficient = 0.789

Table 5:4 Correlations matrix of product characteristics (Kendall's Tau-B)

	Technology level	Level of innovation	Need for adapt.	Software content	Complexity level	Transport costs
Technology level	-					
Level of innovation	0.134	-				
Need for adaptation	-0.060	0.011	-			
Software content	0.315 ***	0.290 ***	0.098	-		
Complexity level	0.509 ***	-0.048	-0.217 **	0.082	-	
Transport cost	-0.243 ***	-0.000	-0.087	0.103	-0.196 *	-
* = 10% level of significance						
** = 5% level of significance						
*** = 1% level of significance						

Overall, 65% of the firms in the study are active in what is considered as high technology areas. Regarding the level of technological innovation, the sample is fairly evenly spread between firms working with established technologies and innovations. Surprisingly enough, though, the correlation between level of technology and level of innovation is weak. As indicated below, the reason may be that level of innovation is more closely associated with level of industry development than with level of technology.

The level of technology is positively correlated with the degree of software content and complexity, but negatively correlated with transport costs. The level of technology is also higher among firms with a high R&D intensity⁸⁷. This indicates that "high tech" firms

⁸⁷ Pearson correlation coefficients = 0.406 ***, 0.395 *** and 0.362 ***

have higher R&D intensity, more complex products, with a higher level of software content, and lower transportation costs than other firms.

Depending upon product characteristics, the **marketing requirements** are likely to vary. The most important marketing variables are high quality, after sales service and technological sales personnel. Other variables of some importance are local adaptation and customer education, while credit, low price and brand name appear to be of less importance. However, some of the variables are highly correlated. (Table 5:5)

Table 5:5 Correlation coefficients of marketing variables (Kendall's Tau-B)

	A/S service	Techn sales	Cust. educ.	Local adapt.	Credit	High quality	Low price
A/S services	-						
Technical sales men	0.311 ***	-					
Customer education	0.396 ***	0.553 ***	-				
Local adaptation	-0.023	-0.051	-0.047	-			
Credit	-0.008	-0.015	0.003 **	0.202	-		
High quality	-0.012	-0.008	0.061	0.090	-0.066	-	
Low price	-0.328 ***	-0.152	-0.245 ***	0.177 **	0.155 *	0.005	-
Brand name	0.309 ***	0.087	0.246 ***	-0.027	-0.067	0.093	-0.213 **

* = 10% level of significance
 ** = 5% level of significance
 *** = 1% level of significance

For example, after sale service, importance of technical personnel and need for customer education are highly positively correlated with each other, but negatively correlated with importance of low price. This would indicate that when customer education is important, a close contact with the customer is more vital than a low price.

To sell the products, a mix of different marketing channels is used. On a scale from 1-5, the most important marketing channel appears to be the firms own sales force. Other market channels of some importance are direct mail, trade shows and fairs and publications and articles, while the least important one is seminars and symposia.

Overall, the type of marketing required and market channels used is related to product characteristics. For high technology products, a need market creation is indicated by strong positive correlations with importance of customer education, technological sales personnel and several market channels, including trade shows, seminars and direct information.

Industry structure

By classifying firms according to industries, the most commonly entered industries are machinery and electrical products manufacturing, with 37% and 26% of the firms, respectively. (Table 5:6) Other industries of importance are the instruments industry and chemistry, including pharmaceutical. Apart from this, a limited number of firms are active in other industries, e.g. transportation equipment, other metal manufacturing and wooden manufacturing.

Table 5:6 Industry classification

Industry	No. of firms	Percentage
Chemistry/pharmaceutical	10	11%
Machinery (non electrical)	33	37%
Electrical products	23	26%
Instruments/photo/optics/watches	15	17%
Other industries	9	10%
No. of observations = 90		

The industry structure was expected to vary between these industries, due to differences in firm characteristics, technology intensity, product characteristics and marketing requirements. In an attempt to investigate these differences, a number of F-tests and chi-square tests were made.

Concerning general firm characteristics, e.g. number of employees, turnover, ownership type and previous experience, no differences were found. However, the level of R&D intensity was highest in the electronic products industry and lowest among machinery manufacturers. (Table 5:7)

Concerning product characteristics and industry structure, the machinery industry was found to have the lowest level of software content, the highest transportation costs and the largest number of competitors. The instrument manufacturers, on the other hand, have the highest level of software content, the lowest transportation costs and the most limited number of competitors.⁸⁸ Apart from that,

Table 5:7 R&D intensity/industry

Industry	R&D costs/ employee	R&D costs/ turnover	R&D personnel/ workforce
Chemistry (n=9)	SEK 98.000	8.9%	22.4%
Machinery (n=32)	SEK 45.000	4.6%	19.8%
Electrical products (n=23)	SEK 115.000	15.1%	36.7%
Instruments (n=14)	SEK 82.000	9.3%	22.9%
F-statistics =	3.929	5.177	4.677
p =	0.012	0.003	0.005

however, the differences were smaller than expected, indicating that an analysis on the industry level may be too imprecise to understand the industry structure encountered by an individual firm.

Therefore, five general industry structure variables have been included in the study, i.e. market growth, customer awareness, number of customers, number of application areas

⁸⁸ F-values = 2.923 **, 6.527 *** and 5.434 ***

and level of competition. These variables are, to a certain extent correlated. In order to invest the relation with technology characteristics, in terms of levels of technology and innovation, these variables are included in the correlation matrix developed in Table 5:8.

Table 5:8 Correlation coefficients of industry structure variables (Kendall's Tau-B)

	Market growth	Cust. awareness	No. of applications	No. of customers	No. of competitors
Market growth	-				
Customer awareness	-0.161 *	-			
Number of applic.	0.211 **	-0.092	-		
Number of customers	0.259 ***	-0.086	0.311 ***	-	
Number of competitors	-0.182 **	0.142	0.085	0.037	-
Level of technology	0.150	-0.035	0.084	0.072	-0.237 ***
Level of innovation	0.234 ***	-0.151	0.056	0.163 **	-0.313 ***

* = 10% level of significance
 ** = 5% level of significance
 *** = 1% level of significance

To define **industry stage of development**, two variables were used, i.e. level of customer awareness and number of competitors. The two measures were not correlated with each other, but both variables are negatively correlated with market growth, indicating a higher market growth during early stages of industry development. Looking at customer awareness, only 20% of the firms indicate that demand has to be created.

The number of competitors varies with product characteristics and is considerably lower among firms providing high technology products or innovations. These findings are further strengthened by a negative correlation with the software content of the product. Positive correlations have also been identified between number of competitors and certain marketing requirements, e.g. need for local adaptation (0.182 **), credit (0.231 ***) and a low price (0.239 **). These variables represent fairly traditional competitive methods, indicating a more mature stage of industry development in industries with many competitors. Negative correlations, on the other hand, have been identified with importance of technological sales personnel (-0.200 **), customer education (-0.300 ***) and brand name (-0.166 **), indicating an early stage of industry development in industries with few competitors.

Related to the competitive situation is the risk of imitation. In this study, 65% of the firms indicate a high or relatively high risk of future imitation. However, no correlation with product level of innovation was found, i.e. innovative firms were not more concerned with the risk of imitation than other firms.

When looking at **market potential**, three main variables have been used; i.e. market growth, number of application areas and number of customers. Customer structure is likely to vary between industries. For certain product types, the actual number of end users as well as application areas is limited, while for others, the customer structure is highly diversified. The number of end users and application areas are positively correlated with each other and with level of market growth, indicating a large market potential in markets with many customers, several application areas and a considerable market growth.

Summary

In this chapter, a presentation of the sample included in the survey is made. It is clear that, in spite of a fairly homogeneous sample, there are considerable differences between the firms included in terms of firm size and technology characteristics. The presentation is combined with a number of analysis regarding correlations between several technology

related variables, e.g. R&D intensity, product characteristics, marketing requirements and industry structure.

This analysis indicate that the R&D intensity is highest in firms with products of "high technology" character, usually complicated products with a high software content. The product characteristics are closely related to the marketing requirements of the products and industry structure. Innovative products, for example, are more likely during early stages of industry development, when the number of competitors is limited and customer education and market creation is important.

6. INTERNATIONALIZATION BEHAVIOUR

Introduction

The intention of this chapter is to describe the internationalization behaviour of firms included in the mail survey. Since few studies of the combined impact of limited size and technology intensity on internationalization have been made, there is limited knowledge about the actual behaviour of these firms. Therefore, it is interesting to look at how these firms do, in fact, go about becoming international.

Due to the selection criteria used, all firms included in the study had a minimum of 20% exports or foreign sales in 1986/87. Still, considerable variations in export share were found. (Table 6:1)⁸⁸

There appears to be a general increase in export share between the two time periods. When looking at changes in absolute exports (SEK) between 1981/82 and 1986/87, only 19 firms were found to have an export in 1986/87 that was equal to or lower than that of 1981/82. The remaining 47 firms had all increased their exports. Among those, 26 firms had a relative increase in exports between the two time periods of 50% or more.

In the following, three dimensions of internationalization are presented, i.e. speed of internationalization, pattern of foreign market selection and foreign entry forms used. Finally, an evaluation of foreign activities is presented.

Table 6:1 Export share in 1981/82 and in 1986/87

Export share	No. of firms (percent)	
	1981/82	1986/87
<20%	22 (33%)	0 (0%)
20-49%	15 (23%)	29 (31%)
50-75%	20 (30%)	36 (38%)
>75%	9 (14%)	30 (32%)
No. of observations	66	95
Average export share	39%	60%

⁸⁸ Of the 19 firms missing in 1981/82, 10 responded to the abbreviated version of the questionnaires and 7 had been established later.

Speed of internationalization

All firms in the sample had relatively rapidly engaged in international activities, which was also partially an outcome of the selection criteria used. Still, firm age at first foreign market entry ranged between 0 and 17 years⁸⁹. (Table 6:2)

This indicated that most firms (78%) had gone international within 5 years from establishment and 44% already within one year. The average age at first foreign entry in the sample as a whole was slightly above 3 years, but there was a highly significant difference between age categories. (Table 6:3)

As further discussed in the following chapter, this may partly be the outcome of the selection criteria used. The speed of internationalization could also be expected to differ between firms with different attitudes towards the importance of establishing the home market before going abroad. However, only a weak correlation was found⁹⁰. Once international activities had been initiated, the speed of foreign market commitment differed. The number of years required to enter 5 foreign markets, for example, ranged between 0 and 17 years. (Table 6:4)

Table 6:2 Age at first foreign market entry

Firm age	No. of observations
0-1 years	41 (44%)
2-5 years	33 (35%)
6-10 years	13 (14%)
>10 years	7 (7%)
No. of observations = 94	
Average age = 3.2 years	

Table 6:3 Age at first foreign entry, by firm age in 1987

Firm age in 1987	No. of observations	Mean age at foreign entry
0-10 years (n=38)	37	1.306
11-15 years (n=25)	26	3.846
>15 years (n=32)	32	4.594
No. of observations = 95		
F-value = 8.572, p = 0.000		

⁸⁹ In the survey, firm age at first entry (using either direct exports, agent/distributor or subsidiary) into any of the 20 "economically closest" markets, as defined by Hörnell et. al. (1973), or other markets considered important by the firm, was investigated.

⁹⁰ Kendall's Tau-B = 0.181 *

Some firms were active in only one country for several years, while others rapidly entered a number of countries. During the first year of foreign activities, 48% of the firms were active in one foreign country and 8% in more than 5 countries. After 3 years, however, only 15% of the firms were active only in one foreign country, but 43% of the firms had entered more than 5 countries.

Table 6:4 No. of years required to enter 5 foreign markets

No. of years required	No. of observations	Percentage
0-1 year	22	27%
2-5 years	44	54%
> 5 years	15	19%
No. of observations = 81		
Average no. of years = 3.5		

Pattern of foreign market selection

The pattern of market selection was divided into four parts, i.e. the actual selection of foreign markets, motives for entering important countries, market concentration vs. diversification and the question of sequence of entries.

Actual market selection

As indicated in previous chapters, it has not been possible to investigate entries into every single foreign country. Rather, entries (using either direct exports, agent/distributor or subsidiary) into the 20 "economically" closest countries to Sweden were studied.⁹¹ This resulted in the following list of the most commonly entered foreign markets within the sample. (Table 6:5)

At the top of this list were, basically, large industrialized countries, e.g. West Germany, the U.K., France and the U.S., and the geographically closest markets, e.g. Denmark, Finland and Norway. Among the less frequently entered markets, some of the geographically more distant markets, e.g. Japan, Brazil, Argentina and South Africa, as

⁹¹ As defined by Hörnell et. al (1973)

well as West European markets of more limited market potential, e.g. Spain and Portugal, were found.

Apart from the countries listed above, other markets of importance, according to the definition of individual firms, were China, Singapore, Czechoslovakia and Korea. (Table 6:6)

There may be a certain bias in this list, since firms only included the most important countries. Other firms may therefore have been active in these markets, but to a more limited extent.

By adding the establishments mentioned in different countries of the Far East (China, Japan, Singapore, Korea, Hong Kong, Taiwan, Malaysia) or of the Middle East (India, Libya, Kuwait, Pakistan, Saudi Arabia, Bahrain, Iran, Iraq), these two areas seemed to be relatively important to the firms in the study. Altogether, almost as many entries had taken place in Asia as in South and North America. Still, no region can be compared with Western

Table 6:5 The most commonly entered foreign markets

	Markets	No. of firms	Percentage
1.	Finland	81	85%
	Norway	81	85%
3.	Denmark	77	81%
4.	West Germany	72	76%
5.	U.K.	66	69%
	Netherlands	66	69%
7.	France	65	68%
8.	U.S.	58	61%
9.	Switzerland	56	59%
10.	Italy	50	53%
11.	Belgium	49	52%
12.	Austria	44	46%
	Canada	44	46%
14.	Australia	39	41%
15.	Spain	38	40%
16.	Japan	26	27%
17.	Portugal	25	26%
18.	Brazil	12	13%
19.	Argentina	10	11%
20.	South Africa	9	9%
No. of observations = 95			

Table 6:6 Other important markets mentioned

No. of firms	Markets
7	China
6	Singapore
5	Czechoslovakia, Korea
4	Hong Kong
3	Taiwan
2	GDR, Greece, India, Ireland, Israel, Malaysia, New Zealand, Poland, Hungary
No. of observations = 84	

Europe, where an outstanding number entries had taken place. (Table 6:7)⁹²

When dividing the total number of entries into a region with the number of countries listed in the region, the difference between Western Europe and North America was more limited, i.e. an average of 45 entries per country vs. 51 entries per country.

In an attempt to investigate the relative importance of different markets, each firm was asked to list the 3 most important countries, according to the firm. By computing the number of firms considering a specific market to be important as a percent of the absolute number of entries into that market, a ranking based of markets in order of importance for individual firms was made. (Table 6:8)⁹³

Table 6:7 Distribution across geographic regions

Region	No. of countries listed	No. of entries
1. Europe	23	782
a. Western Europe	17	768
b. Eastern Europe	6	14
2. America	4	126
a. North America	2	102
b. South America	2	24
3. Asia	17	114
a. Australia/N.Z.	2	43
b. Middle East	8	12
c. Far East	7	59
4. Africa	?	15

⁹² In some cases, firms have indicated the region as a whole or part of the region instead of individual countries. Therefore, these figures are somewhat lower than the actual number of entries.

⁹³ A maximum of 3 markets has been indicated, i.e. some firms have only listed one or two markets. In some cases, firms have listed regional areas rather than single markets, which makes it difficult to give an absolute number of listings for certain markets.

In comparison with the ranking of markets according to number of entries, this list was somewhat different. Larger markets, e.g. West Germany, the U.S. and Japan received a higher ranking according to relative importance than according to number of entries, while smaller European markets, e.g. Finland, Denmark, Netherlands and Belgium, received lower ones. Other European markets, e.g.

France, Italy, Switzerland and the U.K., had a similar position.

In order to study how difficult entries into particular markets have been to handle, the percentage of firms terminating activities in each country was used as an approximation. (Table 6:9)

Even if a market was terminated for other reasons, this indicated that entries were difficult to handle in distant markets, such as Canada, the

Table 6:8 Percent of firms considering a specific market, in which the firm is active, to be one of the 3 most important markets.

Markets	No. of observations	No. of entries into the market	Percentage
1. West Germany	41	72	57%
2. U.S.	28	58	48%
3. U.K.	25	66	38%
4. Norway	28	81	35%
5. France	18	65	28%
6. Finland	21	81	26%
7. Japan	6	26	23%
8. Italy	9	50	18%
9. Denmark	11	77	14%
10. Switzerland	7	56	13%

Table 6:9 Percentage of firms terminating activities in each market

Percent of firms terminating activities	Markets
0%	U.K., Spain, Portugal, Argentina
1-5%	Finland, West Germany, Netherlands, Denmark, Italy, Austria
5-10%	Switzerland, Brazil, Australia, Norway, France, Belgium, Japan
>10%	Canada, U.S., South Africa
No. of observations = 74	

U.S., South Africa, Japan, Australia and Brazil. In the case of South Africa, the political situation could be expected to have had an important impact on the decision to terminate activities. Among several West European countries, e.g. the U.K., Finland, West

Germany and Denmark, most firms appeared to have been successful, since the number of terminations remained low, in spite of a considerable number of entries. Still, in Norway the number of terminations amounted to 7.7% of all market entries. Some of the lowest percentages of terminations were indicated in markets characterized by a limited number of entries, e.g. Argentina, Portugal and Spain, making it difficult to make any statements about these countries.

Motives for market selection

A number of different motives for entering the most important markets were investigated. The dominating motive turned out to be market potential, followed by access to advanced customers. Other motives frequently mentioned were established market contacts, limited geographic distance, limited competition and orders received. (Table 6:10)⁹⁴

The actual motives listed vary between markets. The main motive for entering other Scandinavian countries, for example, was the limited geographic distance. Other motives frequently mentioned were limited competition, orders received, access to established market contacts and advanced customers.

In larger industrialized countries, such as West Germany,

Table 6:10 Motives for entering important markets.

Motives	No. of observations	Percentage
Large market potential	169	25%
Access to advanced customers	109	16%
Established market contacts	74	11%
Limited geographic distance	70	10%
Limited competition	65	10%
Orders received	60	9%
Presence of advanced competitors	45	7%
Language knowledge	34	5%
Limited cultural distance	34	5%
Considerable geographic distance	16	2%
TOTAL:	676	
No. of observations = 85		

⁹⁴ First, all firms have not listed three important markets. Secondly, all firms have not listed three motives per market, (occasionally, even more than three motives have been mentioned).

the U.S., France, the U.K. and Japan, the single most important motive was market potential. The second motive was access to advanced customers, while remaining motives varied. In West Germany, for example, presence of important competitors was important, while in France, limited competition was a more common motive. One reason for the latter may be that France is frequently considered to be a difficult market, partly due to language problems. If there are also important competitors active in the market, the difficulties may be perceived as too great by many firms. In the absence of local competitors, however, some firms may be willing to take the risk to enter the market.

Market concentration vs. diversification

Another question related to the pattern of foreign market selection concerns the choice between a concentration on a limited number of market or diversification into several foreign markets. For this analysis, the number of foreign markets entered within three years from first foreign market entry has been used.

Due to the complexity of the survey, it was not possible to investigate entries into every single market. However, by combining the 20 "economically closest" markets and other markets considered as important by the firms, most markets in which firms were active were likely to be included. (Table 6:11)

Table 6:11 Number of foreign markets within 3 years from first foreign market entry

No. of markets	No. of firms	Percentage
1-2 markets	12	14%
3-5 markets	35	40%
6-10 markets	24	27%
> 10 markets	17	19%

No. of observations = 88
Average number of markets = 6

With an average number of foreign markets slightly above six in the sample as a whole, the sample may be fairly evenly spread between firms being active in more or less than five foreign markets within three years from first foreign market entry.

Sequence of market selection

To study the sequence of market selection, two different types of analysis were made. In the first one, a Pearson correlation coefficient (r) was used. The order of market selection, measured by age at first entry into a market (using either exports, agents or subsidiary) was correlated with "economic distance", for each individual firm.

In the case of a traditional internationalization pattern, age at the time of entering a market would be higher the more distant the market, i.e. a positive correlation of r close to 1 would be expected. A r -value close to -1 would indicate a negative correlation, i.e. a reversed pattern of internationalization, while a r -value approaching 0 indicates that no relation between age at market entry and economic distance could be found.

In 19 cases, the correlation coefficient was missing, due to a lack of variance in the data or less than 4 foreign markets entered. Among the remaining 76 firms, a positive correlation at a 1-10% significance level was identified among 33 firms (43%), indicating a traditional pattern of establishment. Among other firms, no significant correlation between sequence of entry and economic distance could be found, indicating a less traditional sequence of market selection.

An alternative way of analyzing the sequence of foreign market selection was to compare the present ranking of markets with the ranking according to "economic distance", in order to identify any possible changes in behaviour. Initially, the ranking was based on average firm age at first entry into a particular market, using either direct exports, local representatives or subsidiaries. (Table 6:12)

A Spearman correlation coefficient of 0.645 between the two rankings gave a picture of a relatively sequential pattern of market entries. All Scandinavian countries, as well as most West European countries, received a ranking similar to their "economic distance".

