

**Turning social capital into business?  
A study of Swedish biotech firms'  
international expansion**

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**SMG WP 10/2006**

**June 2006**

**SMG Working Paper No. 10/2006**

**June 2006**

**ISBN: 87-91815-27-4**

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# Turning social capital into business?

## A study of Swedish biotech firms' international expansion.

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### Abstract

The effects of using personal networks have in recent years become a topic of interest in the research area that focuses on the internationalization process of the firm. Few studies have, however, used the concept of social capital when studying the internationalization process of high-tech SMEs. In this explorative case study, ten Swedish SMEs in the biotech business have been examined in order to see how they use social capital for accessing the critical resources that they need in their internationalization process. The results of the study indicate that the usefulness of social capital changes during this process and that the wrong perception of social capital's usefulness can lead to unsuccessful internationalization.

## **Introduction**

During the last decade, we have seen a rise in the number of small and medium-sized enterprises (SMEs) that operates in foreign markets from the start, or soon thereafter. These rapid internationalizing SMEs have been labeled Born Globals (Rennie, 1993; Knight and Cavusgil, 1996) or International New Ventures (McDougall, Shane and Oviatt, 1994). A significant amount of studies within this field of research have specifically focused on firms operating within high-tech markets (Bell, 1995; Coviello and Munro, 1997; Knight and Cavusgil, 1996; McDougall et al., 1994; Moen, Gavlen and Endresen, 2004; Spence, 2003; Yli-Renko, Autio and Tontti, 2002). This group of SMEs faces the challenge of managing business in emerging and often specialized niche markets (Crick and Jones, 2000), in which environmental variables change constantly (Autio, Sapienza and Almeida 2000; Crick and Spence, 2005; Jones, 1999). In addition to these challenges, SMEs often face a situation of limited resources compared to large firms, which can be a major constrain for an SME's growth and international expansion (Coviello and McAuley, 1999).

Two of the most important critical resources needed in the internationalization process of high-tech SMEs are foreign market knowledge, seen as experience of foreign operations (Autio et al., 2000; Sharma and Blomstermo, 2003; Yli-Renko et al., 2002) and financial resources (Bell, 1997; Spence, 2003). In order to get access to these scarce resources, high-tech SMEs have been shown use their networks (Bell, 1995; Coviello and Munro, 1997; Jones, 1999; Saarenketo, Puumalainen, Kuivalainen and Kyläheiko, 2003; Sharma and Blomstermo, 2003). Several studies have especially highlighted the usefulness of personal networks that are developed by founders and managers (Crick and Spence, 2005; McDougall et al., 1994; Moen et al., 2004; Yli-Renko et al., 2002). Even though the use of personal networks and the effects thereof have been considered in these studies, we are surprised to find that so few of them have merged personal networks and resource access into the concept of social capital when investigating the internationalization process of high-tech SMEs. Yli-Renko, Autio and Tontti's (2002) study of technology-based new firms' international growth, is an exception. The authors argue that much is left to be done in order to examine the effects of social capital in international expansion. This paper answers their call for more research, by studying how social capital influences the internationalization process of biotech SMEs.

In this study we focus on the social capital possessed by the individuals, often the founders and managers of high-tech SMEs, and how foreign market knowledge and financial resources can be mobilized via their networks. We then address the question of how high-tech SMEs manage the situation when critical resources no longer can be mobilized through the existing social capital of founders and managers. Other studies of high-tech SMEs have discussed the challenges that these firms face when using their networks to access resources in their internationalization processes (Crick and Spence, 2005; Jones, 1999, Rovira, Melén and Sharma, 2006). High-tech SMEs' abilities to mobilize critical resources could be connected to their capability to evaluate the usefulness of social capital in their internationalization process, i.e. their capability to exploit useful existing social capital as well as realizing when there is a need for exploration of new social capital.

The purpose of this study is to examine how high-tech SMEs use social capital in their internationalization process and how the usefulness of social capital affects this process. In doing so, we have conducted an explorative case study of ten Swedish biotech SMEs. The Swedish biotech industry has had the most rapid growth of all sectors in Sweden during the last 10 years and is today among the top four biotech industries in Europe. We aim to make two important contributions to the field of high-tech SMEs' internationalization. First, by using the concept of social capital in researching the internationalization process of SMEs, the study contributes to the understanding of the effects of social capital in an international context. Second, by applying the concept of social capital to the field of high-tech SMEs' internationalization, we contribute by developing a conceptual model aiming to explain how changes in the usefulness of social capital and changes in social capital itself, can influence a high-tech SME's internationalization process.