There were, still, certain differences. Some of the countries that had advanced in rank were France, Brazil, Japan and Australia, i.e. countries of considerable geographic

Table 6:12 Average age at first foreign market entry

Country	Present rank	Economic distance	Difference	Average age	No. of observations
Norway	1	2	+1	4.7 years	81
Denmark	2	1	-1	4.8 years	77
Finland	3	3	0	4.9 years	81
France	4	12	+8	6.2 years	65
Brazil	5	17	+12	6.3 years	12
Japan	6	16	+10	6.5 years	26
West Germany	7	4	-3	6.6 years	72
Belgium	8	7	-1	6.7 years	49
Austria	9	11	+2	6.9 years	44
Switzerland	10.5	9	-1	7.0 years	56
U.K.	10.5	5	-5	7.0 years	66
Netherlands	12	6	-6	7.2 years	66
U.S.	13	8	-5	7.4 years	58
Australia	14	20	+6	7.6 years	39
Italy	15	13	-2	7.8 years	50
Spain	15	14	-1	7.8 years	38
South Africa	17	18	+1	8.1 years	9
Argentina	18	19	+1	8.2 years	10
Canada	19	10	-9	8.5 years	44
Portugal	20	15	-5	8.6 years	25

distance. Among the countries dropping in rank were the U.K., the Netherlands, the U.S., Canada and Portugal. However, considering the limited number of observations in Brazil, Japan and Portugal and the limited spread within the sample, any interpretation must be made with great care.

Another ranking was established, based on the mean establishment rank (MR) of each market, as defined by Hörnell et. al. (1973). In this study, however, the measure has been based not on subsidiary establishments but on market entry using either direct exports, agents or subsidiary, and resulted in the following ranking. (Table 6:13)

The internal consistency between the two rankings of this study was high, with a Spearman correlation coefficient of 0.819. Still, a Spearman correlation coefficient of 0.777 indicates that the latter analysis results in an even closer resemblance to the traditional sequence of market selection. In the first half of the list, few variations from

Table 6:13 Average establishment rank (MR) of foreign markets

Country	Present rank	Economic distance	Difference	MR-measure	No. of observations
Norway	1	2	+1	2.02	81
Denmark	2	1	-1	2.21	76
Finland	3	3	0	2.41	82
West Germany	4	4	0	3.11	72
France	5	12	+7	3.22	64
U.K.	6	5	-1	3.29	65
Switzerland	7	9	+2	3.39	56
U.S.	8	8	0	3.47	58
The Netherlands	9	6	-3	3.58	66
Belgium	10	7	-3	3.69	49
Japan	11	16	+5	3.77	26
Austria	12	11	+1	3.81	43
Argentina	13	19	+6	4.10	10
South Africa	14	18	+4	4.20	10
Brazil	15	17	+2	4.33	12
Australia	16	20	+4	4.44	39
Canada	17	10	-7	4.48	44
Italy	18	13	-5	4.56	50
Spain	19	14	-5	4.68	37
Portugal	20	15	-5	5.20	25

previous research are found. The main exception is France, with a considerably higher position in this ranking than that of "economic distance". In the second half, on the other hand, a number of distant markets, such as Japan, Argentina and Australia have advanced, while some European markets, i.e. Italy, Spain and Portugal, and Canada have lost their positions.

Still, as mentioned before, one has to be careful when interpreting the results, since the actual difference in MR-measure between countries is limited. Besides, the number of observations is limited in certain markets, particularly in Argentina, Brazil and South Africa.

Finally, an attempt was made to investigate the sequence of market selection in individual firms. This, however, turned out to be difficult, since most firms tended to enter more than one foreign market at a time. In 46% of all entries, more than one single market, ranging between 2-15, was entered in one year. This indicates that firms tend to enter

clusters of markets, rather than following a sequential pattern of selecting one market at the time.

In order to investigate the impact of initial market selection on subsequent market sequences, a comparison between firms with an initial entry into the Scandinavian markets, i.e. Norway, Denmark and Finland and firms with initial entries into other markets was made. In the

Table 6:14 Average ranking of West Germany, France and the U.S. by initial market entries

Initial market entries	Average ranking		
	West Germany	France	U.S./Canada
Scandinavia	4.21	4.29	4.95
Western Europe	1.97	3.00	2.73
Southern Europe	3.73	1.27	2.80
U.S./Canada	1.67	2.73	1.00
Others	2.36	2.38	2.64

first category, only initial entries into the Scandinavian markets were included. Due to the large number of market "clusters", overlaps between the latter categories occurred. (Table 6:14)

Depending upon what markets were included in the initial cluster of foreign markets entered, the sequence of market selection differs. Firms with an initial entry into the Scandinavian markets, for example, tended to follow a traditional sequence of market selection. Among firms with an initial entry into Western Europe or North America, West Germany was also rapidly entered, while France received a slightly lower ranking. In contrast, firms rapidly entering the South European markets were slower to initiate activities in Western Europe.

Foreign entry forms

Among the firms within the sample, the forms used for entry into foreign markets varied. Still, the far most important entry form was independent, foreign agents or distributors, used by 87% of all firms. (Table 6:15)⁹⁵

Agents/distributors

The far most common entry form among firms in this study was independent, local agents or distributors, used by 83 firms.

The study made no separation between agents and distributors, but based on the results of the interview study, local distributors were found to be more common than local agents. Therefore, these results are expected to concern distributors to a higher extent than agents.

The average **number of markets** where firms used distributors or agents within the sample was 8.2, further indicating the importance of this entry form. (Table 6:16)

Still, the **relative importance** of distributors/agents varied for different markets. In some markets, e.g. Australia, Austria and Spain, distributor or agent agree-

Table 6:15 Foreign entry forms used

Entry forms	No. of firms	Percentage
Foreign agents/ distributors	83	87%
Direct exports	65	68%
Subsidiaries	42	44%
Licensing	10	11%
Export cooperation	3	3%
Piggybacking	7	7%
Other alternatives	7	7%
No. of observations = 95		

Table 6:16 Number of markets with local agents/distributors

No. of markets	No. of firms	Percentage
1-5 markets	20	24%
6-10 markets	33	40%
>10 markets	30	36%
No. of observations = 83		
Average no. of markets = 8.2		

⁹⁵ Due to the complexity of the survey, previous attempts to use a certain form has been included only for agents/ distributors, exports and subsidiaries. For other entry forms, the figures only give the number of firms using these alternatives in 1987. This may explain some of the differences in the above figures.

ments represented more than 70% of all entries made (71-74%). Remaining entries in these markets were basically export entries.

In other markets, e.g. the U.S., South Africa, the U.K., Brazil, Denmark and Italy, about half of the entries were based on distributor/agent establishments (45-56%). This lower share was explained either by a large number of export entries (e.g. in distant markets such as Brazil and South Africa) or by a large number of subsidiary establishments (e.g. in the U.K. and the U.S.).

An **average age** of 4.3 years at first foreign distributor or agent establishment was somewhat higher than corresponding figure for first export entry, but lower than average age at first foreign subsidiary establishment. (Table 6:17)

There was, however, a difference in average age at first distributor/agent relation between countries. It was lowest in the geographically closest markets, i.e. Finland, Denmark and Norway (4.6-5.5 years) and highest in the Netherlands, Canada, Italy and Portugal (8.6-9.3 years).

Another issue was the **establishment of contacts** with foreign distributors/agents. These contacts had been established in a number of different ways. The far most commonly used contact forms were personal contacts (79%) and requests from foreign firms (73%). Other relatively common alternatives were participation during trade shows and fairs and travelling abroad, while the Swedish Export Council and Export Chambers were less commonly used.

To study how well these different alternatives had functioned, firms were asked to evaluate them on a scale from 1 (very bad) to 5 (very good). According to this

evaluation, the best alternatives required close contacts, i.e. personal contacts or travelling abroad. (Table 6:18)⁹⁶

Most firms agreed that personal contacts had been more important during the first foreign entries, than later.

This indicates a greater propensity for an opportunistic selection of foreign markets during the earlier stages of internationalization. The distributor/agent used was usually a small, non-manufacturing firm. (Table 6:19)

In most cases, there was a formal **contract**, which regulated the distributor/agent relation. This contract usually specified exclusivity per country and use of firm brand name. Such agreements were lacking only in 5% of the cases, and unusual in another 8%. Product exclusivity and trial agreements were somewhat less common, i.e. lacking or unusual in 15 and 27% of the cases, respectively. (Number of observations varied between 62-73 firms)

Table 6:18 Contact alternatives and evaluation.

Contact alternative	No. of firms	Per- centage	Evaluation
1. Personal contacts	67	79%	4.3
2. Travelling abroad	47	55%	4.2
3. Requests	62	73%	3.6
4. Trade shows/fairs	50	59%	3.5
5. Export Chambers	26	31%	2.6
6. The Swedish Export Council	25	26%	2.6
No. of observations = 85			

Table 6:19 Type of distributors/agents used

a. Smaller size	No. of firms	Percentage
Always/often	44	59%
Sometimes	25	33%
Never/seldom	6	8%
No. of observations = 75		
b. Manufacturing	No. of firms	Percentage
Always/often	7	11%
Sometimes	25	38%
Never/seldom	34	52%
No. of observations = 66		

⁹⁶ Note that a firm could indicate more than one alternative.

The relation was often monitored via a number of different mechanisms, e.g. regular sales reports, visits, seminars and educational efforts. Still, the contact intensity varied between firms. To create a contact index, the frequency of contacts through the four mechanisms mentioned above (on a scale from 1 (never) to 6 (at least once a month)), was created. Among a total of 75 firms, this resulted in an index average of approximately 14, within a range from 8 to 24.

Almost 94% of the firms also had some direct contact with their final customers. Somewhat more than 25% of the firms even had relatively much direct contact.

Direct exports

In the sample, 65 firms used or had used direct exports to local customers as a mean to enter foreign markets. The average **number of export markets** entered, among the 20 economically closest or other important markets, was 4.6. This was less than the average number of agents/distributors, but more than the average number of subsidiaries. Still, the spread was large, i.e. between 1 and 20 export markets. (Table 6:20)

Table 6:20 No. of markets with direct exports

No. of markets	No. of firms	Percentage
1-5 markets	34	52%
6-10 markets	16	25%
>10 markets	15	23%
No. of observations = 65		
Average no. of markets = 4.6		

In absolute numbers, the markets where most firms had engaged in direct exports corresponded to the most commonly entered foreign markets. In relative terms, however, there was a slight difference. Comparing the number of export entries into a particular market with the total number of establishments (exports, agents/ distributors and subsidiaries) in that market, the **relative importance** of direct exports as a foreign establishment form was approximated for each market. This gave a high percentage of exports sales (41-59%) in South Africa, Brazil and Italy, but a low percentage (20-26%) in Norway, Spain, Australia, Austria and the U.K.

The average age of firms initiating exports activities was 3.4 years, with a spread in the sample between 0-21 years of age. (Table 6:21)

The average age at first exports also varied between different markets. The markets with the lowest average age at first exports (1.9-4.0 years), were the Scandinavian markets, i.e. Norway, Denmark and Finland. The highest average age (7.1-8.2 years), were more distant markets, e.g. Canada, Japan and South Africa.

Foreign subsidiaries

The third most important entry form in the sample, used by approximately 43% of all firms, was the establishment of foreign subsidiaries. Among these firms, the average number of foreign markets with subsidiaries was 2.3. About 50% of the firms had foreign subsidiary only in one single market. (Table 6:22)

Looking at specific markets, it was clear that subsidiaries were most common in the U.S., Great Britain and West Germany (20, 17 and 14 entries, respectively). The relative importance of subsidiaries in these markets, i.e. the number of subsidiary entries as a percentage of total number of entries using either exports, distributor/agent or subsidiaries, gave a similar picture (22%, 18% and 15%, respectively).

Table 6:21 Age at first direct export

Age	No. of firms	Percentage
0 years	21	32%
1-5 years	29	45%
6- years	15	23%
No. of observations = 65		
Average age = 3.4 years		

Table 6:22 Number of markets with foreign subsidiary

No. of markets	No. of firms	Percentage
1 market	20	49%
2-5 markets	19	46%
6- markets	2	5%
No. of observations = 41		
Average no. of markets = 1.0		

The **average age** of firms at the establishment of the first foreign subsidiary was slightly above 9 years. (Table 6:23)

Another question related to subsidiary establishments was the **type** of foreign establishments made. Unfortunately, the survey did not give a complete picture due to incomplete responses by some firms. Among the 98 subsidiaries indicated altogether, only 73 (74%) were more closely described. Another weakness was that the survey only gave the present situation, i.e. missing possible changes in ownership (e.g. wholly-owned, majority ownership or minority ownership), initial establishment form (Greenfield vs. acquisitions) and shifts in functions performed (e.g. local or international sales, after sales services, production, R&D, etc.).

Still, an indication of ownership and functions performed in 1987 was given by most firms. According to this, 8 firms had established subsidiaries as joint ventures with external partners. This represented 19% of all firms with foreign subsidiaries. Five of these firms had only one foreign joint venture, while one firm had used this strategy on at least 8 different occasions.

Concerning the functions performed, most subsidiaries were expected to perform sales and, possibly, after sales services functions only. Still, 13 firms indicated having at least one production subsidiary. Altogether, the number of production subsidiaries indicated in the survey represented 23% of the total number of subsidiaries. Similarly, 4 firms performed R&D functions in foreign subsidiaries, giving a total of 6% of all subsidiaries.

A further difference between foreign subsidiaries was the **size** of foreign activities, ranging from SEK 100 000 to SEK 850 millions.

Other entry forms

When looking at other entry forms, for example licensing, export cooperation and piggy-backing, the propensity to use them was slightly lower. However, due to weaknesses in the data, no direct comparisons with other entry forms can be made.

In retrospect, it would have been interesting to have more data on licensing, since this is often expected to be an important entry form for technology transfer. However, the case studies indicated a limited importance of licensing. In cases where licensing had been used, this was either a way to receive some compensation for technologies that would otherwise easily have been imitated, as the level of innovation was considered too low for patenting, or a way to reach restricted markets, e.g. in Eastern Europe.

In the mail survey, only 10 firms indicated that they were using licensing. Among them, at least 4 licenses had been sold to the U.S. and 2 to Japan. In one of the firms, the motivation was that the firm lacked resources to handle all product demand itself, particularly since a considerable amount of customer adaptation was required. Other markets where licensing had been used were Jugoslavia, Iraq, Iran, India, Singapore, New Zealand, Korea and Hungary.

Among 7 firms, the export organization of multinational Swedish firms had been used, Kockums, Swedish ABV, Götaverken, ASEA Stal and SKF. In some cases, the small firms had acted as sub-supplier to these firms, providing them with components to be included in larger project sales. Other types of export cooperation were less common, and used by only 3 firms. In those cases, the cooperations concerned markets of considerable distance, e.g. Guinea, Tanzania, China and Indonesia.

The establishment chain

Looking at the average age among firms initiating foreign activities using either direct exports (3.4 years), foreign agent/distributors (4.3 years) or subsidiary (9.0 years), there appears to be some support to the traditional establishment chain.

In a further attempt to investigate the relevance of the establishment chain, the percentage of firms using different sequences of establishment forms (exports, agent/distributors or subsidiaries) in individual markets was studied. (Table 6:24)

Within the sample, a total of 968 foreign market entries (exports, agent/distributor or subsidiary) were indicated. In most cases, firms used only one single establishment form in each market, usually agent/distributor or direct exports. This could, to some extent, be an effect of the limited size and age of most firms included in the sample.

It was also common for firms to use a combination of exports and agents. In 69 cases, agent/distributor establishments were preceded by export experience, while in 18 cases, a reversed sequence was indicated. Even more common (105 observations), however, was to initiate exports activities and establish an agent/distributor relation in a market during the same year⁹⁷.

There was also a certain difference in the sequence of entry forms in different foreign markets. In most markets, approximately three quarters of all firms used only one single type of entry form. However, some markets differed from this pattern. In Italy, Spain, Brazil and South Africa, for example, the percentage of firms relying on one entry form was slightly higher (81-89%), while in the U.K., the U.S. and Japan, this percentage was lower (60-70%)

Table 6:24 The establishment chain

Establishment form	No. of entries	Percentage
Only exports	166	17%
Only agent/distributor	515	53%
Only subsidiary	50	5%
Export and agent	192	20%
Exports and/or agent before subsidiary	34	4%
Other sequences	11	1%
TOTAL:	968	100%

⁹⁷ This may, in some cases, be the outcome of a certain confusion among the respondents concerning the difference between direct exports to an end-user and exports to the agent/distributor.

Concerning subsidiaries, it was interesting to note that only 35% of all establishments were preceded by direct exports or agent/ distributor agreements. Usually, none of these entry forms had been employed before a local subsidiary was established. In four cases, a combination of exports or agent and subsidiary was used during the initial year, while in six cases, a subsidiary was later followed by an agent agreement.

A difference in the propensity to use local subsidiaries as initial entry form into a market was found. In large, distant markets such as Japan and the U.S., for example, most subsidiary establishments were preceded by direct exports and/or agent/distributors agreements (75% and 60%). In the U.K. and West Germany, on the other hand, only 33% and 38% of all subsidiaries, respectively, were preceded by other entry forms.

Finally, the average establishment rank (MR) presented in the previous section, was used to analyze the sequence of market selection for each of the three entry forms, i.e. direct exports (MR-E), local representatives (MR-R) and subsidiaries (MR-D). In this analysis, markets with less than 5 entries were excluded. This resulted in shorter list for subsidiary establishments, since most subsidiaries were concentrated on a limited number of markets. (Table 6:25)

Overall, there appear to be a difference in market sequence, based on different entry forms. In markets of limited geographic distance, such as Norway, the rankings were higher using the MR-E or MR-R measures, than according to MR-D. Several European countries, e.g. West Germany, Switzerland, the Netherlands and Austria, received relatively high rankings on direct exports, but lower rankings for local representatives. Markets of greater distance received the highest rankings for local representatives, e.g. South Africa, Brazil and Argentina. Important industrialized countries, such as the U.S., West Germany and the U.K.⁹⁸, received high rankings for subsidiaries, but lower rankings for direct exports or local representatives.

⁹⁸ In a ranking of all markets, Australia also received a higher ranking based on subsidiary establishments.

Table 6:25 Ranking of markets according to mean establishment rank for direct exports (MR-E), local agents (MR-R) and subsidiaries (MR-D).

Export ranking (MR-E)	Representative ranking (MR-R)	Subsidiary ranking (MR-D)
1.61 Norway	1.90 Finland	1.60 U.S.
1.76 Denmark	2.00 South Africa	1.73 West Germany
2.07 West Germany	2.04 Norway	1.86 Finland
2.44 Finland	2.44 Denmark	1.94 U.K.
2.50 Switzerland	2.68 France	2.11 Norway
2.58 Netherlands	2.75 Brazil	2.67 France
2.79 Austria	2.86 U.K.	2.80 Japan
2.79 U.K.	2.88 Argentina	
3.15 France	3.00 Japan	
3.20 South Africa	3.04 West Germany	
3.25 Belgium	3.10 U.S.	
3.29 U.S.	3.46 Netherlands	
3.47 Canada	3.48 Switzerland	
3.64 Italy	3.55 Belgium	
3.90 Portugal	3.88 Austria	
4.25 Japan	3.97 Canada	
4.30 Spain	4.15 Australia	
4.45 Australia	4.24 Spain	
5.83 Brazil	4.50 Portugal	
	4.81 Italy	

In order to test the correlations between different entry forms, a matrix of Spearman rank correlations was developed. (Table 6:26)

According to these results, the ranking according to direct export differs very little from the ranking according to economic distance, i.e. firms appear to initiate direct exports in markets of limited economic dis-

Table 6:26 Spearman correlation coefficient matrix

		Economic distance	MR-E	MR-R	MR-D
Economic distance	-				
MR-E (n=19)	0.808	-			
MR-R (n=20)	0.322	0.526	-		
MR-D (n=7)	0.414	0.234	-0.306	-	

tance and then, successively, enter more distant markets. The correlations between economic distance and the rankings according to local representatives and subsidiaries is lower. This agrees with previous observations, that local representatives are common in most markets, including markets of greater economic distance, and subsidiaries in markets of large potential.

There is, however, a relatively high similarity in ranking of markets with direct exports and local representatives, while the correlation between direct exports and foreign subsidiaries is slightly lower. The main difference in ranking, however, concerns the use of local representatives and foreign subsidiaries, with a negative rank correlation indicating an opposite sequence in market selection between the two entry forms. This is interesting, since it indicates that the sequence of market entry is likely to differ, depending upon what type of entry mode is used. In the case of local subsidiaries, local market potential is particularly important for the same reasons that are expected to force small, technology based firms to go international, i.e. a minimum size of operation is necessary.

Evaluation of foreign activities

To make an evaluation of foreign activities, a few subjective questions regarding problems, perceived profitability, previous experience, expected results and plans for the future, were asked. According to these results, most firms appeared to be relatively happy with the situation.

The main problems during internationalization concerned the possibility to find suitable foreign representatives. Almost 58% of all firms had some problems in that area. About 35% had problems to get local market knowledge, while only 24% indicated problems to find financing.

In many cases, it had been possible to make use of previous experience of the founder or other persons within the firm during the process of internationalization. As many as 72% of the firms had been able to use previous industry experience during internation-

ization. Approximately 45% of all firms had been able to use previous contacts with local representatives or general knowledge about foreign markets, but only 8% were able to use financial contacts during the process.

Concerning perceived profitability, 46% of the firms indicated a good or very good profitability of foreign operations, while only 15% had a low or very low profitability. Comparing the achieved profitability with expected profitability of foreign operations, approximately 45% of the firms felt that the outcome corresponded to the expected result. Approximately 29% had received a higher than expected profitability, while 15% had received a lower one.

Looking at the firms' expectations for the future, most firms were very optimistic. Foreign sales volumes were expected to increase in 95% of the firms, and to stay the same in the remaining 5%. Export shares were expected to increase in 71% of the firms, to be stable in 25% and to be lower only in 4% of the firms. Similarly, the number of foreign markets covered by the firms was expected to increase in 74% of the cases, remain unchanged in 24% and diminish in only 2% of the firms.

The last question included in the questionnaire was an open-ended question, asking the firms what they would have done differently if they had started their internationalization in 1987. The intention was to find out what they had learnt in the process.

Among the 85 firms responding to the complete version of the questionnaire, 23 did not answer the question. Seven firms responded that they would do the same thing all over again, while the remaining firms gave a number of different aspects of what could have been done differently.

"Since I started this firm 5 years ago, I have continuously asked myself: If I had known six months ago what I know now.... ? To sum up - I would have looked for a job!"

When looking at the speed of internationalization, four firms felt that they should have invested more in the Swedish market before going abroad, while two firms would have

preferred a more rapid internationalization. One firm indicated that it would have attempted to get an approval within the Common Market as soon as possible.

Concerning market selection pattern, four firms argued that a concentration on a more limited number of markets would have been preferable. Others would have selected different markets.

Most regrets, however, were related to foreign establishment form. Eleven firms indicated that they should have used other entry forms, e.g. Swedish partners, joint ventures or subsidiaries. Ten firms felt that they had made insufficient evaluations of foreign agents.

"...be more careful when selecting an agent and demand some real efforts from him. As a small, newly established firm, you are so happy every time a foreigner wants to sell your product, that you don't make the demands you are entitled to with a good product."

Apart from that, several firms indicated that they should have made greater international commitments. Eight firms felt that they should have collected more information concerning markets and competitors before going abroad. Five firms responded that marketing efforts should have been greater, in terms of more PR, advertising and personal support, and four firms indicated that they should have known the language better.

"In many cases, it is better to do your homework before starting. The best way to solve problems is to take care of them before they arise."

Concerning the product line, some of the changes that were expected to have facilitated internationalization were increased concentration, diversification, standardization, increased customer involvement and more readily developed products.

Finally, certain organizational changes were suggested, such as a postponed establishment, to avoid initial losses, and better planning/ structure of the firm.

Summary

In this chapter, the internationalization process of the firms included in the mail survey was presented. All firms have relatively rapidly engaged in foreign activities, with an average age at first foreign entry of 3.2 years, which is partly explained by the selection criteria used, i.e. establishment after 1965 and at least 20% foreign sales.

The foreign markets most commonly entered are geographically close markets or industrialized countries of large size, e.g. West Germany, the U.K., France and the U.S. Using two alternative measures, the ranking of markets according to entry sequencing did not differ more than marginally with the ranking according to "economic distance" made by Hörnell et. al. (1973). However, the ranking of markets according to importance yielded a slightly different result. Larger markets, like West Germany, the U.S. and Japan, received higher ranking, while small European markets received lower ones.

When looking at the market selection sequence of individual firms, however, a slightly different pattern occurred. First, firms tended to enter "clusters" of foreign markets, rather than one foreign market at the time. Second, depending upon what markets were initially entered, the subsequent sequence differed. For example, a more traditional pattern was found among firms with an initial entry into the Scandinavian markets, but other sequences were common among firms with initial entries into other geographic areas.

Besides, the motives for market selection differed between with type of markets. The main motives for entering the Nordic countries were a limited geographic distance and ad hoc factors, such as local contacts or orders received. Entries into larger markets, on the other hand, were more often strategically motivated, e.g. market potential, access to advanced customers or competition.

Concerning foreign entry form, the most commonly used form was local representatives. Still, the possibility to identify local representatives was considered to be the main problem during internationalization. In many cases, contacts had been established based on opportunistic behaviour, through personal contacts, requests from local firms or during travelling. These alternatives were also considered to have worked relatively well. Among the limited number of firms using formal information channels, e.g. local Export Chambers or the Swedish Export Council, satisfaction with the outcome was lower.

The propensity to use local representatives varied with local market characteristics. The relative importance of local representatives, for example, was greatest in some markets, e.g. Australia, Austria and Spain, while direct export dominated in others, e.g. South Africa, Brazil and Italy. Local subsidiaries, finally, dominated in markets of large potential, like the U.S., the U.K. and West Germany. Similarly, the sequence of foreign market entry differed when different entry forms were used. Norway and Denmark, for example, received lower rankings according to sequence of foreign subsidiary establishment than according to sequence of direct export entry. The U.S. and the U.K. received considerably higher rankings according to sequence of subsidiary establishment.

Among firms with foreign subsidiaries, more than 60% had established foreign subsidiaries without any previous experience via direct export or local representatives. A high level of local market commitment is common at an early stage of internationalization, particularly in the European market. However, in markets of greater distance, such as Japan and the U.S., the traditional establishment chain appear to be valid.

Overall, certain variations in internationalization behaviour have been identified. In the following chapter, an analysis of internationalization in terms of speed, pattern and entry form, based on differences in internal firm characteristics and industry structure, is presented.

7. TESTING THE HYPOTHESES

Introduction

In this chapter, an attempt is made to test the hypotheses developed in chapter 4. First, the methods of analysis are described. The statistical methods are presented and an operationalization of dependent variables employed is made. Second, a number of bi-variate analyses are undertaken, to investigate the impact of specific internal firm characteristics and industry variables on internationalization behaviour. Third, a number of multi-variate analyses are made, to test the combined impact of several explanatory variables simultaneously on speed of foreign entry, market selection pattern and foreign entry form.

Methods of analysis

Statistical methods employed

For analysis of survey data, a number of different methods of analysis were employed. First, dependent variables were classified into two or three categories and a number of bi-variate analyses were made. In cross tabulations, Kendall's Tau-B or Chi-square values were used to establish simple associations between dependent and explanatory variables, measured on an ordinal or nominal scale. In cases where the dependent variable was measured on a nominal or ordinal scale, but the dependent variable on an interval scale, t-tests were undertaken.

Second, multi-variate analysis were made to investigate the combined impact of several explanatory variables simultaneously. When the dependent variable was measured on an interval scale, multiple regression analyses were undertaken and when the dependent variable was measured on a nominal scale, logit analyses were made.

Speed of foreign entry

In order to measure speed of internationalization, three dependent variables were used, i.e. firm age at first foreign entry and the number of years required from first foreign entry until 5 foreign markets had been entered. An alternative measure of speed is the number of markets entered within 3 years from first foreign entry, indicating how rapidly the firm has increased its foreign commitment. However, as indicated before, the different dimensions of internationalization are not independent. The second variable could also be viewed as a measure of foreign market selection pattern, by indicating the market diversification strategy employed. Therefore, this variable is described in the section concerning the pattern of foreign market selection below.

Age at first foreign entry: The first measure of speed employed in this study was absolute firm age at first foreign entry, using either direct exports, local representatives or subsidiary. One problem when using this variable was its correlation with the firm's absolute age⁹⁹. Due to the selection criterion of at least 20% of foreign sales, younger firms were not included in the study unless they had rapidly gone international. Older firms, on the other hand, had more time to reach the inclusion criterion.

There were also certain validity problems when using age as an explanatory variable. When a firm was established as a spin-off from a university or another firm, the business idea could be fairly well developed at the time of establishment. In those cases, the main part of product development might have been undertaken already before the firm was established. In other cases, an extended period of product development might have been required before a commercialization was initiated.

Due to these problems, absolute age at the time of first foreign entry might differ considerably between firms, even if they have all initiated foreign activities soon after the main product was developed. To correct for these problems, an alternative measure would be the number of years between the year of commercializing the main product,

⁹⁹ Pearson correlation coefficient = 0.427 ***

first overall sales, and the year of first foreign sales. In this analysis, however, no such correction was made, due to a lack of data concerning the date of first product commercialization.

An alternative way to handle this problem would be to treat age as a confounding variable and control for it, by undertaking the analyses on subgroups of different age categories. This, however, would reduce the number of observations in each analysis to a point where little can be said about possible variations due to differences in explanatory variables.

A final approach would be to treat age as an unrelated or randomized variable. This would be an appropriate solution if no systematic correlations between age and explanatory variables are found. However, age is correlated with some of the explanatory variables, e.g. R&D expenditures as a percent of turnover, perceived customer awareness and number of product applications¹⁰⁰. Still, this alternative has been employed, since the number of explanatory variables correlated with age is limited.

In bi-variate analyses, age at first foreign entry was classified into three categories, i.e. 0-1 year, 2-5 years and more than 5 years of age. In multiple regression analyses, however, absolute age was used as dependent variable.

Number of years until 5 foreign markets were entered: The second measure of speed of internationalization was the number of years required from first foreign entry until five foreign markets had been entered. In 10 cases, this variable was missing, since less than 5 foreign markets had been entered by the time of the study. However, opposite to what was expected, this measure was also highly correlated with firm age¹⁰¹.

In bi-variate analyses, this variable was classified into three categories, i.e. firms entering five foreign markets within one years from first foreign entry, firms requiring 2-5 years

¹⁰⁰ Pearson correlation coefficient = -0.234 **, 0.337 *** and -0.220 **

¹⁰¹ Pearson correlation coefficient = 0.488 ***

to enter five markets and firms requiring more than five years to enter five markets. In the multi-variate analysis, however, the absolute number of years was used.

Foreign market selection pattern

To study pattern of foreign market selection, three dependent variables were used, i.e. number of foreign markets entered within 3 years, sequence of market selection and entry into the U.S. market. The second of these variables could also be used to indicate the speed of foreign market commitment. The last variable, actual entry into the U.S. market, was used as an indication of market selection based on strategic considerations.

No. of markets entered within 3 years: The number of foreign markets entered within a certain amount of time from first foreign entry is used to indicate how seriously the firm is willing to commit itself to foreign activities, once foreign entry had been made.

Since a firm may need some time to evaluate initial foreign activities before other projects are started, at least 3 years were expected to be required before the intention to continue internationally was shown in an increased number of foreign market entries. Due to this, a market concentration/diversification strategy was measured as the number of foreign markets entered within 3 years from first foreign entry.

In bi-variate analyses, the number of foreign markets entered within 3 years from first foreign entry was classified into two groups, firms with less than 5 foreign markets, indicating a market concentration strategy, and firms with 5 foreign markets or more, indicating a market diversification strategy. In multiple regression analyses, however, the absolute number of foreign markets was used as dependent variable.

Sequence of market selection: In order to investigate the sequence of market selection, a Pearson correlation coefficient indicating the correlation between firm age at first entry into a market and "economic distance"¹⁰²ⁿ to the market, was calculated. This is an

¹⁰² As defined by Hörnell et. al. (1973)

approximation, since economic distance is measured on an ordinal rather than an interval scale, as requested for a Pearson correlation analysis.

A weakness with this measure is the limited number of foreign markets entered by certain firms. In cases where less than 3 foreign markets have been entered, the value of this variable was set as missing.

In the bi-variate analysis, firms with a positive Pearson correlation coefficient, significant at a 10%-level, were classified as following a traditional sequence of market entry, based on the concept of "economic distance". Other firms have been classified as following a non-traditional sequence. This, however, is a simplification, since the latter group consist of firms with negative as well as positive, although not statistically significant, Pearson correlation coefficients. Therefore, this variable was considered too imprecise to permit more advanced analyses, i.e. no multi-variate analysis has been made.

Entry into the U.S.: Third, in an attempt to investigate the propensity to select foreign markets based on strategic considerations, entry into the U.S. market was used as an approximation. The reason for using the U.S. market as an indicator of a strategic market selection was that this market was often considered as an important market among the firms in the study. Besides, the U.S. market is often expected to be of particular importance, due to its size and sophisticated demand structure. In the case studies, several firms indicated an importance to enter this market either to gain access to advanced customers or to exploit local technology. In order to compare firms active in the U.S. with other firms, a logit analysis was undertaken.

An alternative would be to study entries into the West German market, since this is also a market of great importance to many firms in the study. However, it is difficult to assess whether this market has been entered due to strategic considerations or due to a limited "economic distance".

Foreign entry form

To investigate the selection of foreign entry forms, two dependent variable were used, i.e. actual use of foreign subsidiaries and timing of foreign subsidiary establishment.

Use of foreign subsidiary: The material was classified into two categories, firms with subsidiaries and other firms, since it was expected that the initial decision to use this entry form is more important than subsequent decisions to increase the number of foreign subsidiaries¹⁰³. Such a distinction was considered enough to test the hypotheses concerning propensity to use entry forms of higher levels of foreign commitment.

Similar analyses could, of course, be made of other entry forms, for example, the usage of direct exports or local representatives¹⁰⁴. Still, it was expected that such an analysis would have a limited explanatory value, for different reasons. First, initial direct export is often expected to be a result of opportunistic behaviour, while the establishment of a subsidiary indicates a more strategic commitment to foreign activities. Second, local representatives are used by virtually all firms included in the study, making it difficult to draw any conclusions concerning propensity to use this entry alternative.

Timing of subsidiary: The second dependent variable was timing of foreign subsidiary establishment, i.e. the time lag between first foreign activities and the initial subsidiary establishment among firms with at least one foreign subsidiary. Even if this measure excludes all firms presently not using this entry alternative, it makes it possible to distinguish between firms that rapidly engaged in a higher level of foreign commitment and firms that started foreign subsidiaries after a longer period of foreign experience.

¹⁰³ Since the sample only includes young firms, the average number of foreign subsidiaries is low, i.e. 1 foreign subsidiary/ firm

¹⁰⁴ Concerning licensing, export cooperation or piggy-backing, question 2.2 indicated only the use of these alternatives in 1987, not if they had previously been used. Therefore, these results would not be comparable with the others.

In bi-variate analyses, this variable was classified into two categories, firms starting foreign subsidiaries within less than 5 years from first foreign sales, and others. In the multi-variate analysis, however, absolute number of years with foreign activities before the establishment of a first foreign subsidiary, was used.

Explanatory variables

During the initial bi-variate analyses, the impact of firm size, ownership structure, previous experience, technology intensity, product characteristics, marketing requirements, industry classification and industry structure was investigated, using the original variables, as defined in chapter 5. Matrixes of associations between these variables and internationalization behaviour are presented in Appendix V.

For the following multi-variate analyses, however, it was not possible to include all variables simultaneously, since a large number of variables are likely to yield a limited explanatory value of a model. In order to reduce the number of variables in each category, five factor analyses have been undertaken. The outcome of these analyses is presented in Appendix VI. The factor scores of the variables created by the factor analyses were then included in multi-variate analyses, in combination with a dummy-variable, i.e. ownership structure, and two measures of product technology, i.e. level of technology and level of innovation, measured on five-point Likert scales. (Table 7:1)

During the following multi-variate analyses, these variables have been included in a basic model to explain internationalization behaviour of firms. The correlations between the different explanatory variables are presented in a Pearson correlation matrix in Appendix VII.

Table 7:1 Variables included in multi-variate analyses

Variable	Name	Explanation	
Firm size	SIZE	Factor based on turnover (+), no. of employees (+)	
Ownership	AGTYPE	Dummy 0 = private 1 = corporate	
Experience		Factors based on:	
- industry	IEXP	local representatives contacts (+) and general industry knowledge (+)	
- local	FEXP	local market experience (+)	
Technology intensity		Factors based on:	
- R&D intensity	INTENS	R&D cost/turnover (+), R&D costs/employee (+), percent of R&D employees (+)	
- no. of patents	PATENTS	number of patents; total (+) and in 1987 (+)	
Technology level	HIGH	Level of product technology (1 = low, 5 = high)	
Innovation level	INOVA	Level of product innovation (1 = low, 5 = high)	
Marketing requirements		Factors based on:	
- educations needs	ED	importance of technological sales personnel (+) and customer education (+)	
- local adaptations	ADAPT	importance of local adaptation (+), credit (+) and low price (+)	
- image creation	IMAGE	importance of after sales service (+), brand name (+) and low price (-)	
Industry structure		Factors based on:	
- stage of development	STAGE	no. of competitors (+), level of customer awareness (+), market growth (-)	
- market potential	POT	no. of applications (+), no. of end-users (+), market growth (+)	

Internal firm characteristics

Hypotheses 1-3: Firm size

To investigate the impact of firm size¹⁰⁵ on the process of internationalization, firms were classified into three categories, i.e. very small, small and medium-sized firms. Firm size was then correlated with internationalization behaviour, using a Kendall's Tau-B matrix¹⁰⁶.

Based on these results, no correlation between firm size and speed of internationalization in terms of age at first foreign entry, was found. However, a weak correlation between size and number of years required to entered five foreign markets was identified. (Table 7:2)

Opposite to what was expected, a higher speed of internationalization, in terms of number of years required to enter five foreign markets, was found among smaller firms, i.e. hypothesis 1 has to be rejected. This result is slightly

Table 7:2 Number of years required to enter five foreign markets by firm size (column percentages)

No. of years required	Turnover (SEK)		
	< 20 million	20-50 million	> 50 million
0-1 year	11 (31%)	6 (27%)	5 (22%)
2-5 years	22 (61%)	12 (54%)	10 (43%)
> 5 years	3 (8%)	4 (18%)	8 (35%)
No. of observations	= 81		
Kendall's Tau-B	= 0.187 *		
No. of employees			
No. of years required	> 50 persons		
	persons	persons	persons
0-1 year	11 (33%)	4 (19%)	7 (36%)
2-5 years	20 (61%)	14 (67%)	10 (37%)
> 5 years	2 (6%)	3 (14%)	10 (37%)
No. of observations	= 81		
Kendall's Tau-B	= 0.218 **		
* = 10% level of significance			
** = 5% level of significance			

¹⁰⁵ measured as turnover (SEK) or number of employees in 1987

¹⁰⁶ See Tables 1 and 2 in Appendix V

surprising, since it indicates that smaller firms tend to be quicker than larger ones to expand their foreign activities.

Concerning pattern of foreign market selection, no significant variations were found, and **hypothesis 2** could not be supported. This, however, does not necessarily mean that firm size does not influence this dimension of internationalization. Rather, it may be an outcome of the fairly homogeneous sample in terms of firm size, with most firms being either small or medium-sized.

When looking at foreign entry form, the timing of subsidiary establishment did not vary with firm size, but the propensity to establish foreign subsidiary was higher in firms of larger size. (Table 7:3)

The average number of employees was slightly higher among firms using foreign subsidiaries in 1987 (78 persons) than among firms lacking subsidiaries (40 persons).¹⁰⁷ In terms of turnover, a similar, although not statistically significant result, was found (SEK 122 millions

Table 7:3 Propensity to use subsidiaries by firm size (column percentages)

	Turnover (SEK)		
	< 20 million	20-50 million	> 50 million
Firms without subsidiaries	31 (76%)	14 (48%)	11 (44%)
Firms with subsidiaries	10 (24%)	15 (52%)	14 (56%)
No. of observation = 95			
Kendall's Tau-B = 0.268 ***			
	No. of employees		
	< 20 persons	20-50 persons	> 50 persons
Firms without subsidiaries	29 (73%)	13 (54%)	14 (45%)
Firms with subsidiaries	11 (27%)	11 (46%)	17 (55%)
No. of observations = 95			
Kendall's Tau-B = 0.230 **			
* = 10% level of significance			
** = 5% level of significance			
*** = 1% level of significance			

¹⁰⁷ T-value = 1.924, p = 0.057

vs. SEK 33 millions).¹⁰⁸ Overall, these results support the expected relationship between firm size and level of foreign commitment of **hypothesis 3**.

Hypotheses 4-6: Ownership structure

Next, the impact of ownership structure was investigated. In these analyses, ownership was divided into two types: purely private ownership and firms with at least 10% corporate ownership. Based on a number of cross-tabulations, a matrix including the chi-square values was developed¹⁰⁹.

The expectation of **hypothesis 4**, that speed of internationalization is likely to be higher among firms with corporate owners, was partly supported. Even if the number of years required to reach five foreign markets did not show any variations due to ownership structure, it was found that firms with corporate ownership tended to be younger at the time of their first foreign activities. (Table 7:4)

Table 7:4 Speed of internationalization by ownership structure (column percentages)

Age at first foreign entry	Ownership structure	
	Privately owned	Corporate owners
0-1 years	14 (34%)	22 (52%)
2-5 years	14 (34%)	16 (38%)
> 5 years	13 (32%)	4 (10%)
No. of observations = 83		
Chi-square value = 6.665 **		
* = 10% level of significance		
** = 5% level of significance		
*** = 1% level of significance		

A significant difference in absolute age at first foreign entry between the categories was found. The average age at the time of the first foreign entry was 2.3 years among firms with corporate ownership, and 4.2 years among privately owned firms.¹¹⁰

¹⁰⁸ T-value = 1.924, P = 0.112

¹⁰⁹ See Tables 3 and 4 in Appendix V

¹¹⁰ T-value = 2.417, p = 0.018

There is, however, a problem concerning the interpretation of these results. Since it is not known at what point in time the external owner entered the firm, I cannot tell anything about the direction of the relationship. On the one hand, firms engaged in international activities might be forced to invite external owners in order to raise the capital required for an international penetration. An external owner may, on the other hand, stimulate the firm to investigate the international alternative, by providing the managerial and/or financial resources required.

When investigating the pattern of foreign market selection in terms of sequence and diversification, no statistically significant influence of ownership structure was found. Still, firms active in the U.S. were more often characterized by a partial or complete corporate ownership. (Table 7:5)

Table 7:5 Propensity to enter the U.S. market by ownership structure (column percentage)

	Ownership structure	
	Privately owned	Corporate owners
Firms not active in the U.S.	20 (47%)	12 (29%)
Firms active in the U.S.	22 (53%)	30 (71%)
No. of observations = 84		
Chi-square value = 3.231, p = 0.072		

Although this does not necessarily imply a less traditional pattern of foreign market selection, an external owner appears to facilitate entry into markets of strategic importance, e.g. large, distant market such as the U.S., where costs of market entry are likely to be high. Due to this, **hypothesis 5** could only be partly supported.

When looking at the propensity to use a particular entry form, privately owned firms were less likely to use foreign subsidiaries than firms with corporate ownership, as expected in **hypothesis 6**. This observation could, however, not be statistically supported on a 10% level of significance.