## **Theoretical Background**

### **Internationalization**

Traditional internationalization process theories describe the internationalization process of firms as a process of accumulating knowledge of markets and institutions abroad, by operating in these markets (Bilkey and Tesar, 1977; Johanson and Vahlne, 1977). The internationalization process is an incremental learning process where the experiences made in each step provides the firm with new foreign market knowledge. While several scholars that have examined the internationalization process of high-tech SMEs have criticized the incremental internationalization process (Bell, 1995; Knight and Cavusgil, 1996), a study by

Autio et al. (2000), has found support for the incremental process. These authors argue that small, newly started high-tech firms take small incremental steps in their internationalization process, but are able to do so in a more rapid manner than older firms (Autio et al., 2000). Their finding suggests that high-tech SMEs must experience more rapid learning than older firms, in order for rapid internationalization to occur. To manage this fast learning and internationalization, SMEs can use their networks, and thus studies have demonstrated SMEs extensive use of their networks to access resources in their internationalization (Crick and Spence, 2005; McDougall et al., 1994; Yli-Renko et al., 2002). Such resources include financial resources and knowledge about foreign markets (Spence, 2003). Also, initial relationships with larger firms can guide SMEs' modes of entry and provide them with important market knowledge (Coviello and Munro, 1997). Domestic and foreign client following is another important explanation for high-tech firms' internationalization (Bell, 1995).

### **Social capital, learning and the internationalization process**

In their formulation of international new ventures from 1994, McDougall et al. emphasizes that personal networks developed by founders can facilitate knowledge access for small and newly started international ventures. Their findings have later been supported in studies of both high-tech SMEs and SMEs operating in other industries (Andersson and Victor, 2003; Madsen and Servais, 1997; Moen et al., 2004; Rovira et al., 2006). We find that these studies and the other network studies indirectly have identified the important role played by social capital for internationalizing high-tech SMEs. Autio (2005) acknowledges that even though McDougall et al. (1994) did not explicitly mention social capital in their study, their findings point to the international social capital of the entrepreneur as an important facilitating condition for early internationalization. We chose to use the concept of social capital because it is a comprehensive concept that encompasses the findings made in previous studies of internationalizing SMEs and high-tech firms, but also because it enables us to perform a more thorough study of high-tech SMEs' abilities to access and mobilize critical resources via their networks in the internationalization process.

Social capital is both an accepted and an elusive concept. Elusive in that way that there exist many different views on what social capital constitutes, though most scholars of social capital seem to agree that the concept incorporates the network of relationships for a member and the resources available, for action and activities, through that network (Adler and Kwon, 2002; Portes, 1998). Some scholars focus on the individuals' benefits of social capital

(Burt, 1997) while others see it as beneficiary for a social unit (Coleman, 1988), and some incorporates both (Nahapiet and Ghoshal, 1998; Inkpen and Tsang, 2005). In this paper we focus on the benefits of the individuals' social capital for the larger social unit; the internationalizing high-tech SME. This means that we study individual network members' ability to access critical resources through personal relationships in the internationalization process.

Nahapiet and Ghoshal suggest in their 1998 article concerning social capital's effect on intellectual capital and organizational advantage, that social capital has a facilitating role for firms' knowledge acquisition and learning. Yli-Renko et al. (2002) support this argument in an international setting, by giving evidence of social capital's facilitating effects on high-tech SMEs' acquisition of experiential market knowledge in their internationalization process. Both of these studies distinguish that social capital facilitates learning by affecting the conditions in which learning can occur. Thus, we argue that in an international SME context, this means that social capital influences the conditions for experience based learning in foreign markets. Foreign market knowledge is based on experience from current interactions within the network (Blomstermo, Eriksson, Lindstrand and Sharma, 2004; Chen and Chen, 1998; Johanson and Vahlne 1990; Lindstrand, 2003; Moen et al., 2004). Thus, social capital defines with whom, where and how this interaction and experience based learning takes place.

Even though social capital has been emphasized as a mean for high-tech SMEs to get access to the critical resources needed for a rapid internationalization, studies have also highlighted the challenges that high-tech SMEs face when using this social capital. Crick and Spence's (2005) study demonstrates that existing networks that comprise previously developed relationships of owners and managers, might lose their usefulness in a certain phase of a firm's internationalization. In order to get access to critical resources and enter new markets, the firms in their study, had to develop new networks. This was sometimes achieved by recruiting new managers that had different network relationships. In a study from 2006, Rovira et al. (2006) emphasize the importance for internationalizing high-tech SMEs to avoid being trapped in an unprofitable network. It seems as high-tech SMEs sometimes must be able to go outside the boundaries of their established social capital and search for new social capital in order to succeed.