(Table 7:6)

On a 15% level of significance, however, the expectation of a higher propensity to use more committed forms of foreign activities among firms with corporate owners was supported. Timing of foreign subsidiary establishment did not vary with ownership structure.

Table 7:6 The propensity to use different entry modes by ownership structure (column percentages)

	Ownership structure	
	Privately owned	Corporate owners
Firms without subsidiaries	28 (67%)	21 (50%)
Firms with subsidiaries	14 (33%)	21 (50%)
No. of observations = 84		
Chi-square value = 2.400, p = 0.121		

Hypotheses 7-8: Previous experience

Based on cross-tabulations, the impact of previous experience on internationalization behaviour was investigated¹¹¹. The results indicated hypothesis 7 could be partly supported, i.e. speed of foreign entry was higher among firms with certain types of experience. (Table 7:7)

These results indicate that firms with established contacts with representatives or general industry knowledge are significantly younger at the time of their first foreign entry. When looking at absolute age at first foreign entry, the average age was slightly above two years among firms with established contacts with representatives, compared to four years among other firms.¹¹² Similarly, firms with general industry knowledge were younger than firms lacking such knowledge at the time of first foreign entry, i.e. an average of 2.7 years, compared to 4.4 years.¹¹³ The other speed measure, i.e. the number of years required to enter five foreign markets, did not vary with previous experience.

Table 7:7 Speed of internationalization by previous experience (column percentages)

Contacts with representatives		
Age at first foreign entry	No	Yes
0-1 years	12 (27%)	25 (64%)
2-5 years	22 (49%)	8 (21%)
> 5 years	11 (24%)	6 (15%)

No. of observations = 84
Chi-square value = 12.205, p = 0.002

Industry knowledge		
Age at first foreign entry	No	Yes
0-1 years	6 (25%)	31 (52%)
2-5 years	12 (50%)	18 (30%)
> 5 years	6 (25%)	11 (18%)

No. of observations = 84
Chi-square value = 5.064, p = 0.079

¹¹¹ See Tables 3 and 4 in Appendix V

¹¹² t-value = 2.240 **

¹¹³ t-value = 1.853 *

The first variation in pattern of foreign market selection due to previous experience concerned access to financial contacts. Strangely enough, this result indicated a more sequential market selection pattern among firms with previous financial contact.¹¹⁴ The limited number of firms with such experience, however, reduces the explanatory value of the observation. The second finding concerned the impact of previous industry experience on the propensity to enter the U.S. market. Once again, a surprising find was made, i.e. the propensity to enter the U.S. market was lower among firms with previous industry experience. (Table 7:8) Overall, the expected relation of management of **hypothesis 8** could not be supported.

Concerning foreign entry form, no relationship with previous experience of management had been hypothesized and no relationships were found in the analyses made.

Hypotheses 9-11: R&D intensity

The next question concerned the impact of R&D intensity on internationalization. Using a Pearson correlation coefficient matrix, correlations between speed and R&D intensity, i.e. R&D expenditures as a percent of total turnover, number of R&D employees as a percent of total work force - excluding production, R&D expenditures per employee and number of patents, were investigated¹¹⁵. None of the technology intensity measures were significantly correlated with speed of internationalization, i.e. the expected relation of **hypothesis 9** could not be supported.

Table 7:8 Propensity to enter the U.S. market by previous experience (column percentage)

	Industry knowledge	
	No	Yes
Firms not active in the U.S.	5 (21%)	27 (44%)
Firms active in the U.S.	19 (79%)	35 (56%)
No. of observations = 85		
Chi-square value = 4.028, p = 0.045		

¹¹⁴ Chi-square value = 3.861, p = 0.049

¹¹⁵ See Tables 5 and 6 in Appendix V

Looking at pattern of foreign market selection, a number of t-tests indicated that a market diversification strategy was associated with a slightly higher level of technology intensity. Based on these findings, **hypothesis 10** was partly supported. (Table 7:9)

Table 7:9 Propensity to use market concentration/diversification by R&D intensity

	R&D costs/ employee	R&D costs/ turnover	R&D personnel/ work force	Number of of patents
Market concentration (n=38)	SEK 50.000	5.8%	18%	1.4
Market diversification (n=50)	SEK 80.000	9.8%	27%	2.2
T-values =	1.902	1.904	2.576	1.100
p =	0.058	0.060	0.012	0.275

When comparing firms following a sequential pattern of market selection with other firms, no variations in R&D intensity were found. Similarly, R&D intensity appeared to be of limited importance to explain entries into the U.S. market.

Concerning the choice of foreign entry form, no correlations with R&D intensity were found, i.e. the expectation of **hypothesis 11** could not be supported.

Hypotheses 12-14: Product characteristics

To investigate the impact of product characteristics on internationalization behaviour, a correlation matrix using Kendall's Tau-B was developed¹¹⁶. The only statistically significant correlations between product characteristics and the speed of internationalization concerned level of technological innovation. (Table 7:10)

¹¹⁶ See Tables 1 and 2 in Appendix V

Table 7:10 Speed of internationalization by technology characteristics (column percentage)

		Product level of innovation				
Age at first foreign entry	1 = low	2	3	4	5 = high	
0-1 years	9 (53%)	6 (46%)	8 (42%)	12 (50%)	6 (30%)	
2-5 years	7 (41%)	5 (38%)	7 (37%)	6 (25%)	8 (40%)	
> 5 years	1 (6%)	2 (15%)	4 (21%)	6 (25%)	6 (30%)	
No. of observations	= 93					
Kendall's Tau-B	= 0.143 *					
		Product level of innovation				
No. of years required	1 = low	2	3	4	5 = high	
0-1 years	8 (47%)	7 (30%)	4 (23%)	1 (9%)	2 (15%)	
2-5 years	7 (41%)	11 (48%)	11 (65%)	8 (73%)	7 (54%)	
> 5 years	2 (12%)	5 (22%)	2 (12%)	2 (18%)	4 (31%)	
No. of observations	= 81					
Kendall's Tau-B	= 0.207 **					
* = 10% level of significance						
** = 5% level of significance						
*** = 1% level of significance						

An explanation for these seemingly conflicting observations may be that a firm providing technological innovations requires a certain time to develop the product before a prototype can be presented to the customer and internationalization can be initiated. Once internationalization has started, innovative firms are able to rapidly expand their foreign activities into several markets during early stages of industry development. Based on these findings, the expected relation between product technology and speed of internationalization of **hypothesis 12** could only partly be supported.

When looking at patterns of market selection, a few correlations with product characteristics were found. A market diversification strategy, for example, was slightly more common among firms with standardized and complex products. (Table 7:11)

Table 7:11 Propensity to use market concentration/diversification by product characteristics (column percentage)

	Level of standardization				
	1 = low	2	3	4	5 = high
Market concentration	15 (58%)	9 (39%)	8 (40%)	4 (36%)	2 (25%)
Market diversification	11 (42%)	14 (51%)	12 (60%)	7 (54%)	6 (75%)
No. of observations = 88					
Kendall's Tau-B = 0.169 *					
	Level of product complexity				
	1 = low	2	3	4	5 = high
Market concentration	4 (67%)	4 (44%)	15 (63%)	8 (38%)	2 (14%)
Market diversification	2 (33%)	5 (56%)	9 (37%)	13 (62%)	12 (86%)
No. of observations = 74					
Kendall's Tau-B = 0.277 **					
* = 10% level of significance					
** = 5% level of significance					
*** = 1% level of significance					

When looking at market sequencing, firms with a high level of technology, complex products and low transportation costs were less likely to follow a sequential market selection pattern. (Table 7:12)

Table 7:12 Propensity to use a sequential market selection pattern product characteristics (column percentages)

		Level of product technology				
		1 = low	2	3	4	5 = high
Non-sequential pattern	0	4 (57%)	10 (45%)	11 (58%)	19 (70%)	
Sequential pattern	1 (100%)	3 (43%)	12 (55%)	8 (42%)	8 (30%)	
No. of observations = 76						
Kendall's Tau B = -0.185 *						
		Level of product complexity				
		1 = low	2	3	4	5 = high
Non-sequential pattern	3 (75%)	4 (44%)	9 (45%)	12 (71%)	10 (77%)	
Sequential pattern	1 (25%)	5 (56%)	11 (55%)	5 (29%)	3 (23%)	
No. of observations = 63						
Kendall's Tau-B = -0.189 *						
		Transportation costs				
		1 = low	2	3	4	5 = high
Non-sequential pattern	2 (100%)	3 (75%)	16 (64%)	18 (53%)	5 (45%)	
Sequential pattern	0	1 (25%)	9 (36%)	16 (47%)	6 (55%)	
No. of observations = 76						
Kendall's Tau-B = 0.176 *						
* = 10% level of significance						
** = 5% level of significance						
*** = 1% level of significance						

Among firms active in the U.S., products were characterized by slightly higher levels of technology, innovation and software content. (Table 7:13)

Table 7:13 Propensity to enter the U.S. by product characteristics (column percentages)

Level of technology					
	1 = low	2	3	4	5 = high
Firms not active in the U.S.	1 (33%)	3 (43%)	14 (66%)	8 (35%)	11 (30%)
Firms active in the U.S.	2 (67%)	4 (57%)	11 (44%)	15 (65%)	26 (70%)
No. of observations = 95					
Kendall's Tau-B = 0.158 *					
Level of innovation					
	1 = low	2	3	4	5 = high
Firms not active in the U.S.	9 (53%)	8 (62%)	11 (65%)	4 (15%)	4 (20%)
Firms active in the U.S.	8 (47%)	5 (38%)	9 (45%)	20 (83%)	16 (80%)
No. of observations = 94					
Kendall's Tau-B = 0.299 ***					
Software content					
	1 = low	2	3	4	5 = high
Firms not active in the U.S.	10 (56%)	4 (25%)	13 (41%)	0	0
Firms active in the U.S.	8 (44%)	12 (75%)	19 (59%)	7 (100%)	1 (100%)
No. of observations = 74					
Kendall's Tau-B = 0.199 **					

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

Overall, these findings support **hypothesis 13**, i.e. that firms providing "high technology" products are likely to follow a less traditional pattern of foreign market selection.

When studying the impact of product characteristics on entry form, no correlations with the propensity to use foreign subsidiaries were found. However, firms with standardized products were slightly quicker to establish foreign subsidiaries than others. Still, the expected relation of **hypothesis 14** could not be supported.

Hypotheses 15: Marketing requirements

No hypothesis about the impact of marketing requirements on speed of inter-nationalization has been developed and no statistically significant results were achieved during analysis¹¹⁷. Similarly, no relationship with pattern of foreign market selection has been hypothesized. Still, a diversified market selection pattern was slightly more common among firms considering after sales services and customer education was of importance, while a less sequential pattern was common in cases where brand name was important. Among firms active in the U.S., technologically knowledgeable sales personnel and customer education are considered to be more important marketing requirements than among other firms.¹¹⁸

Concerning foreign entry forms, **hypothesis 15** was supported. The propensity to use subsidiaries was slightly higher in cases where customer education and brand name were considered important, indicating a higher need for personal marketing¹¹⁹. Also, foreign subsidiaries were established at an earlier point in time among firms requiring personal support, in terms of after sales services and customer education¹²⁰. In terms of general marketing activities, these firms indicated a higher importance of high quality and brand name, while a low price was not considered important.¹²¹

¹¹⁷ See Tables 1 and 2 in Appendix V

¹¹⁸ Kendall's Tau-B = 0.212 ** and 0.219 **

¹¹⁹ Kendall's Tau-B = 0.188 * and 0.190 *

¹²⁰ Kendall's Tau-B = -0.348 ** and -0.434 ***

¹²¹ Kendall's Tau-B = -0.288 **, -0.322 ** and 0.370 ***

Contextual variables

Industry classification

In this section, the internationalization behaviour of firms in different industries is investigated, using a number of cross-tabulations¹²². However, no statistically significant differences in speed of internationalization or pattern of market selection between industries were found. However, the propensity to use different entry forms varied between industries. (Table 7:14)

Table 7:14 Propensity to use different entry forms by industry classification (column percentages)

	Industry classification			
	Chemistry	Machinery	Electronics	Instruments
Firms without subsidiaries	9 (90%)	19 (58%)	14 (61%)	5 (33%)
Firms with subsidiaries	1 (10%)	14 (42%)	9 (39%)	10 (67%)
No. of observations = 81				
Chi-square value = 8.032, p = 0.045				

The propensity to use foreign subsidiaries is lowest among chemical firms. Among instrument/optical firms, the propensity to use foreign subsidiaries is higher than in other industries. Among machinery and electronic firms, finally, the propensity to use subsidiaries was slightly lower than among instrument/optical firms. These variations may, to a certain extent, be explained by differences in industry structure.

¹²² See Tables 3 and 4 in Appendix V

Hypotheses 16-19: Industry structure

Since it was expected that analysis on the industry level may often be too imprecise to understand the impact of industry structure on internationalization behaviour, the previous analysis was complemented with an analysis on the firm level. In order to investigate the influence of industry structure, five industry variables were used, i.e. level of customer awareness, number of competitors, market growth, number of application areas and number of end-users. During analyses, the first two variables were used as proxies for industry stage of development, while the other three were used as proxies for market potential¹²³.

When looking at speed of foreign entry, no initial hypothesis concerning expected impact of industry structure has been developed. However, some interesting results have been found. (Table 7:15)

Table 7:15 Speed of internationalization by industry structure (column percentages)

Age at first foreign entry	Market growth				
	1 = low	2	3	4	5 = high
0-1 years	1 (50%)	4 (67%)	15 (48%)	16 (40%)	5 (33%)
2-5 years	1 (50%)	2 (33%)	10 (32%)	16 (40%)	4 (27%)
> 5 years	0	0	6 (19%)	8 (29%)	6 (40%)

No. of observations = 94
Kendall's Tau-B = 0.171 *

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

¹²³ See Tables 1 and 2 in Appendix V

This indicates that the speed of internationalization, in terms of age at first foreign entry, is slightly lower in industries characterized by high levels of market growth, which agrees with the idea that firms active in growing markets are more likely to expand in their home market for some time before foreign activities are initiated. When looking at speed of internationalization in terms of number of years required to enter 5 foreign markets, the speed was higher when the levels of customer awareness and competition were low, i.e. during early stages of industry development. (Table 7:16)

Table 7:16 Number of years required to enter five foreign markets by industry characteristics (columns percentages)

No. of years required	Customer awareness				
	1 = low	2	3	4	5 = high
0-1 years	2 (40%)	5 (45%)	4 (21%)	7 (22%)	4 (29%)
2-5 years	3 (60%)	6 (55%)	12 (63%)	17 (53%)	6 (43%)
> 5 years	0	0	3 (16%)	8 (25%)	4 (29%)

No. of years required	Level of competition				
	1 = low	2	3	4	5 = high
0-1 years	3 (60%)	5 (28%)	10 (36%)	3 (16%)	1 (10%)
2-5 years	2 (40%)	9 (50%)	16 (57%)	10 (53%)	6 (60%)
> 5 years	0	4 (22%)	2 (7%)	6 (31%)	3 (30%)

No. of observations = 81
Kendall's Tau-B = 0.178 *

No. of observations = 80
Kendall's Tau-B = 0.214 **

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

Concerning pattern of foreign market selection, a market diversification strategy was more common when customer awareness as well as number of competitors was limited, in the early stages of industry development. (Table 7:17)

Table 7:17 Propensity to use market concentration/ diversification by industry structure (column percentages)

Level of customer awareness					
	1 = low	2	3	4	5 = high
Market concentration	1 (25%)	3 (25%)	7 (35%)	19 (53%)	8 (50%)
Market diversification	3 (75%)	9 (75%)	13 (65%)	17 (47%)	8 (50%)
No. of observations = 88					
Kendall's Tau-B = -0.180 *					
No. of competitors					
	1 = few	2	3	4	5 = many
Market concentration	1 (20%)	9 (47%)	8 (28%)	9 (45%)	11 (85%)
Market diversification	5 (80%)	10 (53%)	21 (72%)	11 (65%)	2 (15%)
No. of observations = 87					
Kendall's Tau-B = -0.231 **					
* = 10% level of significance					
** = 5% level of significance					
*** = 1% level of significance					

Apart from that, negative correlations between the propensity to enter the U.S. market and numbers of application areas and competitors were found. Firms active in the U.S. were found to have less product application areas and competitors than other firms. (Table 7:18)

Table 7:18 Propensity to enter the U.S. market by industry structure (column percentages)

		No. of competitors				
		1 = few	2	3	4	5 = many
Firms not active in the U.S.		4 (21%)	7 (37%)	7 (44%)	8 (38%)	10 (53%)
Firms active in the U.S.		15 (79%)	12 (63%)	9 (56%)	13 (62%)	9 (47%)
No. of observations = 94						
Kendall's Tau-B = -0.168 *						
		No. of applications				
		1 = few	2	3	4	5 = many
Firms not active in the U.S.		4 (50%)	5 (23%)	10 (33%)	10 (48%)	8 (62%)
Firms active in the U.S.		4 (50%)	17 (77%)	20 (67%)	11 (52%)	5 (38%)
No. of observations = 94						
Kendall's Tau-B = -0.170 **						

Based on these findings, the expectations about a less traditional pattern of foreign market selection during early stages of industry development, as indicated in **hypothesis 16**, and in industries characterized by a narrow product market niche, as indicated in **hypothesis 18**, were at least partially supported.

Concerning the impact of industry structure on selection of foreign entry forms, no relation with the propensity to use subsidiaries was found. However, the timing of foreign subsidiary establishment differed. (Table 7:19)

Table 7:19 Timing of foreign subsidiary by industry structure

		Customer awareness				
		1 = low	2	3	4	5 = high
< 5 years from first foreign entry	4 (50%)	6 (35%)	6 (60%)	5 (100%)	1 (50%)	
> 5 years from first foreign entry	4 (50%)	11 (65%)	4 (40%)	0	1 (50%)	
No. of observations = 42						
Kendall's Tau-B = 0.232 *						
		No. of competitors				
		1 = few	2	3	4	5 = many
< 5 years from first foreign entry	1 (100%)	8 (62%)	11 (69%)	1 (14%)	1 (20%)	
> 5 years from first foreign entry	0	5 (38%)	5 (31%)	6 (86%)	4 (80%)	
No. of observations = 42						
Kendall's Tau-B = 0.328 **						
		No. of application areas				
		1 = few	2	3	4	5 = many
< 5 years from first foreign entry	2 (25%)	3 (33%)	6 (75%)	6 (67%)	4 (57%)	
> 5 years from first foreign entry	6 (75%)	6 (67%)	2 (25%)	3 (33%)	3 (43%)	
No. of observations = 41						
Kendall's Tau-B = -0.256 *						

These results indicate a quicker establishment of foreign subsidiaries among firms active in industries with an established demand but limited competition. Due to this, **hypothesis 17** could only be partly supported. Opposite to what was expected, a quicker establishment of foreign subsidiaries was found in industries where the product had several application areas. Thus, **hypothesis 19** could not be supported.

Overall, the results present a fairly clear picture. The speed of foreign entry is slightly lower among firms active in industries characterized by a high market growth, where the home market may be able to support firm growth for a more extended time period. However, once foreign activities have been initiated, a more diversified market selection strategy is found during early stages of industry development and in narrow market niches, where each market could be expected to provide only a limited number of potential customers. Concerning entry form, no relation with the propensity to use foreign subsidiaries was found, while subsidiaries were more rapidly established when a product had several application areas. One interpretation of this finding may be that a minimum scale of operation is required to support a foreign subsidiary. Apart from that, the impact of industry structure on timing of foreign subsidiaries was uncertain.

Multi-variate analyses

Above, a number of bi-variate analyses of the individual impact of a number of different variables on internationalization are presented. There are, however, reason to believe that these variable are not independent. Therefore, a number of multi-variate analyses have been made.

Speed of internationalization

In order to investigate the combined impact of different variables on speed of internationalization, all variables presented above were included in a multiple regression analysis.

First, age at first foreign entry was used as dependent variable. In a first step, including all variables, a R²-value of 0.220 was received. However, in spite of the reduction of variables during factor analyses, a large number of variables were included in the model. Due to this, the adjusted R²-value was low, only 0.032. In a second step, the three variables with the highest t-values, i.e. ownership structure (AGTYPE), industry experience (IEXP) and level of technology innovation (INOVA), were included in a new multiple regression analysis. This resulted in an increase in adjusted R²-value to 0.149. (Table 7:20)

Table 7:20 Regression analysis; speed of internationalization

Explanatory variables	Dependent variable: Age at first foreign entry			
	Initial analysis		Second analysis	
	Coeffi- cients	t-values	Coeffi- cients	t-values
CONSTANT	4.082	1.746*	4.205	4.791 ***
SIZE	0.379	0.551		
AGTYPE	-1.865	-1.909 *	-1.698	-2.374 **
IEXP1	-0.861	-1.748 *	-0.754	-2.077 **
FEXP	-0.423	-0.870		
INTENS	0.144	0.256		
PATENTS	-0.249	-0.291		
TECH	0.118	0.220		
INOVA	0.863	2.340 **	0.716	2.742 ***
ED	-0.092	-0.187		
ADAPT	0.085	0.164		
IMAGE	-0.031	-0.058		
STAGE	0.229	0.361		
POT	0.211	0.460		
No. of observations =	68		82	
F-value =	1.172		5.727	
P =	0.324		0.001	
R ² =	0.220		0.180	
Adjusted R ² =	0.032		0.149	

*** = 0.5% level of significance
** = 2.5% level of significance
* = 5.0% level of significance

The results of the second step indicate that age at first foreign entry tends to increase among privately owned firms and with level of innovation, but decreases with previous industry experience. These findings agree with the findings presented in the earlier bivariate analyses. Thus, **hypotheses 4 and 7** were supported, while **hypothesis 12** was rejected.

Second, the number of years required before five foreign markets were entered was used as dependent variable. At the initial step, a R^2 -value of 0.165 was received. However, none of the expected variables received a statistically significant t-value and an adjusted R^2 of 0.000 indicated a limited explanatory value of the model. At the second step, only the variables with the highest explanatory values, i.e. level of technological innovation and need for local adaptation, were included. Still, this resulted in only a marginal increase in adjusted R^2 -value and this analysis will not be used in the following discussion.

Pattern of market selection

In order to test the impact of the explanatory variables defined above on the number of foreign markets entered within 3 years from first foreign entry, a multiple regression analysis was undertaken. As in the previous analysis, this resulted in a R^2 -value of 0.132, but the adjusted R^2 -value was low and none of the variables received a statistically significant T-value. Therefore, this analysis will not be further discussed.

Due to methodological problems concerning the measure of market sequencing, no multivariate analysis using this dependent variable was made. Instead, entry into the U.S. market was used as a proxy for a less traditional market selection pattern. Based on a logit analysis, the variables specified above were used to investigate whether firms active in the U.S. market differed from other firms. (Table 7:21)

The goodness of fit of these models was rather high, with high chi-square values and pseudo R^2 -values indicating that approximately 30% of the variance in the dependent

Table 7:21 Logit analysis; entry into the U.S.

Dependent variable:	1 = Entry into the U.S. market 2 = No entry into the U.S. market			
Explanatory variables	Initial analysis		Second analysis	
	Estimates	t-values	Estimates	t-values
CONSTANT	1.089	0.632	1.292	0.772
SIZE	0.315	0.382		
AGTYPE	1.389	1.718 *	-1.457	-2.076 **
IEXP	-0.483	-1.397	-0.532	-1.574
FEXP	-0.048	-0.133		
INTENS	-1.317	-2.496 **	-1.206	-2.535 **
PATENTS	-0.380	-0.524		
TECH	0.566	1.459	0.484	1.321
INOVA	0.677	2.302 **	-0.631	-2.358 **
ED	0.482	1.396	0.513	1.500
ADAPT	0.401	1.000		
IMAGE	0.136	0.358		
STAGE	-0.711	-1.345	-0.527	-1.136
POT	-0.822	-2.172 **	-0.742	-2.133 **
No. of observations =	69		69	
Chi-square value (df) =	29.81 (13) ***		28.287 (8) ***	
Pseudo R ² -value =	0.302		0.291	

*** = 0.5% level of significance
 ** = 2.5% level of significance
 * = 5.0% level of significance

variable is "explained" by the explanatory variables¹²⁴. Looking at the results, firms entering the U.S. market appear to differ from others in several aspects. They are often corporately owned firms, providing innovative products for a narrow market niche, so that **hypotheses 5, 13 and 18** are at least partially supported. Strangely enough the level of R&D intensity is lower among these firms, so that **hypothesis 10** has to be rejected. One reason for this, although not further investigated in the study, may be that these firms are based as university spin-offs. In those cases, the main part of R&D

¹²⁴ Based on the following formula, proposed by Aldrich and Nelson (1984):

$$PseudoR^2 = \frac{\chi^2}{(N + \chi^2)}$$

expenditures may have been invested previously to the establishment of the firms. This idea is further supported by a negative, although not statistically significant, impact of industry experience.

Selection of entry forms

Based on a logit analysis, this section investigates the propensity of firms to use foreign subsidiaries. In a first step, all variables specified above were included. In the second step, variables with a T-value exceeding 1.7 were included. (Table 7:22)¹²⁵

¹²⁵ Estimates for firms with foreign subsidiaries

Table 7:22 Logit analysis; use of foreign subsidiaries

Dependent variable:	1 = Firms with foreign subsidiaries 2 = Firms without foreign subsidiaries			
Explanatory variables	Initial analysis		Second analysis	
	Estimates	t-values	Estimates	t-values
CONSTANT	-0.532	-0.354	-1.427	-1.050
SIZE	2.474	1.528	1.408	1.719 *
AGTYPE	0.691	0.907		
IEXP	-0.079	-0.255		
FEXP	-0.278	-0.815		
INTENS	-0.834	-1.901 *	-0.470	-1.425
PATENTS	-0.991	-1.346		
TECH	0.585	1.642	0.538	1.764 *
INOVA	0.648	2.272 **	-0.424	-1.867 *
ED	0.094	0.281		
ADAPT	0.277	0.750		
IMAGE	0.612	1.550	0.386	1.295
POT	-0.298	-0.915		
COMP	-0.344	-0.765		
No. of observations =	69		71	
Chi-square value (df) =	23.163 (13)	*14.934 (5) **		
Pseudo R ² =	0.251		0.174	
*** = 0.5% level of significance				
** = 2.5% level of significance				
* = 5.0% level of significance				

This indicates that subsidiaries are more common among firms with higher levels of product technology and innovation, giving support to **hypothesis 14**. Contrary to what was expected, R&D intensity was lower among firms with foreign subsidiaries, thus **hypothesis 11** had to be rejected. This is further supported by the observations concerning the number of patents. Other results, although only weakly supported, include a higher propensity to have foreign subsidiaries among larger firms and when image creation, e.g. in terms of after sales service and brand name, is important.

Overall, the variations in independent variable means between firms using or not using foreign subsidiaries in the logit analysis were relatively small and some caution is required in the interpretation of the data.

Finally, a regression analysis was made in an attempt to identify any differences in timing of foreign subsidiary establishment. This model received a relatively high explanatory value, with a R²-value of 0.677 and an adjusted R²-value of 0.430 at the initial step. At a second step, variables with the highest t-values were retained, resulting in an even higher adjusted R²-value. (Table 7:23)

Table 7:23 Regression analysis; timing of subsidiary

Explanatory variables	Dependent variable: No. of years from initial foreign entry			
	Initial analysis		Second analysis	
	Coeffi- cients	t-values	Coeffi- cients	t-values
CONSTANT	2.955	0.718	5.252	5.891 ***
SIZE	-2.921	-2.845 **	-2.583	-2.718 **
AGTYPE	-5.438	-3.030 ***	-4.272	-2.727 **
IEXP1	1.190	1.163		
FEXP	2.096	2.497 **	1.943	2.764 **
INTENS	3.639	2.207 **	5.087	4.167 ***
PATENTS	2.375	1.711 *	2.024	1.559
TECH	0.716	0.800		
INOVA	0.553	0.818		
ED	-1.519	-1.559		
ADAPT	1.132	1.165		
IMAGE	-1.793	1.841 *	-1.831	-2.173 **
POT	-1.285	-1.412		
COMP	2.171	2.161 **	2.889	3.446 ***
No. of observations =	31		31	
F-value =	2.743		4.818	
P =	0.027		0.002	
R ² =	0.677		0.595	
Adjusted R ² =	0.430		0.471	

*** = 0.5% level of significance
** = 2.5% level of significance
* = 5.0% level of significance

These results indicate a more rapid establishment of foreign subsidiaries among larger firms with corporate ownership, i.e. **hypotheses 3 and 6** were supported. Contrary to what was expected, firms with high R&D intensity were slower to establish subsidiaries abroad. Thus, **hypothesis 11** was rejected. Concerning marketing requirements, the

expected relation of **hypothesis 15** was supported, in that subsidiaries were established earlier when personal marketing was important. A quicker establishment of subsidiaries was found during early stages of industry development, thus giving support to **hypothesis 17**. Although no hypothesis concerning the impact of previous experience had been developed, it was surprising to find that subsidiaries tended to be established later by firms with previous foreign experience of managers.

Summary

To summarize the results, the hypotheses concerning speed of internationalization, pattern of foreign market selection and choice of foreign entry form are summarized in three tables, indicating to what extent the hypotheses were supported. Concerning the interpretation of bi-variate analyses, one has to be careful since correlations between explanatory variables may influence the results. This, in turn, may explain why some multi-variate analysis did not support the statistically significant results developed in bi-variate analyses.

Based on the summary in Table 7:24, concerning speed of internationalization, only hypotheses 4 (corporate ownership) and 7 (management experience) were supported by bi-variate as well as by multi-variate analyses.

Table 7:24 Hypotheses related to speed of internationalization

HYPOTHESES	BI-VARIATE ANALYSES		MULTI-VARIATE ANALYSES	
	Age at first foreign entry	No. of foreign markets after 5 years	Age at first foreign entry	No. of markets after 5 years
Hypothesis 1: Limited size - turnover - no. of employees	Not supported	Rejected * **	Not supported	Not supported
Hypothesis 4: Corporate ownership	Supported **	Not supported	Supported **	Not supported
Hypothesis 7: Management experience - reps. - industry	Partly supported *** *	Not supported	Partly supported **	Not supported
Hypothesis 9: R&D intensity	Not supported	Not supported	Not supported	Not supported
Hypothesis 12: Product type - level of innov.	Rejected *	Partly supported **	Rejected **	Not supported

The results indicate that speed of foreign entry tends to be higher in corporately owned firms and where management has previous industry experience or contacts with local representatives. Firm size and R&D intensity, however, did not influence speed of internationalization, which is slightly surprising. This does not necessarily imply that these factors are unimportant, but that they may be an outcome of the intention to create a fairly homogeneous sample, including only small, technology based firms.

Furthermore, age at first foreign entry tends to be higher among firms providing technological innovations. This may be explained by an initial need to develop the product and establish an initial demand before commercialization can take place. However, based on a bi-variate analysis, the speed of subsequent market entries was higher among these firms. One explanation may be that they are active during early stages of industry development, when competition is still limited.

As indicated in Table 7:25 below, hypotheses 2 and 8, concerning the impact of firms size and previous experience on pattern of foreign market selection could not be supported, and hypotheses 10 and 16 were only supported by bi-variate analyses.

Table 7:25 Hypotheses related to pattern of foreign market selection

HYPOTHESES	BI-VARIATE ANALYSES			MULTI-VARIATE ANALYSES	
	Diversification strategy	Sequence of market selection	Entry into the U.S.	Diversification strategy	Entry into the U.S.
Hypothesis 2: Limited size	Not supported	Not supported	Not supported	Not supported	Not supported
Hypothesis 5: Corporate ownership	Not supported	Not supported	Supported *	Not supported	Supported *
Hypothesis 8: Management experience - financial - industry	Not supported	Not supported ^{**126}	Rejected ^{**}	Not supported	Not supported
Hypothesis 10: R&D intensity - R&D/SEK - R&D/person - R&D pers.	Supported * * **	Not supported	Not supported	Not supported	Rejected **
Hypothesis 13: Product type - level of techn. - level of innov. - standard. - software - complexity - transport cost	Partly supported * ***	Partly supported * *	Partly supported * *** **	Not supported	Partly supported **
Hypothesis 16: Industry stage - awareness - competition	Supported * **	Not supported	Partly supported *	Not supported	Not supported
Hypothesis 18: Market potential - no. of appl.	Not supported	Not supported	Partly supported *	Not supported	Supported **

¹²⁶ in opposite direction

Based on a bi-variate analysis, a market diversification strategy tends to be more common among firms with high R&D intensity and complex products. These firms are also more likely to be active during the early stages of industry development, where there were few competitors and inexperienced customers. This is further supported by a need for after sales services and customer education. However, these observations are not supported by the multi-variate analysis, and any interpretations must be made with care.

Concerning pattern of market selection, a less sequential pattern was found among "high technology" firms, with products characterized by high levels of technology and complexity and low transportation costs. Other variables, however, did not significantly influence the sequence of market selection. One reason may be the methodological weakness of this dependent variable, as indicated previously in the chapter.

A less traditional pattern of market selection among "high technology" firms is supported by the following analysis. The products of firms active in the U.S. market were often innovations of "high technology" character, with a considerable software content and a need for customer adaptation and education. This lends support to the observation that these firms tended to be active during early industry stages, with a limited number of competitors and few product application areas. That these firms are often corporately owned may be explained by the high costs associated with an entry into a large, distant market, such as the U.S. Still, these firms had limited previous industry experience and lower R&D intensity than other firms. One explanation for this could be that these firms are spin-offs from universities, established to commercialize innovations developed during university research.

As indicated in Table 7:26, only two hypotheses concerning foreign entry forms, i.e. number 11 (R&D intensity) and number 19 (market potential) were not at least partially supported.

Table 7:26 Hypotheses concerning foreign entry form

HYPOTHESES	BI-VARIATE ANALYSES		MULTI-VARIATE ANALYSES	
	Propensity to use subsidiary	Timing of first subsidiary	Propensity to use subsidiary	Timing of first subsidiary
Hypothesis 3: Firm size - turnover - no. of employees	Supported *** **	Not supported	Weakly supported	Supported **
Hypothesis 6: Corporate ownership	Weakly supported	Not supported	Not supported	Supported **
Hypothesis 11: R&D intensity	Not supported	Not supported	Rejected *	Rejected ***
Hypothesis 14: Product characteristics - level of techn. - level of innov. - standard.	Not supported	Not supported **	Supported * **	Not supported
Hypothesis 15: Marketing - a/s service - education - quality - low price - brand name	Partially supported * *	Supported ** *** ** *** **	Weakly supported	Supported **
Hypothesis 17: Industry stage - awareness - competition	Not supported	Partly supported * ¹²⁷ **	Not supported	Supported **
Hypothesis 19: Market potential - no. of appl.	Not supported	Rejected *	Not supported	Not supported

¹²⁷ in opposite direction

Overall, the propensity to use foreign subsidiary appears to be slightly higher among larger firms, providing innovative or high technology products and requiring personal marketing efforts. Besides, subsidiaries are more rapidly established by large, corporately owned firms, indicating a more favourable access to the financial resources required for a subsidiary establishment. These firms tend to be active during early stages of industry development, when personal marketing efforts are particularly important to create demand.

Strangely enough, R&D intensity does not appear to influence the decision to establish foreign subsidiaries. One interpretation of this may be that it is the character of the technology developed, rather than the amount of resources invested in R&D activities, that influences this decision.

8. AN ANALYSIS OF INTERNATIONAL SUCCESS

Introduction

In this chapter, an attempt has been made to identify success factors in the process of internationalization of small, technology based firms. Four different success measures have been tested against a number of internal firm characteristics and industry variables.

Theoretical background

Among the internal success factors identified in previous research are general firm characteristics, such as age, size, resources and production strategy, management quality and efforts, technology and skills intensity, marketing strategy and skills and exports organization¹²⁸.

Among the contextual success factors identified are presence of governmental support, local country characteristics and industry characteristics, including stage of development, customer structure competitive structure and comparative advantages of the firm in relation to competitors¹²⁹.

However, overall conclusions of previous research are rather vague and the results are often divergent, since different countries, industries and types of firms have been included¹³⁰. In an attempt to overcome these shortcomings, this study concentrates on one particular type of firms, i.e. small/young, technology based firms in small countries. In this way, it is possible to generalize for small firms in other small countries. This

¹²⁸ See e.g. Bilkey (1987), Forsman (1987), Kaynak et. al. (1987), Kirpalani & Macintosh (1980), Munro & Beamish (1987), Newbould et. al. (1978), Reid (1987), Rosson & Ford (1982) or Utterback & Reitberger (1982)

¹²⁹ See e.g. Bilkey (1987), Kaynak et. al. (1987), Kirpalani & Machintosh (1980), Kirpalani & Balcomes (1987), Newbould et. al. (1978), SIND (1988:1)

¹³⁰ See discussion by Kamath, Rosson, Patton & Brooks (1987)

focus, on the other hand, limits the possibilities of making any predictions concerning international success of larger firms or firms with larger home markets.

According to Bilkey (1987) and Reid & Rosson (1987), few attempts to combine internal and contextual success factors have been made. Within the tradition of international marketing, for example, the main emphasis has been on internal variables, such as management and marketing issues. Within the industrial organization tradition, on the other hand, a pre-occupation with contextual variables, related to industry structure, can be observed. In this study, however, variables of internal as well as contextual character are included, to provide a more complete explanation of success.

Measuring international success

One difficult question is to decide what criteria to use as measures of international "success". This question has frequently been debated in previous research¹³¹. Some success measures commonly used are growth in export sales, export intensity (e.g. export as a percentage of total sales), number of foreign markets penetrated, local market shares, export intensity in relation to domestic competitors, or a combination of several of these factors.

All these measures, however, imply that "more" international activity is the same as greater success. Among small, technology based firms, active in newly established industries, one can question whether this is actually the case.

In this study, four different export success measures were initially tested; absolute growth in exports sales over the five year period between 1982-87 (measured in SEK), relative growth in exports sales over the same period (absolute export growth as a percentage of export sales in 1982), export intensity (export as a percentage of total turnover in 1987) and perceived profitability of foreign activities (measured on a scale from 1-5, where 1

¹³¹ Kirpalani & Balcomes (1987)

is very low and 5 is very high). Among these, the first three measures could be characterized as more objective, while the last is of a subjective character.

In order to investigate whether there exists an internal consistency between these different success measures, a Pearson correlation matrix has been developed. (Table 8:1)

This implies that depending upon which success measure is used, the results may vary, due to a lack of correlation

between the different measures. Only two statistically significant correlations were found, i.e. a positive correlation between relative and absolute export growth, which could be expected since both measures are based on absolute export growth, and a negative correlation between export share and relative export growth. In the latter case, this indicates that the relative export growth is lower among firms that already have a considerable export share, which also appears intuitively correct.

Methodology

The results in this chapter will draw upon the material collected during the two empirical phases: interview studies and a mail survey. In order to provide a complete explanation of international success, a wide range of internal and contextual variables identified by previous research as influential have been included. Variables of internal character have been divided into four sections, i.e. general firm characteristics, product characteristics,

Table 8:1 Correlation coefficients of success measures

	Export share	Perceived profitability	Absolute export growth	Relative export growth
Export share	-			
Perceived profitability	0.146	-		
Absolute exp. growth	0.140	0.068	-	
Relative exp. growth	-0.243 *	-0.085	0.660 ***	-

* = 10% level of significance
** = 5% level of significance
*** = 1% level of significance

marketing activities and internationalization behaviour. Variables of contextual character are basically related to industry structure.

In the bi-variate analyses, perceived profitability of foreign operations was used in order to compare successful firms with less successful ones. In these analyses, the sample was divided into two categories: 20 firms indicating a very high profitability were classified as successful, while 14 firms indicating a low or very low profitability were classified as unsuccessful. The main advantage of this measure was that it does not necessarily require a considerable increase in foreign operations.

When possible, explanatory variables were measured on an interval scale. In some cases, variables have only been classified on an nominal scale, while remaining variables have been measured on a 5-point Likert scale, as indicated in chapter 5. Depending upon the scale of the variable, Kendall's Tau-B, Chi-square values or t-values were used to investigate any differences in explanatory variables between successful and unsuccessful firms. Concerning internationalization behaviour, the following variables were employed. (Table 8:2)

Table 8:2 Internationalization variables

Variables	Interpretation
IAGE	Firm age at first foreign entry (direct export, representatives or subsidiary)
SPEED	No. of years required to enter 5 foreign markets, from first foreign entry
COM3	No. of foreign markets entered within 3 years from first foreign entry
INTAR	No. of years with foreign activities
INFO	No. of information sources used to identify foreign representatives
SUBS	Whether the firm has any foreign subsidiaries or not (0-1)
U.S.	Whether the firm has entered the U.S. market or not (0-1)

In the multi-variate analyses, all four dependent variables were used, i.e. export share, relative and absolute export growth, and perceived profitability. The main advantage of the relative export share over absolute export share is a possibility to correct for the influence of firm size. The first three dependent variables were analyzed, using multiple regression analyses. The last one, however, was measured on an ordinal rather than on an interval scale, thereby not

permitting any regression analysis. Due to this an alternative analysis, based on an ordered probit model, was undertaken.

As indicated in chapter 7, a factor analysis of explanatory variables was made, in order to reduce the number of variables included in the model. Concerning internationalization behaviour, the same variables as identified above were used. A Pearson correlation coefficient matrix of all explanatory variables is found in Appendix VII.

In the concluding discussion, these quantitative results are interpreted in light of the more qualitative data collected during interview studies.

Empirical findings

In this section, the findings based on the two different methods of analysis are presented.

Bi-variate analyses

Using perceived profitability of foreign operations as success measures, an attempt to establish a profile of particularly successful and unsuccessful firms was made. The complete specifications of correlations is found in Appendix V. Overall, the results are rather inconclusive and a limited number of statistically significant observations are found. This, in turn, is partly explained by the limited number of observations included in this section. In the following, the explanatory variables yielding a statistically significant difference between the two groups are presented.

First, general firm characteristics were investigated. Strangely enough, it was found that firms with corporate ownership were less successful than privately owned firms. (Table 8:3)

One interpretation may be that corporate owners put a higher stress on performance than purely privately owned firms. Other observations indicated a higher level of product technology, lower trans-

portation costs and a limited importance of low price among successful firms¹³². The level of R&D intensity was also slightly higher among successful firms. (Table 8:4)

Table 8:3 Success by ownership structure (columns percentages)

	Ownership structure	
	Private ownership	Corporate ownership
Unsuccessful firms	3 (20%)	8 (53%)
Successful firms	12 (80%)	7 (47%)
No. of observations = 30		
Chi square value = 3.589, p = 0.058		

Table 8:4 Success by R&D intensity

	R&D costs/ employee	R&D costs/ turnover	R&D personnel/ work force
Unsuccessful firms	SEK 37.000	5.0%	16.1%
Successful firms	SEK 71.000	8.1%	25.5%
t-value =	1.267	1.273	1.716
p =	0.215	0.213	0.096

¹³² Kendall's Tau-B = 0.276 *, -0.334 ** and -0.263 *

The only variation between the groups related to internationalization behaviour concerned the possibilities to use established representative contacts of firm executives during internationalization. (Table 8:5)

Contrary to what could have been expected, this indicates that firms with such contacts in general are less successful than others. A possible interpretation for this may be that such contacts facilitate internationalization, but are not necessarily the best channels to reach potential customers and increase profitability.

Concerning industry structure, a classification according to industry indicated a higher propensity of success among firms active in the chemistry and electronics industries. (Table 8:6)

Table 8:6 Success by industry classification (column percentages)

	Industry classification			
	Chemistry	Machinery	Electronics	Instruments
Unsuccessful firms	0	7 (54%)	1 (13%)	3 (60%)
Successful firms	3 (100%)	6 (46%)	7 (87%)	2 (40%)
No. of observations = 29				
Chi square-value (df) = 6.464 (3), p = 0.091				

Moreover, successful firms were more often active in industries characterized by a low level of competition¹³³.

¹³³ Kendall's Tau-B = -0.331 **

Overall, these results indicate that success is associated with private ownership, high levels of R&D intensity and product technology, low transportation costs, limited importance of low product price and limited competition. Concerning internationalization, the propensity for success is lower among firms using established representative contacts. However, one must not forget that the number of firms included in this part of the study was limited. Besides, the results are relatively weak and any interpretations must be made with great care. Still, these findings indicate that firms providing "high technology" products could be expected to be more successful than other firms.

Multi-variate analyses

Three multiple regression analyses were undertaken in order to investigate the combined impact of several explanatory variables simultaneously.

First, **export share** in 1987 (1986) was used as dependent variable. In the first step, the variables specified in chapter 6 were included, to investigate the impact of firm and industry characteristics on international success. However, the explanatory value of the model was limited. The only variable with a statistically significant influence was previous foreign experience of managers. In a second step, the internationalization variables specified above were included, in order to test the impact of internationalization behaviour on export share. The explanatory value of this model was slightly higher, with an adjusted R^2 -value of 0.110. The only variables with statistically significant coefficients were speed of internationalization, in terms of the number of years required to enter 5 markets, and foreign experience, i.e. the number of years of foreign activities. In a third step, the variables identified during the two initial steps were combined in a third regression, in order to investigate their combined impact on export share. However, the explanatory value of this model was only slightly higher, with an adjusted R^2 -value of 0.116. (Table 8:7)

Table 8:7 Regression analysis; export share

Dependent variable: Export as a percentage of turnover in 1986/87						
Explanatory variables	First step		Second step		Third step	
	Coeffi-cient	t-values	Coeffi-cients	t-values	Coeffi-cients	t-values
CONSTANT	58.470	3.618 ***	50.441	4.094 ***	57.442	10.374 ***
SIZE	-0.117	-0.024				
AGTYPE	-6.038	-0.896				
IEXP	4.074	1.200				
FEXP	6.185	1.843 *			2.504	0.935
INTENS	-4.583	-1.175				
PATENT	5.908	0.998				
TECH	1.003	0.270				
INOVA	1.793	0.698				
ED	-1.854	-0.542				
ADAPT	3.303	0.924				
IMAGE	-3.628	-1.012				
STAGE	-3.760	-0.857				
POT	-2.177	-0.685				
IAGE		-1.043	-1.286			
SPEED		-2.174	-1.941 *	-2.896	-3.279 ***	
COM3		0.691	0.778			
U.S.		1.445	0.215			
SUBS		-2.355	-0.404			
INFO		1.428	0.925			
INTAR		1.159	1.825 *	1.359	2.334 **	
No. of observations =	69		70		72	
F-value =	0.985		2.213		4.104	
P =	0.478		0.045		0.010	
R ² =	0.189		0.200		0.153	
Adjusted R ² =	0.000		0.110		0.116	

*** = 0.5% level of significance

** = 2.5% level of significance

* = 5.0% level of significance

The results indicated that internal firm characteristics have a limited impact on export share. The only variable of statistical significance in the first step of this analysis was previous foreign experience of firm managers, resulting in a slightly higher export share. Concerning internationalization behaviour, export shares tend to be higher among firms that rapidly entered at least five foreign markets. Export share is also higher among firms which have been internationally active for a longer time period. Still, the limited explanatory value of these models indicates that export share may not be a very good indicator of international success among small, technology based firms.

Second, **absolute export growth** was used as a dependent variable. At the first step, firm and industry variables were included. This resulted in an adjusted R^2 -value of 0.187, indicating slightly higher explanatory value of the model. The variables of statistical significance were product level of innovation and stage of industry development. At a 15% level of significance, level of technology and importance of image creation were other variables of certain importance. At a second step, internationalization variables were included in a new regression analysis, yielding a slightly lower explanatory value, i.e. an adjusted R^2 -value of 0.117. In this step, two variables of statistical significance were identified, i.e. age at first foreign entry and number of years required to enter 5 markets. At a 15% level of significance, the number of markets entered within 3 years from first foreign entry and number of years with foreign activities were found to have a certain impact. At a third step, all variables identified above were combined in a regression analysis, resulting in an adjusted R^2 -value of 0.130. (Table 8:8)

These results indicate a higher explanatory value of the model including only firm and industry variables. The increase in absolute exports was found to be higher in firms providing innovations and active during early stages of industry development. The products were, however, often of a lower level of technology and the need for image creation, e.g. through after sales services and brand name, was limited. Strangely enough, however, none of these variables came out as statistically significant when combined with internationalization variables.

Concerning internationalization variables, absolute export growth tended to be higher in firms with a slower speed of internationalization, but a diversified pattern of foreign market selection. At the same time, absolute export growth appeared to be slightly higher during the early stages of internationalization, i.e. a weak negative correlation with number of years with foreign activities was found.

Third, **relative export growth** was used as dependent variable. The explanatory value of the models developed were, however, limited in all steps of analysis. The adjusted R^2 -value at the two first steps were 0.000 and 0.037. The only variables with a t-value of statistically significance were two firm variables, i.e. previous foreign experience of

Table 8:8 Regression analysis: Absolute export growth

Dependent variable: Absolute export growth over 5 years (TSEK)						
Explanatory variables	First step		Second step		Third step	
	Coeffi-cient	t-values	Coeffi-cients	t-values	Coeffi-cients	t-values
CONSTANT	54.320	3.252 ***	0.886	0.069	22.956	1.164
SIZE	-4.308	-0.964				
AGTYPE	-9.382	-1.407				
IEXP	-1.084	-0.343				
FEXP	3.039	0.993				
INTENS	2.588	0.670				
PATENT	2.216	0.381				
TECH	-5.675	-1.553			-2.191	-0.794
INOVA	4.798	2.089 **			1.359	0.549
ED	0.155	0.048				
ADAPT	3.784	1.077				
IMAGE	-5.984	-1.572			-2.397	-0.667
STAGE	-7.093	-1.860 *			-4.199	-1.235
POT	1.500	0.517				
IAGE		1.882	2.298 **	1.560	1.800 *	
SPEED		2.172	1.914 *	1.648	1.459	
COM3		1.303	1.504	1.034	1.187	
U.S.		-1.708	-0.236			
SUBS		-2.769	-0.468			
INFO		1.925	1.221			
INTAR		-0.978	-1.432	-0.838	-1.217	
No. of observations =	77		55		50	
F-value (d.f.) =	1.936		2.024		1.915	
P =	0.055		0.072		0.084	
R ² =	0.386		0.232		0.272	
Adjusted R ² =	0.187		0.117		0.130	

*** = 0.5% level of significance

** = 2.5% level of significance

* = 5.0% level of significance

managers and product level of innovation, and two internationalization variables, i.e. the numbers of years required to enter five foreign markets and number of years with foreign activities. When included in a third step of analysis, these variables increased the adjusted R²-value to 0.117. (Table 8:9)

Based on these observations, a higher relative export growth could be expected among firms with previous foreign experience and innovative products, even if these variables were not significant on a 10% level of significance. Concerning internationalization

Table 8:9 Regression analysis; relative export growth

Dependent variable: Relative export growth over 5 years (TSEK)						
Explanatory variables	First step		Second step		Third step	
	Coeffi-cient	t-values	Coeffi-cients	t-values	Coeffi-cients	t-values
CONSTANT	2.732	1.378	0.422	0.340	2.599	3.423 ***
SIZE	0.350	0.699				
AGTYPE	-0.403	-0.516				
IEXP	0.328	0.877				
FEXP	0.605	1.701 *			0.393	1.583
INTENS	-0.667	-1.360				
PATENT	-0.802	-1.229				
TECH	-0.038	-0.092				
INOVA	0.478	1.759 *			-0.235	-1.251
ED	0.180	0.499				
ADAPT	0.025	0.064				
IMAGE	-0.317	-0.707				
STAGE	-0.362	-0.828				
POT	0.082	0.251				
IAGE		0.059	0.650			
SPEED		0.215	1.983 *	0.152	2.041 **	
COM3		0.020	0.812			
U.S.		0.627	0.890			
SUBS		0.043	0.074			
INFO		0.183	1.182			
INTAR		-0.148	-2.268 **	-0.130	-2.219 **	
No. of observations =	48		51		51	
F-value (d.f.) =	0.895		1.273		2.650	
P =	0.566		0.286		0.045	
R ² =	0.255		0.172		0.187	
Adjusted R ² =	0.000		0.037		0.117	

*** = 0.5% level of significance
 ** = 2.5% level of significance
 * = 5.0% level of significance

behaviour, a recent internationalization and slow market spread tend to result in a higher relative export growth.

Finally, **perceived profitability** of foreign operations was used as a proxy for international success. This analysis is used as a complement to the previous bi-variate analysis of perceived success. At the first step, five firm variables received t-values of statistical significance at a 10%-level, i.e. number of patents, level of technology, level of innovation, importance of customer education and importance of product adaptation.

The only industry variable of statistically significance was industry stage of development.

At the second step, none of the internationalization variables received statistically significant t-values. Consequently, internationalization behaviour appear to have a limited impact of perceived profitability. In the third step, the most important variables of step 1 were included in a new model. (Table 8:10)

Table 8:10 Ordered probit analysis; perceived profitability

Dependent variable: Perceived profitability (1 = low, 5 = high)						
Explanatory variables	First step		Second step		Third step	
	Coeffi-cient	t-values	Coeffi-cients	t-values	Coeffi-cients	t-values
CONSTANT	0.008	0.008	1.490	1.590	0.208	0.286
SIZE	-0.301	-0.469				
AGTYPE	-0.338	-0.944				
IEXP	0.136	0.648				
FEXP	-0.008	-0.046				
INTENS	-0.138	-0.663				
PATENT	0.667	1.590			0.292	1.679 *
TECH	0.356	1.912 *			0.294	1.941 *
INOVA	-0.218	1.338			-0.204	1.527
ED	-0.263	-1.693 *			-0.179	-1.283
ADAPT	0.302	1.311			0.144	0.832
IMAGE	-0.159	-0.796				
STAGE	-0.468	-1.899 *			-0.367	-2.107 **
POT	-0.027	-0.141				
IAGE			-0.034	-0.233		
SPEED			0.007	0.096		
COM3			0.005	0.102		
U.S.			0.111	0.322		
SUBS			0.045	0.144		
INFO			0.006	0.075		
INTAR			0.009	0.266		
No. of observations =	68		69		69	
Chi-square value (d.f.) =	20.106 (13)		0.697 (7)		17.092 (6)	
P =	0.093		0.997		0.009	

*** = 0.5% level of significance
 ** = 2.5% level of significance
 * = 5.0% level of significance

Based on these results, it appears that profitability of foreign operations, as perceived by managers of firms, is higher in firms with a technological advantage in terms of patents and a high level of product technology. Similarly, profitability is higher during early stages of industry development, but is lower among firms working with innovations, which seems slightly conflicting.

Discussion

Looking at the results achieved in the previous section, it is difficult to find any clear relations between explanatory variables and international success. Firm size, for example, appears to be of limited importance, which fits in with the attempt to establish a relatively homogeneous sample of firms. Concerning ownership structure, some slightly surprising results were achieved. The level of perceived profitability was lower among firms with corporate owners. One reason for this may be a higher stress on performance rather than on export growth among firms with corporate ownership. Similarly, although not statistically significant, the results indicate higher export shares and export growth among privately owned firms. An interpretation may be that corporately owned firms are more likely to demand a minimum level of performance of foreign operations, rather than an increase in foreign operations.

The technology factors seem to have a certain impact on international success. Perceived profitability, for example, was higher among firms with high R&D intensity, providing "high technology" products. These products are, in general, also characterized by low transportation costs and a limited importance of a low price. When looking at industry structure, success appears to be more common when competition is limited, e.g. during early stages of industry development.

This agrees with the expectation that small firms of high technology character are frequently active during early stages of product development. During these stages, considerable investments in product adaptation and customer education may be required before sales take off. Still, many high technology firms have indicated a relatively high level of perceived profitability of foreign operations. This may be the result of

technological first mover advantages in combination with the potential for newcomers to take market shares on a growing market with a limited number of competitors. The high levels of R&D investments indicated may be required for continuous product development, in order not to lose this technological position once competition increases.

The results concerning export share and absolute export growth indicate a negative correlation with technology level and importance of image creation, through after-sales service and brand name. These firms are also more likely to have previous foreign experience of managers. In terms of internationalization behaviour, firms with high export growth between 1982 and 1987 were slower to initiate foreign activities. One reason may be an initial lack of financial and managerial resources required for foreign market evaluation and investments. Besides, as indicated during the case studies, many small, technology based firms are established by technological entrepreneurs, with limited financial and marketing experience. During the first years, these firms are often dominated by interest in technological questions, rather than in business activities. A new product is often expected to "sell itself" by its pure existence, and marketing activities are limited. However, once foreign activities were initiated, a rapid spread into several foreign markets took place.

Summary

Based on the above discussion, it is clear that one cannot give any general recipes for international success of small, technology based firms. First of all, one has to decide how to define success. What is the general objective of the firm? Does it strive for absolute export growth, an increased export share, higher profitability or a combination of these? Depending upon the situation of the firm and the success measure selected, success factors appear to differ. For example, during early stages of industry development, firms providing high technology products may be able to achieve a relatively high level of profitability, by providing unique products under limited competition.

Overall, there appears to be a possibility for small, technology based firms to succeed internationally. However, for continued success, a minimum of financial and managerial

resources may be required. Once international activities have been initiated, the firm needs capacity to handle control and information flow from all foreign markets entered, e.g. develop adequate report systems and motivate local representatives to perform. Due to this, it is sometimes necessary to concentrate foreign activities to a limited number of national markets. This may explain why export growth is higher during the initial stages of internationalization.

In addition, the firm may have to make continuous investments in product development and establish close contacts with advanced customers for joint projects, in order to keep a position of technological leadership and avoid being out-competed during later stages of industry development.

9. SUMMARY AND CONCLUSIONS

Introduction

The main purpose of this study has been twofold;

1. To describe the international behaviour of young, technology-based Swedish firms in terms of speed of internationalization, pattern of market selection and choice of foreign entry forms.
2. To analyze variations in internationalization behaviour, in an attempt to understand what factors might explain these variations.

It was expected that a limited size and certain technology characteristics, i.e. a high level of R&D intensity and "high technology" product characteristics, would influence internationalization behaviour. To some extent, these expectations were supported.

Summary and discussion of findings

Based on an interview study and a mail survey, the internationalization behaviour of small, technology-based Swedish firms was described in chapters 3 and 6. In the following three sections, observed behaviour, in terms of speed, pattern of market selection and foreign entry form, is summarized.

Speed of internationalization

Given the small size of the firms included in the survey, the speed of foreign entry was relatively high, i.e. the average firm age at first foreign entry was not more than 3.2 years. Once foreign activities had been initiated, a number of foreign markets were rapidly

entered. On average, firms had established themselves on five different markets within 3.5 years from the date of first foreign market entry. Similarly, only 15% of the firms were active in only one foreign market after three years of foreign activities.

During the case studies, a number of possible explanations for a rapid speed of internationalization were identified. In several cases, the possibility to take advantage of the international experience of other Swedish multinational corporations facilitated the process of internationalization, displaying a traditional willingness of Swedish firms to enter cooperative agreements¹³⁴. Some of the early pioneers, like SKF and Swedish Match, with sales and services organizations around the world, have often acted as agents of other Swedish firms until these firms have been able to build up their own sales organizations.

In this study, a limited home market potential was often an important motive to rapidly initiate foreign activities. Since these firms are, typically, active in specialized product areas, the number of potential customers in Sweden is limited. By entering cooperative sales agreements with Swedish multinationals, some firms quickly managed to establish foreign representation in a number of important markets all over the world. In other cases, small, technology-based firms acted as sub-contractors to large Swedish or foreign OEM-customers, with extensive distribution networks.

Sometimes, the international tradition of Swedish industry contributed indirectly, by providing a positive attitude towards internationalization. In at least three of the firms, it was possible to identify "an international vision", that is an initial ambition to go outside the Swedish market. By entering cooperative development projects with foreign customers, these firms were able to provide internationally acceptable products from the start.

¹³⁴ According to Carlson (1979), such cooperative behaviour reflects the relatively limited size of Swedish multinationals, their willingness to learn from each other, as well as the small, homogeneous home market, where many industrialists share the same social and educational background.

Another interesting observation was the role of the previous experience of executives in speeding up internationalization. Six of the case firms had been established as spin-offs from other firms. These firms were sometimes able to make use of existing contacts abroad, thus facilitating the search for potential customers or representatives. Based on previous contacts, a decision to enter a particular market via a specific representative was common. Five of the case firms were established as university spin-offs, by persons with extensive international technology networks. During international seminars and symposia, these persons had established contacts with other actors in the area, e.g. other researchers and potential customers.

Unfortunately, due to methodological differences, these results are not directly comparable with previous Swedish studies, which makes it difficult to make any statements of the speed of internationalization of small, technology-based firms in relation to other Swedish companies. Still, a fairly rapid speed of internationalization is indicated among these small, technology-based firms. To some extent, this may be an outcome of the selection criteria used, i.e. establishment in 1965 or later and a minimum of 20% foreign sales. Using these criteria, young firms had not been included unless they had rapidly initiated foreign activities. However, it may also reflect a general increase in the speed of internationalization, due to a reduction of economic distance over time, e.g. markets have become more similar due to improved communication technologies and a homogenization of demand¹³⁵.

Pattern of foreign market selection

The foreign markets where most firms in the study did have some foreign sales, using either direct exports, local representatives or subsidiaries, were the other Nordic countries. Other markets commonly entered were large industrialized countries, West Germany, U.K., France and the U.S. In terms of perceived importance¹³⁶, however,

¹³⁵ See discussion by Nordström (1991)

¹³⁶ As defined by the firm

these markets received higher rankings than the Nordic countries, indicating a difference between actual market selection and perceived strategic importance of markets.

There appears to be a tendency to enter the Nordic markets in response to perceived opportunities, e.g. a limited geographic distance, limited competition, orders received and access to local market contacts. In larger industrialized countries, such as West Germany, the U.S., France, the U.K. and Japan, market selection was usually based on strategic considerations, related to market potential, access to advanced customers and the competitive situation. This agrees with the observation by Ågren (1990), that the attraction of the U.S. market is its perceived importance for long-term build-up of firm-specific advantages, stemming either from the technological sophistication or the size of the market. In line with this argument, the product level of innovation tended to be higher in firms active in the U.S. market than in other firms.

To establish the sequence of initial market selection, using either direct exports, local representative or subsidiary, two measures were used: average firm age at first market entry, and average establishment rank of a market. In comparison with the average establishment sequence observed by Hörnell et. al. (1973), certain markets, e.g. France, Australia and Japan, received higher rankings in this study, while others received lower ones, like Canada, Portugal and the Netherlands. Still, the overall pattern of foreign market selection differed very little from the traditional pattern.

To take the analysis one step further, the market selection sequences associated with direct exports, local representatives and foreign subsidiaries were compared. The market sequence based on direct exports or local representatives followed the traditional sequence fairly well, while the sequence for foreign subsidiaries differed considerably. After the exclusion of markets with less than 5 foreign subsidiaries, the highest average establishment ranks were received by the U.S., West Germany, Finland and the U.K. The importance of the U.S. as a host country for initial subsidiary establishments represents an interesting exception from the traditional establishment pattern, but agrees

with the high perceived strategic importance of the U.S. market¹³⁷. The other Nordic countries received lower rankings, suggesting that these markets could easily be reached via direct exports or local representatives.

Most firms were found to enter more than one foreign market during one year. Due to this, a large number of ties in ranking could be expected and all interpretations of market sequencing must be made with great care. There appears to be a tendency to initiate foreign activities in clusters of markets, rather than to follow a slow sequential process of learning about one foreign market at the time. These clusters often included geographically close markets, such as the Nordic countries, as well as markets of great strategic importance, e.g. West Germany, the U.K. or the U.S., further complicating the interpretation of the market selection sequence.

Another question concerning the patterns of market selection concerns the impact of initial market entry on subsequent entries. Does the selection of an "unusual" first market result in a less traditional pattern of market selection also in the future? Based on the results of this study, the answer is yes, i.e. there appears to be a tendency among firms initiating foreign activities in markets other than the Nordic ones to follow a less traditional sequence of market selection.

Foreign entry forms

The foreign entry forms used by most firms were direct exports and local representatives, used by 68% and 87% of the firms in the sample. This agrees with previous studies and indicates that small firms are more likely to use foreign entry forms requiring limited initial investments. Still, it is interesting to note that as many as 44% of the firms did have at least one foreign subsidiary.

The propensity to use different entry forms varied between markets. The relative importance of direct exports was highest in certain distant markets, e.g. South Africa and

¹³⁷ A similar result was received by Nordström (1991)

Brazil, due to sanctions, problems to identify local representatives or difficulties to support a local subsidiary. The relative importance of subsidiaries was highest in the U.S., the U.K. and West Germany, i.e. relatively large, industrialized markets with a demand structure similar to the Swedish one. Since small, technology-based firms usually have only one or two foreign subsidiaries, those are more likely to be established in markets of strategic importance, with sophisticated customers or large market potentials, rather than in markets of limited "economic distance". One motive for using subsidiaries in those markets may be that direct contacts are necessary for customer adaptation and training before a new technology is accepted¹³⁸.

The propensity to follow an incremental establishment chain via direct exports and/or local representative to local subsidiary, differed between markets. Overall, 65% of all subsidiaries were established directly, without any previous experience in the market via direct export or local representatives. An immediate subsidiary establishment was most common in Europe, particularly in the U.K. and West Germany. In large, distant markets, such as the U.S. and Japan, firms were likely to follow a more traditional establishment chain, with foreign subsidiaries preceded by direct exports or local representatives.

In the light of traditional internationalization theories, one interpretation may be that the "home market" of firms has expanded, to include large parts of Northern Europe. However, in more distant markets, a high level of uncertainty still leads to a sequentially increased foreign commitment. These findings are, to some extent, contrary to other recent studies, reporting a fairly direct and rapid entry into the U.S.¹³⁹ and Japan¹⁴⁰. One reason for the observed differences may be that this study focuses on small, technology-based firms, while the other studies included firms of all sizes.

¹³⁸ See discussion by Lasserre (1982)

¹³⁹ Ågren (1990)

¹⁴⁰ Hedlund & Kverneland (1984)

Another explanation for the more traditional pattern in the U.S. and Japan is suggested by Nordström (1991), who argues that in order to reduce uncertainty, firms are more likely to follow a traditional establishment chain within home markets of key competitors or within markets with tight oligopolistic structures. The technology intensity of the firms included in this study and the frequently cited importance of the U.S. and Japan as home countries of innovations makes it possible to assume that main competitors are likely to be active in those markets.

The propensity to use licensing as foreign entry form was lower, i.e. approximately 10% of the firms¹⁴¹. In a study by Zander (1991), as many as 32% of all transfers of manufacturing technology related to major innovations by Swedish multinationals were carried out as licensing agreements. Even if these studies are not directly comparable, this is slightly surprising, given that small firms are expected to use this entry form more often than larger ones¹⁴².

Influencing factors

Chapter 7 investigates the possible impact of internal firm characteristics and industry structure on internationalization behaviour. Overall, the impact of firms size and technology characteristics on internationalization behaviour was lower than expected. This, however, does not necessarily mean that these variables are unimportant in explaining the internationalization process of firms. Rather, it may be the outcome of a fairly homogeneous sample, i.e. all firms included in the study are relatively small and perform at least some in-house R&D.

Concerning **firm size**, the expected relationships with speed of internationalization and sequence of market selection could not be supported. Contrary to expectations, the number of years required to enter at least 5 foreign markets was lower among the

¹⁴¹ This figure cannot be directly compared to the figures concerning direct exports, local representatives or subsidiaries, due to weaknesses in the data.

¹⁴² Telesio (1984)

smaller firms in the sample. Similarly, the pattern of market selection did not vary with firm size, which agrees with the findings of Nordström (1991). However, as expected, the use of subsidiaries was found to be more common among larger firms. These firms were also found to be quicker to establish foreign subsidiaries, once internationalization had been initiated.

The weak explanatory value of firms' size in the multi-variate analyses of this study may partly be explained by a certain correlation with **ownership structure**, i.e. firms with corporate ownership tend to be larger than privately owned ones. This agrees with the observations of Steiner (1990), who reports a change from entrepreneurial management and ownership to corporate, external private or mixed ownership as a firm grows.

In the analysis of speed of foreign entry, ownership structure came out as an important explanatory variable, i.e. firms with corporate owners tend to be younger than privately owned firms at the time of first foreign entry. Even if the causal direction cannot be determined, this agrees with the expectation that firms may be able to facilitate foreign activities by inviting external, corporate owners to provide the managerial or financial resources required for internationalization.

The expectation that firms with corporate owners are likely to follow a less traditional market selection sequence was weakly supported, using entry into the U.S. as a proxy. This suggests that entry into the U.S. may require extra resources provided by corporate owners¹⁴³.

Although it could not be concluded that firms with corporate owners were more likely to use foreign subsidiaries, the time lag between initial foreign entry and the establishment of a first foreign subsidiary was lower among these firms. Once again, this may be the outcome of a higher level of resource availability. However, as indicated above, it is not known when and why these corporate owners have entered a firm. One

¹⁴³ Ågren (1990) found that entry into the US market tends to be costly, compared to initial expectation.

can hypothesize either that they have been invited in order to provide the capital required for international expansion, or that they have pushed the internationalization idea once they have entered the firm.

Another factor that was expected to influence the process of internationalization was **previous experience** of managers within the firms. As expected, firms with established contacts with local representatives or general industry experience were likely to be younger at the time of their first foreign entry. However, the expectation that firms with previous experience would follow a less traditional pattern of market selection could not be supported. Previous industry experience was even found to be slightly less common among firms active in the U.S. than in other firms.

The second most important variable group in this study was technology intensity, measured in terms of R&D intensity and product characteristics. However, these results were slightly confusing, which reflects the difficulties in measuring characteristics of technology¹⁴⁴. The expected relationship between **R&D intensity** and speed of market selection could not be supported. Contrary to expectations, the propensity to use local subsidiaries was lower among R&D intensive firms. Similarly, the time lag between initial foreign entry and first subsidiary establishment was higher in those firms.

When looking at **product characteristics**, firms with a high level of product innovation were slightly older when going international. Once foreign activities had been initiated, however, a large number of foreign markets were rapidly entered. Concerning pattern of market selection, a less traditional establishment sequence was identified among firms providing high technology products, with high complexity and limited transportation costs. Market diversification was common among firms with complex, but relatively standardized products. The propensity to enter the U.S. market, finally, was higher among firms with innovative, high technology products with a high software content. When looking at entry forms, a higher propensity to use subsidiaries was identified in firms with innovative, high technology products.

¹⁴⁴ See discussion by Zander (1991), where attempts are made to operationalize dimensions characterizing manufacturing technology.

One interpretation may be that firms providing innovative, "high tech" products initially make considerable investments in product development. Due to extensive R&D expenditures, the financial resources available for an international penetration are limited, and sales are based on requests rather than on active commercialization. Over time, however, innovative, "high tech" firms are more likely than others to establish foreign subsidiaries and to enter the U.S. market.

In terms of **marketing requirements**, a shorter time lag between initial foreign entry and first subsidiary establishment was found among firms basing their strategy on personal marketing efforts, such as after sales services, customer education, technical sales personnel and brand name, rather than on low prices. This agrees with previous findings concerning the impact of marketing aspects on the selection of foreign entry forms¹⁴⁵.

These results were supported by the analysis of **industry structure**, where the factor "stage of industry development", including customer level of awareness and number of competitors, received a high explanatory value in several analyses. Rapid speed of internationalization, market diversification strategy and high propensities to enter the U.S. market were found among firms active in early stage of industries. This suggests that small firms may have an advantage during the early stages of industry development, by providing innovative products of high technology character while competition is still limited. However, in terms of foreign entry forms, the impact of industry structure was less clear.

International success

In chapter 8, an attempt was made to identify potential success factors during the process of internationalization. A subjective success measure, 'perceived profitability of foreign operations', indicated greater success among "high technology firms", with high R&D intensity and "high tech" products. Similarly, profitability was higher during early stages of industry development, with limited competition. During these stages, investments in

¹⁴⁵ E.g. Hörnell et. al. (1973)

product adaptation and market creation may be required before sales take off. Still, there appears to be a possibility to create "first mover" advantages, resulting in high margins and good performance. Conversely, profitability was lower when products were characterized by a high level of innovation, which may be explained by the considerable R&D investments required during the development of an innovation. Perceived success did not appear to be affected by variations in internationalization behaviour, which was disappointing since it limits the possibilities to establish any "rules of thumb" for international success.

International success in terms of a high export share or absolute export growth, was more common among firms of less "high technology" character, e.g. providing standardized products with a limited need for image creation, via brand name and after sales services. These firms were also more likely to have managers with previous foreign experience. Still, the explanatory value of these models was limited and all interpretations must be made with care.

Methodological discussion

Even if efforts have been invested to make the study as complete as possible, by including mini-case studies as well as an extensive mail survey, certain weaknesses remain. Due to the selection criteria used, the lack of substantial variations of the independent variables make it difficult to interpret some of the results, e.g. speed of internationalization. For example, are younger firms in general quicker to go abroad and to expand foreign activities, or is this merely a result of the sample criteria used?

Since internationalization is a longitudinal and iterative process, a cross sectional mail survey is likely to capture only certain aspects of the process. Measures of industry structure in particular are uncertain, since they are measured as they were perceived by the manager of the firm in 1987. Due to this, one does not know if these perceptions were correct or if the industry structure was the same at the time of the initial foreign activities. Considering these weaknesses, the explanatory value of industry stage of development is surprisingly high.

To overcome some of the methodological shortcomings with a mail survey, a number of short case studies were included. This made it possible to come closer to a process oriented research methodology. Still, in order to develop a complete understanding of the internationalization process, interviews also at customer companies, local representatives and local subsidiaries would have been valuable. This would also have permitted a more thorough analysis using a network approach. However, an initial ambition in this direction was tested in the pilot study, but turned out to be too resource intensive.

When trying to investigate the impact of technology on internationalization, it was not an altogether easy task to define technology intensity. It was found that in order to understand firm behaviour, it is important to investigate specific technology characteristics, e.g. levels of product technology, innovation and software content, rather than mere R&D expenditures.

Based on the analysis made, the difficulty to study international performance and to establish a more general success profile became obvious. One finding was that the choice of success variable has an important impact on the identification of success factors. This may explain the conflicting results achieved in previous research, where different success measures have been employed. Besides, it is questionable whether level of foreign activities, measured e.g. by export growth or export share, is a valid measure of success among small, technology-based firms.

Suggestions for future empirical research

During this research project, a number of questions related to the ones investigated have been raised. One question that was not examined in detail, was the use of other entry forms than direct exports, local representatives and subsidiaries. The use of licensing and piggy-backing in particular appears to be of some importance to this type of firms. Among firms not presently using these alternatives, how many have attempted to use them, but failed? Why did they fail? Among firms using these alternatives, what were the motives for selecting these entry forms? How did they evaluate the outcome?

Another question, only very briefly included in this study, concerns international activities other than foreign sales. R&D cooperation with foreign customers, for example, could be expected to be of importance to these firms, since access to sophisticated customers is a frequently cited motive for selecting markets of strategic importance. Similarly, it would be interesting to investigate more closely to what extent small, technology-based firms are involved in international networks, as suppliers of components to large multinational OEM-customers. A final aspect of internationalization would be to discover whether these firms are engaged in foreign manufacturing or purchasing, e.g. by using foreign sub-contractors for manufacturing of parts and components.

Finally, since the mail survey on which this study is based was undertaken in 1987, the question concerning a possible entry into the EEC was not investigated. Therefore, it would be interesting to complement this study with a follow-up study, to investigate whether these discussions have changed the international direction of these firms.

Theoretical implications

In this section, some theoretical implications related to the observations made in this study are presented. Basically, three different schools of thoughts are discussed; behaviouristic theories, internalization theories and a network approach.

Behaviouristic theories

The study gives some support for the sequential internationalization process of Aharoni (1966) and the Swedish researchers at Uppsala University during the 1970s¹⁴⁶. The pattern of market selection follows the traditional establishment sequence of Hörnell et. al. (1973) reasonably well, except for the increased importance of the U.S. as host country for early subsidiary establishment.

¹⁴⁶ E.g. Hörnell et. al. (1973), Johanson & Vahlne (1977), Johanson & Wiedersheim-Paul (1974)

Based on case analyses, the basic mechanism of learning seems to explain the observed typical change from opportunistic selection of foreign markets during early stages of internationalization, to a more strategically based selection process in later stages. Similarly, there appears to be a change in the selection of foreign representatives over time. During early stages of internationalization, opportunistic selection of representatives based on existing contacts and orders received, is common. However, once foreign sales start to take off, these initial representatives are often replaced.

There appears to be a greater propensity to follow a traditional establishment chain in large distant markets, such as the U.S. and Japan, than in markets of limited "economic distance", e.g. the U.K. and West Germany. This may reflect a decrease in the "economic distance" between Sweden and other North European countries due to increased international integration. As a result, a subsidiary establishment in the U.K. or West Germany may not be considered a great international step, but rather an increased commitment in an extended "home market".

Internalization theory

If R&D intensity is used as a measure of level of proprietary knowledge, this study gives limited support to the idea of internalization of such investments. In fact, a lower propensity to establish foreign subsidiaries and a longer time lag between first foreign sales and the establishment of a local subsidiary was found among firms with a high level of R&D intensity.

In terms of product technology, however, the expected relation between proprietary technology and the propensity to use foreign subsidiaries is supported. The propensity to use foreign subsidiaries is higher in firms providing innovative products or products of a high level of technology. Overall, this indicates that the character of the technology developed is more likely to affect the internalization decision than the amount of resources invested in the development process. In other words, R&D intensity appear to be a poor measure of 'proprietary knowledge'.

Similar findings are reported by Zander (1991), whose research indicated a preference of wholly-owned subsidiaries over licensing or joint ventures when the technology was characterized by a low technology age, high observability¹⁴⁷ and high team dependence¹⁴⁸. These findings are in line with the observation in this study of a higher propensity to use subsidiaries when the level of product innovation is high, i.e. when the technology age is low.

Network theory

Previous studies of Swedish firms have often stressed the importance of networks between individual firms. During many years of regular interaction, technological, social and other types of bonds are developed. The establishment of such networks requires time, effort and resources¹⁴⁹.

In this study, such an approach has been supported. One of the main problems indicated was the difficulties to identify suitable local representatives. Even when local representatives had been identified, they were often replaced before an acceptable cooperation was established. In cases where a working personal relationship had been developed, however, the performance of the representative was often considerably higher.

Among technology-based firms, considerable information exchanges during international seminars, symposia and trade shows are likely to result in an international contact network. This appears to be particularly true in firms established as spin-off from university research. Such a network is likely to facilitate internationalization, by providing initial contacts. Another important source of information is Swedish and foreign customers, together with whom the firms have developed customer adapted products and applications. These findings agree with the research of von Hippel (1978), indicating that

¹⁴⁷ I.e. how easily the technology is learned by a competitor by examining the product/ process.

¹⁴⁸ I.e. the degree to which the technology is dependent on the experience of a group of persons.

¹⁴⁹ See e.g. Hägg & Johanson (1981); Johanson & Mattsson, 1984; Thorelli (1986)

customers are often an important source of ideas concerning new products or applications.

In firms established as spin-offs from other Swedish firms, general industry knowledge or contacts with local representatives appear to facilitate the process of internationalization. Surprisingly, such contacts sometimes resulted in lower perceived profitability, perhaps reflecting overoptimistic expectations or market selection based on opportunities rather than strategic considerations.

Finally, initial internationalization has often been facilitated by the possibility of firms to draw upon the international distribution networks of large Swedish multinationals. Over time, however, these cooperative arrangements have not always worked out as planned. Still, they have contributed to a rapid speed of internationalization and facilitated the identification of local representatives.

Conclusions

During this study, a number of observations concerning the internationalization behaviour of small, technology-based firms have been made. When looking at the empirical results, one may conclude that these firms often rapidly engage in foreign activities. The speed of internationalization was particularly high in firms where managers had previous experience of foreign operations. In terms of actual behaviour, the propensities to enter the U.S. market and to establish foreign subsidiaries are positively associated with a corporate ownership and innovative or "high tech" products. Thus, internationalization appears to be facilitated if a firm provides unique products of innovative or "high tech" character and is able and willing to invite external capital and managerial resources. However, the impact of firm size and R&D intensity was less than expected.

When looking at theoretical implications, this study gives some support to the behaviouristic approach, indicating a sequential process of internationalization. Still, certain differences from traditional theory have been identified. Since technology-based firms are often part of an international community, where contacts are based on a shared

interest in a particular technology area rather than on geographic or cultural similarities, foreign markets are usually selected based on strategic considerations, e.g. access to advanced customers, market potential and the competitive situation. Besides, there are some indications that the perceived "home market" of many Swedish firms has expanded to include other North European countries. This may explain why the "establishment chain" to foreign activities, i.e. direct exports and local representatives before foreign subsidiaries, is less valid in West Germany and the U.K. than in the U.S. and Japan.

In this study, the internalization argument, i.e. that firms are unwilling to exploit proprietary knowledge on an imperfect market, was only weakly supported. During the early stages of industry development there was more concern about possibilities for competitive cooperation in order to increase customer awareness, than about future imitation and competition. Furthermore, an important motive for establishing foreign subsidiaries was the necessity of being close to advanced customer during the development and initial commercialization of technology-based products, which explains the high relative importance of local subsidiaries in markets of high strategic importance, e.g. the U.S., the U.K. and West Germany.

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APPENDICES

APPENDIX I: SAMPLE FRAMES

Table: Description of the sample frames (no. of firms)

	First mailing	Second mailing	TOTAL
Total sample frames:	100	340	440
Firm not fulfilling selection criteria:			
a. no in-house R&D activities	18	40	58
b. subsidiary establishments	7	24	31
c. established before 1965	8	20	28
d. less than 20% exports	75	116	191
e. foreign owners	1	37	38
Other excluded firms:			
a. no contact	2	6	8
b. double mailings	0	6	6
Intended sample frame:	20	124	144
Responses received:			
a. complete	12	73	85
b. abbreviated	0	0	10
Response rates:			
a) complete	60%	59%	59%
b) including abbreviated			66%

APPENDIX II:**THE MAIL SURVEY (Letter of presentation)**Internationaliseringen av mindre, teknikbaserade företag

Institute of International Business (IIB) vid Handelshögskolan i Stockholm, inledder under 1986 ett forskningsprojekt om internationaliseringen av mindre, teknikbaserade företag. Syftet är att studera möjligheterna för mindre företag att på ett tidigt stadium etablera sig på den internationella marknaden. Undersökningen genomförs av civilekonom Maria Lindqvist, under ledning av docent Lars Håkanson.

I dagsläget har ett antal fallstudier med mindre, teknikbaserade svenska företag genomförts. För att öka möjligheterna att dra generella slutsatser genomförs nu en enkätundersökning av ett större antal företag inom elektronikbranschen.

Medverkande företag kommer dels att få möjlighet att under våren 1988 delta vid ett seminarium, där resultaten från undersökningen presenteras, dels erhålla en skriftlig rapport.

Undersökningsresultatens kvalitet är starkt beroende av att utvalda företag delta. Vi hoppas därför att Ni, eller annan person med god erfarenhet av företagens internationella verksamhet, vill hjälpa oss genom att avsätta de cirka 20 minuter som krävs för att fylla i bifogad enkät. Alla svar kommer naturligtvis att behandlas konfidentiellt och ingen information om enskilda företag kommer att kunna utläsas ur resultaten.

Vi vore mycket tacksamma om Ni har möjlighet att besvara vår enkät före den 30 oktober 1987. Vänligen sänd den ifyllda enkäten till:

Maria Lindqvist
IIB
Box 6501
113 83 STOCKHOLM

Med vänliga hälsningar

Docent Lars Håkanson
Chef IIB

Maria Lindqvist
Civilekonom

POSTAL ADDRESS: P.O. BOX 6501, S-113 83 STOCKHOLM, SWEDEN OFFICE ADDRESS: SVEAVÄGEN 65
TELEPHONE +46 (0) 8 736 0120 CABLE: SCHOOLECON, STOCKHOLM

SCREENING FORM (translated version)

NOTE: In order to avoid unnecessary work, please fill in this form before answering the enclosed survey

Name of the firm:

- () The firm is a subsidiary of a foreign company

IF THE FIRM IS A SUBSIDIARY OF A FOREIGN
COMPANY, PLEASE RETURN THIS FORM WITHOUT ANSWERING
THE COMPLETE QUESTIONNAIRE

Does the firm perform any type of in-house R&D activities?

Was the firm established as an independent entity, i.e. not as a subsidiary of another non-financial corporation?

Was the firm established later than 1964?

Did the firm have an export share of at least 20% during last year?

IF THE ANSWER TO ANY OF THESE QUESTIONS IS
NO, PLEASE RETURN THIS FORM WITHOUT
ANSWERING THE COMPLETE QUESTIONNAIRE

THANK YOU FOR YOUR COOPERATION !

QUESTIONNAIRE (translated version)¹

STRICTLY CONFIDENTIAL

No information about individual firms will be published without the firm's approval.

Lars Håkanson
Docent

Maria Lindqvist
Civilekonom

INTERNATIONALIZATION OF SMALL, TECHNOLOGY-BASED FIRMS

Name of the firm (A):
Name of respondent (A):
Position of respondent (A):
Telephone (A):
Year of firm establishment (A):

If the firm has Swedish subsidiaries, please name these and indicate if its activities are related to the main activities of the firm. Related subsidiaries are to be included in the definition of the firm.

Related subsidiaries:

Non-related subsidiaries:

Foreign subsidiaries are not to be included in the definition of the firm, unless such a specification is indicated

¹ Figures in parenthesis represent number of firms giving a specific response. Questions followed by (A) indicate that the question was included also in the abbreviated version of the questionnaire.

1. FIRM DESCRIPTION

Ownership structure

- 1.1 Please indicate the percentage of firm shares owned by
- a) private persons:
 - b) venture capital/ investment firms and other financial institutions:
 - c) other corporate, non-financial owners:

Product area

- 1.2 (A) What are the three most important products/ business areas of the firm and how large are their shares of total sales?

Comments:

Firm size and profitability

- 1.3 (A²) Please approximate turnover, export share and number of employees in Sweden and abroad in 1982 (1981) and 1987 (1986)

1982 (1981) 1987 (1986)

- a) turnover
- b) export share
- c) no. of employees in Sweden
- d) no. of employees abroad

- 1.4 (A) Please indicate the profitability of the firm in 1987 (1986)

Very high	5 (21)	4 (23)	3 (23)	2 (12)	Very low	1 (6)
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Comments:

² excluding figures for 1982 (1981)

Personnel

- 1.5 Please approximate the number of employees in different functions in 1987 (1986)
- a) research and development
 - b) production and assembly
 - c) marketing and sales
 - d) other functions

Production

- 1.6 a) How is production of larger series of components/ products organized?
- in-house (23) subcontracting (30) a combination (30)
- b) How is final production organized?
- at order (41) for stock (10) a combination (32)

Research and development

- 1.7 (A) How large were the firm's R&D expenditures during 1987?
- 1.8 How many patents were approved in Sweden in 1987 and how many were used?
- 1.9 Does any R&D activities take place in cooperation with external partners?
- No (15) Yes (70), with:
- a) customers: Swedish (17), foreign (10), both (23)
 - b) competitors: Swedish (1), foreign (1)
 - c) consultants: Swedish (25), foreign (2), both (5)
 - d) universities: Swedish (18), foreign (1), both (7)
 - e) others (15)

2. INTERNATIONALIZATION

2.1 (A³) Please indicate approximately what year the firm first had a larger export order, entered an agent/distributor agreement or established a local subsidiary in the following markets. Indicate also if activities on a market have later been terminated. If the firm has considerable activities in other markets, please include them in the list.

Market	Direct exports (year)	Agent/ distributor (year)	Local subsidiary (years)	Terminated (year)
1. Argentina	(4)	(6)	(0)	
2. Australia	(12)	(33)	(2)	
3. Belgium	(20)	(36)	(2)	
4. Brazil	(7)	(6)	(0)	
5. Canada	(18)	(28)	(5)	
6. Denmark	(34)	(46)	(4)	
7. Finland	(31)	(52)	(5)	
8. France	(26)	(45)	(5)	
9. Italy	(23)	(29)	(2)	
10. Japan	(12)	(22)	(4)	
11. Netherl.	(24)	(46)	(3)	
12. Norway	(13)	(49)	(9)	
13. Portugal	(9)	(16)	(1)	
14. Switzerl.	(20)	(41)	(2)	
15. Spain	(10)	(30)	(2)	
16. U.K.	(22)	(43)	(15)	
17. S.Africa	(5)	(5)	(0)	
18. U.S.	(27)	(38)	(18)	
19. BRD	(27)	(43)	(13)	
20. Austria	(14)	(36)	(1)	

³ excluding year of market termination

2.2 (A) If the firm has other types of foreign activities, please indicate in what form and in what markets:

- a) licensing: (10)
- b) export cooperation: (3)
- c) piggy-backing: (7)
- d) other forms: (7)

2.3 (A⁴) Please indicate the three main motives for entering the three most important markets:

Markets 1) 2) 3)

- limited local competition: (65)
- importance of being where the main competitors are: (45)
- access to advanced customers: (109)
- large market potential: (169)
- established contacts with customers/representatives: (74)
- an order was received: (60)
- difficulties to handle customer relations due to large distance: (16)
- closely situated market: (70)
- limited cultural differences: (34)
- a known language: (43)
- other motives: (15)

⁴ excluding indications of motives for entering the markets

3. FOREIGN ORGANIZATION

Question 3.1 is to be answered only by firms with at least one foreign subsidiary

Foreign subsidiaries

- 3.1 (A⁵) Please approximate the turnover of all foreign subsidiaries and indicate if the subsidiary is a joint venture, a production subsidiary or has local R&D activities.

Market	Turnover	Joint venture	Production	R&D
	(16)		(21)	(5)

Questions 3.2 to 3.5 are to be answered only by firms with at least one local agent or distributor

Local representatives

- 3.2 Please approximate your sales through the three most important agents/distributors. Indicate the size of the agent/distributors and whether he is engaged in production or not.

Market	Sales	No. of employees			Production
		<100	100-500	>500	
		(152)	(25)	(14)	(49)

⁵ excluding sales volumes/market

3.3 How has the firm come into contact with foreign representatives and how successful have different contact alternatives been?

	Very good 5	4	3	2	Very bad 1
a) the Export Council	(2)	(3)	(8)	(6)	(6)
b) Chambers of Comm.	(2)	(1)	(12)	(6)	(5)
c) personal contacts	(36)	(19)	(10)	(0)	(2)
d) trade shows	(7)	(18)	(19)	(7)	(0)
e) travelling	(19)	(19)	(7)	(7)	(0)
f) requests	(12)	(20)	(24)	(5)	(1)
g) other forms	(4)	(3)	(3)		

3.4 How often do representative agreements include different clauses?

	Always 5	4	3	2	Never 1
a) exclusivity/ market	(29)	(28)	(12)	(2)	(2)
b) exclusivity/ product	(25)	(19)	(9)	(2)	(8)
c) trial agreements	(19)	(12)	(14)	(5)	(12)
d) brand name	(41)	(11)	(8)	(1)	(4)
e) time limit, years:	(24)	(10)	(4)	(3)	(12)

Comments:

3.5 (A) How often does the firm use different types of representatives?

	Always 5	4	3	2	Never 1
a) small firms	(13)	(31)	(25)	(3)	(3)
b) manufacturing firms	(1)	(6)	(25)	(23)	(11)

Comments:

4. INDUSTRY STRUCTURE

4.1 (A) Please indicate how you want to characterize the industry structure for your most important product/product area:

	High/many 1	2	3	4	Low/few 5
a) Market growth	(15)	(34)	(28)	(6)	(2)
b) Establishment	(16)	(33)	(19)	(12)	(5)
c) No. of applications	(16)	(17)	(15)	(18)	(18)
d) No. of end-users	(27)	(19)	(11)	(15)	(11)
e) No. of competitors	(10)	(19)	(29)	(18)	(8)
f) Transport costs	(10)	(18)	(20)	(16)	(20)

Comments:

4.2 Approximately how large is the firm's market share, based on your market definition?

- a) Market definition:
- b) Market share:

4.3 How large is the risk of future competition in your main product are?

Very high 5 (21)	4 (34)	3 (17)	2 (13)	Very low 1
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5. MARKETING

5.1 (A) Please indicate how you want to characterize your most important product:

	High level 5	4	3	2	Low level 1
a) technology	(34)	(21)	(20)	(7)	(3)
b) innovation	(17)	(23)	(19)	(11)	(14)
c) standardization	(8)	(9)	(19)	(24)	(24)
d) software	(0)	(7)	(29)	(14)	(15)
e) complexity	(12)	(22)	(20)	(9)	(8)

Comments:

5.2 What is the approximate value of an average order of your most important product?

5.3 How important are different marketing factors for your most important product?

	Very important 5	4	3	2	Unimportant 1
a) after sales services	(39)	(26)	(9)	(7)	(2)
b) technical sales men	(37)	(27)	(12)	(7)	(1)
c) customer education	(21)	(26)	(17)	(10)	(7)
d) local adaptation	(31)	(18)	(15)	(13)	(6)
e) credits	(1)	(12)	(15)	(13)	(6)
f) high quality	(64)	(17)	(3)		
g) low price	(5)	(10)	(37)	(27)	(4)
h) brand name	(11)	(19)	(24)	(15)	(12)
i) other factors	(11)	(1)	(1)		

5.4 How important are different marketing channels for your most important product?

	Very important 5	4	3	2	Unimportant 1
a) trade shows and fairs	(18)	(23)	(23)	(11)	(7)
b) seminars etc.	(9)	(18)	(15)	(23)	(16)
c) articles etc.	(10)	(22)	(32)	(13)	(4)
d) info/brochures	(19)	(27)	(31)	(10)	(2)
e) personal sales	(53)	(19)	(7)	(4)	(1)
f) other channels	(3)	(3)			

5.5 Please indicate approximately how often you have contacts with your most important agent/distributor in different ways:

	> 1 time/ month	6-12 times/ year	3-5 times/ year	1-2 times/ year	more seldom	never
a) seminars, meetings	(7)	(5)	(7)	(39)	(13)	(5)
b) visits	(9)	(10)	(28)	(25)	(4)	
c) education of personnel	(2)	(3)	(7)	(35)	(24)	(4)
d) reports	(11)	(19)	(10)	(15)	(17)	(5)

Comments:

5.6 If the firm has direct contacts with end-users, in what way and how often?

6. EVALUATION

6.1 To what extent do you agree with the following propositions?

	Completely 5	4	3	2	Not at all 1
a) We want to remain small to keep our flexibility and independence	(13)	(17)	(17)	(18)	(19)
b) It is unnecessary to apply for patents, since we cannot afford to defend them	(16)	(19)	(19)	(19)	(11)
c) It was important to develop our home market before going international	(36)	(14)	(15)	(8)	(12)
d) It was important to rapidly go international	(19)	(26)	(16)	(20)	(2)
e) Personal contacts were more important during early estab- lishments than later	(27)	(22)	(16)	(9)	(6)

6.2 Has the firm had any problems during internationalization concerning:

	Very large 5	4	3	2	None 1
a) financing	(12)	(8)	(11)	(21)	(32)
b) identification of representatives	(17)	(31)	(21)	(9)	(5)
c) market knowledge	(4)	(24)	(29)	(20)	(8)
d) other problems	(3)	(2)			

6.3 Has the firm been able to use previous experience of personnel during internationalization?

- a) contacts with agents/distributors (40)
- b) financial contacts (7)
- c) local market knowledge (39)
- d) industry experience (61)
- e) other types (5)

6.4 (A) How was the profitability of your foreign activities during 1987?

Very good	Very bad
5 (19) 4 (22) 3 (32) 2 (9) 1 (3)	

6.5 (A) How well did you succeed internationally compared to your expectations?

Very well	Very bad
5 (10) 4 (25) 3 (37) 2 (9) 1 (3)	

6.6 How do you expect the firm's foreign activities to develop in the future concerning:

Increase No change Decrease

- a) sales volumes (81) (4)
- b) export share (60) (21)
- c) no. of markets (63) (20) (3)
- d) foreign organization?

6.7 If you would initiate foreign activities today, what would you do differently?

THANK YOU FOR YOUR COOPERATION!

APPENDIX III: ANALYSIS OF NON-RESPONDENTS

Table: Distribution of respondents and non-respondents according to age, size (turnover and no. of employees) and industries. (Column percentage)

	Respondents	Non-respondents
Firm age		
0-10 years	38 (40%)	18 (43%)
11-15 years	25 (26%)	8 (19%)
>15 years	32 (34%)	16 (38%)
TOTAL	95	42
	Respondents	Non-respondents
Firm size (turnover)		
0-20 MSEK	41 (43%)	25 (63%)
20-50 MSEK	29 (31%)	8 (20%)
>50 MSEK	24 (26%)	7 (18%)
TOTAL	95	40
	Respondents	Non-respondents
Firm size (no. of employees)		
0-20 persons	40 (42%)	20 (55%)
20-50 persons	24 (25%)	8 (22%)
>50 persons	31 (32%)	8 (22%)
TOTAL	95	36
	Respondents	Non-respondents
Industry classification		
Chemistry	10 (11%)	3 (6%)
Machinery	33 (37%)	14 (30%)
Electronics	23 (26%)	16 (34%)
Instruments/ optics	15 (17%)	8 (17%)
Others	9 (10%)	5 (11%)
TOTAL	95	46

APPENDIX IV: GENERAL SAMPLE DESCRIPTION

Table 1: Age of sample firms in 1987

Age:	No. of firms:	Percentage:
0-10 years	38	40%
11-15 years	25	26%
16-22 years	32	34%

No. of observations = 95

Average age = 12 years

Table 2: Number of employees in Sweden in 1987 (1986)

No. of employees:	No. of firms:	Percentage:
0-20 employees	40	42%
20-50 employees	24	25%
50-200 employees	27	27%
201+ employees	4	4%

No. of observations = 95

Average no. of employees = 56 persons

Table 3: Total turnover in 1987 (1986)

Turnover (MSEK):	No. of firms:	Percentage:
0-20 MSEK	41	43%
20-50 MSEK	29	31%
50-200 MSEK	23	24%
201+ MSEK	2	2%

No. of observations = 95

Average turnover = 69.5 MSEK

Table 4: Product diversification

No. of product types:	No. of firms:	Percentage:
1 product type	23	28%
2 product types	25	31%
>2 products	33	41%

No. of observations = 81

Table 5: Ownership structure 1987 (1986)

Ownership type:	No. of firms:	Percentage:
Private ownership	42	44%
Corporate ownership	21	22%
Mixed ownership	21	22%

No. of observations = 84

Table 6: R&D intensity as a percentage of employees working with R&D related to total number of employees, excluding production and assembly.

R&D intensity (personnel):	No. of firms:	Percentage:
0-10%	24	28%
11-25%	26	31%
26-50%	32	38%
51%-	3	4%

No. of observations = 85

Average R&D intensity = 24.3%

Table 2: Matrix of correlations between internationalization variables⁷ and explanatory variables (Kendall's Tau-B)

	Direct exports	Local subsidiary	Success (0-1)
Internal firm characteristics			
Firm size			
- turnover	-0.164 *	0.268 ***	0.000
- employees	-0.132	0.230 **	-0.156
Product characteristics			
- level of technology	0.107	0.137	0.276 *
- level of innovation	-0.274 ***	-0.166	0.051
- standardization	-0.089	0.082	-0.019
- software content	-0.108	-0.131	0.129
- complexity	-0.117	0.113	0.029
- transport costs	-0.041	-0.037	-0.344 **
Marketing requirements			
- A/S services	0.094	0.115	-0.191
- Techn. salesmen	0.126	0.061	-0.024
- Customer education	0.176 *	0.188 *	-0.207
- Local adaptation	-0.019	0.137	0.082
- Credits	-0.079	0.007	-0.089
- Low price	-0.094	-0.132	-0.263 *
- Brand name	-0.023	0.190 *	0.039
Industry structure			
- Market growth	0.183 **	-0.098	0.234
- Customer awareness	-0.046	0.027	0.128
- No. of applications	-0.161 *	-0.093	0.025
- No. of end-users	0.145	0.072	0.158
- No. of competitors	-0.236 ***	-0.061	-0.331 **

⁷ Classified on an ordinal scale

Table 3: Associations between internationalization variables and explanatory variables⁸ (Chi-square values)

	Age at first foreign entry	No. of years to enter 5 markets	No. of markets after 3 years	Pattern of market selection	Entry into the U.S.
Ownership structure	6.665 **	3.359	0.769	0.494	3.231 *
Previous experience					
- local representatives	12.205 ***	0.746	0.516	1.414	0.001
- financial contacts	2.954	1.564	0.028	3.861 **	1.773
- local knowledge	2.172	2.537	0.153	0.981	0.094
- industry knowledge	5.064 *	1.719	0.000	0.610	4.028 **
Industry classification	3.274	3.359	6.891 *	2.811	5.848

Table 4: Associations between internationalization variables and explanatory variables (Chi-square values)

	Direct exports	Local subsidiary	Success (0-1)
Ownership structure	7.269 ***	2.400	3.589 *
Previous experience			
- local representatives	0.758	0.043	3.656 *
- financial contacts	0.088	0.090	0.115
- local knowledge	0.094	0.219	0.354
- industry knowledge	0.265	0.299	0.007
Industry classification	10.541 **	8.030 **	6.464 *

⁸ Classified as ordinal data

Table 5: Matrix of correlations between internationalization variables and explanatory variables (t-values)

	Age at first foreign entry	No. of years to enter 5 markets	No. of markets after 3 years	Pattern of market selection	Entry into the U.S.
Technology intensity					
- R&D exp./turnover	0.203	0.259	1.739 *	0.770	0.564
- R&D exp./employee	0.037	0.720	0.968	0.577	0.200
- R&D personnel	0.591	1.310	0.861	0.419	0.812

Table 6: Matrix of correlations between internationalization variables and explanatory variables (t-values)

	Direct exports	Local subsidiary	Success (0-1)
Technology intensity			
- R&D exp./turnover	0.678	1.272	1.267
- R&D exp./employee	0.246	0.408	1.716 *
- R&D personnel	0.391	0.712	1.273

APPENDIX VI: FACTOR ANALYSES

Table: Factor analyses of explanatory variables

ANALYSIS 1 - FIRM SIZE

Factor:	Size	
Variables to be factored	Component loadings	Per cent of variance explained
1. Turnover	0.963	
2. No. of employees	0.963	93%

ANALYSIS 2 - TECHNOLOGY INTENSITY

Factors:	R&D intensity	No. of patents	
Variables to be factored	Component loadings		Per cent of variance explained
1. R&D expenditures/ turnover	0.942	-0.090	
2. R&D expenditures/ employee	0.919	0.071	
3. R&D personnel/ total personnel (excl. prod)	0.839	-0.008	
4. No. of patents in -87	0.024	0.961	
5. No. of patents overall	-0.042	0.959	86%

ANALYSIS 3 - MANAGEMENT EXPERIENCE

Factors:	Industry experience	Local experience	
Variables to be factored	Component loadings		Per cent of variance explained
1. Local representatives	0.871	-0.172	
2. General industry exp.	0.782	0.338	
3. Local market exp.	0.031	0.964	81%

ANALYSIS 4 - MARKETING REQUIREMENTS

<u>Factors:</u>	Education needs	Local needs	Image needs
Variables to be factored	Component loadings		
1. Technological sales personnel	0.924	-0.035	0.023
2. Customer education	0.835	0.022	0.312
3. Local adaptation	-0.062	0.787	0.046
4. Credit	0.071	0.737	0.046
5. After-sales services	0.194	0.065	0.787
6. Brand name	0.025	0.006	0.784
7. Low price	-0.197	0.407	-0.569
			66%

ANALYSIS 5 - INDUSTRY STRUCTURE

<u>Factors:</u>	Market potential	Stage of development	
Variables to be factored	Component loadings		Per cent of variance explained
1. No. of applications	0.792	0.031	
2. No. of customers	0.781	-0.073	
3. Market growth	0.505	-0.546	
4. No. of competitors	0.262	0.804	
5. Customer awareness	-0.188	0.652	59%

APPENDIX VII: PEARSON CORRELATIONS MATRIX

Table: Pearson correlations⁹ matrix of explanatory variables and factors¹⁰

	SIZE	AGTYPE	IEXP	FEXP	INTENS
SIZE	1.000				
AGTYPE ¹¹	0.258	1.000			
IEXP	-0.041	0.063	1.000		
FEXP	0.219	0.166	0.000	1.000	
INTENS	0.009	0.039	-0.131	0.232	1.000
PATENTS	0.801	0.278	0.019	0.353	-0.006
TECH ¹²	0.062	-0.011	-0.101	0.035	0.404
INOVA ¹³	0.103	0.016	0.065	0.082	0.155
ED	-0.043	-0.075	0.038	0.121	0.071
ADAPT	0.228	0.350	-0.084	-0.041	-0.039
IMAGE	0.226	-0.043	0.077	0.093	0.028
POT	-0.089	-0.033	0.106	-0.094	-0.072
STAGE	0.143	0.179	0.232	-0.177	-0.468

⁹ pairwise correlations

¹⁰ LEGEND: SIZE = firm size, AGTYPE = ownership structure, IEXP = industry experience, FEXP = foreign experience, INTENS = R&D intensity, PATENTS = no. of patents, TECH = level of technology, INOVA = level of innovation, ED = importance of customer education, ADAPT = importance of local adaptation, IMAGE = importance of image creation, POT = market potential, STAGE = industry stage of development, IAGE = firm age at first foreign entry, SPEED = no. of years required to enter 5 foreign markets, COM3 = No. of markets entered within 3 years from first foreign entry, USA = whether the US market has been entered, SUBS = whether subsidiaries have been used, INFO = no. of information sources used, INTAR = no. of years with foreign activities

¹¹ Dummy variable (0 = corporate ownership, 1 = privately owned)

¹² Measured on a 5-point Likert scale (1 = low, 5 = high)

¹³ Measured on a 5-point Likert scale (1 = low, 5 = high)

	PATENT	TECH	INOVA	ED	ADAPT
IMAGE	1.000				
POT	0.137	1.000			
STAGE	0.299	0.139	1.000		
IAGE	0.039	0.259	0.189	1.000	
SPEED	0.234	-0.128	-0.109	-0.006	1.000
COM3	0.417	0.123	0.127	-0.012	-0.007
U.S.	-0.053	0.113	0.108	-0.079	0.054
SUBS	0.043	-0.253	-0.425	-0.243	0.272
INFO	-0.024	-0.038	0.267	0.075	-0.053
INTAR	-0.001	-0.136	-0.155	-0.135	0.180
INTAR	0.028	0.086	0.205	-0.010	-0.059
U.S.	0.155	0.151	0.323	0.285	0.117
SUBS	0.208	0.126	0.173	0.092	0.116
INFO	0.100	-0.144	0.022	0.103	0.086
INTAR	0.159	-0.133	-0.285	-0.007	0.121
	IMAGE	POT	STAGE	IAGE	SPEED
IMAGE	1.000				
POT	0.059	1.000			
STAGE	-0.147	0.000	1.000		
IAGE	-0.040	0.066	-0.146	1.000	
SPEED	-0.100	-0.007	0.223	-0.025	1.000
COM3	0.192	-0.168	-0.244	-0.105	-0.677
U.S.	0.020	-0.164	-0.163	-0.092	-0.279
SUBS	0.240	-0.024	-0.011	0.123	0.078
INFO	0.120	0.054	0.030	-0.155	0.029
INTAR	0.106	-0.262	0.410	-0.241	0.548
	COM3	U.S.	SUBS	INFO	INTAR
COM3	1.000				
U.S.	0.348	1.000			
SUBS	0.039	0.359	1.000		
INFO	0.082	0.187	0.218	1.000	
INTAR	-0.346	0.115	0.170	0.248	1.000

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