## **Research Method and Data Collection**

Our study of use of social capital in the internationalization process of high-tech SMEs demanded an explorative approach for us to be able to capture the many facets of the subject. Therefore we chose to use the case study method on the Swedish biotech business to get an in-depth view of the actual process of their international development. To find a suitable sample we decided on six criteria that potential firms had to meet in order to be included. The firms must be defined as SMEs; the firms must operate in the biotech business; the firms' founder/s had to work at the firms and they must still be involved in firm activities; the firms' head-offices must be located in the Stockholm-Uppsala region; the firms must conduct their own Research and Development (R&D); and the firms must have at least one product sold on a foreign market (i.e. non-Swedish market). These criteria were chosen so we could investigate SMEs in the biotech business that managed the production chain themselves; from R&D to the interaction with international actors. Furthermore we wanted to investigate firms included in the fast expanding biotech cluster of Stockholm-Uppsala. Since the founders of small entrepreneurial enterprises often have been shown to play important roles in the firms' first years of internationalization (McDougall et al., 1994; Madsen and Servais, 1997), we also wanted the founders to still be active in the firms. When we visited seven of these biotech firms, we found that additional interviews made in new SMEs provided us with similar narratives as the ones in previously visited firms. Therefore we decided ten SMEs provided a sufficient number of cases to include in this qualitative study.

The studied firms have been founded between 1984 and 2000. Some firms have been operating in foreign markets for about two years, while others have been selling products to foreign customers for more than six years. Each firm is, therefore, in a different phase of their internationalization process. The ten firms are also different in terms of number of employees and they all focus on different areas of the biotech-business. Another important difference is that some of the founders of the firms have considerable experience from working in industry settings whereas others only have experience from academia. When looking at the ten firms, three different clusters of management constellations are crystallized. The first cluster consists of the firms that are founded and managed by persons with significant industrial experience (i.e. the industrial firms). The second group consists of the firms that in the beginnings were founded by academicians but later were changed when managers with industrial experience were grafted to oversee the international development (i.e. the metamorphic firms). The last group of firms is those that mainly has been founded and managed by researchers from academia (the academic firms). One case from each group will represent the others and will therefore be described in greater detail in the following case

studies. We chose to include the cases of the three firms where we had spent most time. As seen in Table 1 some of the SMEs have only been visited once, whereas others have received several visits. Since all of the case studies, however, still are under progress we will continue to follow the investigated firms in order to see how their internationalization process progresses. The fact that we have interviewed several of the firms at different points in time has also increased the validity of the qualitative investigation.

<b>Firm</b>	<b>Business</b>	<b>Founded in</b>	<b>Number of staff</b>	<b>Turnover in 2003 (Thousands of \$)</b>	<b>First international sale</b>	<b>Foreign subsidiaries</b>	<b>Interviews</b>
<b>Industrial Firms</b>							
<b>Spectra</b>	Develops and sells products for genetic analysis in clinical research.	1997	90	11 268	1999/2000	5	4
<b>Note</b>	Develops and sells microfluidic solutions for the life science industry.	2000	81	603	2000/2001	3	5
<b>Deoprof</b>	Develops and sells medical devices for the field of interventional cardiology.	1988	218	44 909	1998	8	2
<b>Medlink</b>	Develops and sells in-vitro diagnostic kits based on immunological reactions.	1991	26	4 109	1994	1	1
<b>Metamorphic Firms</b>							
<b>Multivite</b>	Develops and sells products based on bio ceramic technology.	1987	22	79	2000/2001	0	2
<b>Cycode</b>	Develops and sells ready-made adjuvants for animal vaccine development and production.	1997	7	885	1999	0	2
<b>Rapido</b>	Develops and sells products for DNA-identification and quantification.	1986	3	0	1998	0	1
<b>Academic Firms</b>							
<b>Innovia</b>	Develops and sells IVD tests for detection and monitoring of viral diseases.	1984	16	330	1995	0	3
<b>Zamic</b>	Develops and sells products aimed at predicting the onset of arthritic diseases.	1998	9	236	2001	0	1
<b>Byolin</b>	Develops and sells products for biological control and plant growth stimulation.	1996	13	870	1998	0	1

Table 1: The investigated firms in the beginning of 2003, when the study was started.

Case studies typically combine various forms of data collection methods (Eisenhardt, 1989), and details about the companies have been collected from databases, masters' theses and websites. In-depth interviews have been conducted with different employees. The interviews were semi-structured, since we wanted to give the interviewees the opportunity to speak freely. A questionnaire had, however, been prepared beforehand to make sure interesting and important facts were included in the interviews.

Two researchers conducted most of the interviews, where one interviewer had personal interaction with the informant, while the note-taker retained a more distant view (Eisenhart, 1989). According to Eisenhardt (1989), the use of multiple investigators may enhance the creative potential of a study, since complementary insights increase the richness of data. As well as hand-written notes, a tape recorder was used during the interviews. With the help of both the tapes and the hand-written notes, transcripts of the interviews were written. All of the interviews were conducted at the head-offices in Sweden of the companies being studied; this provided the opportunity to observe how the work at the companies was performed. Twenty-two interviews have hitherto been conducted with staff at the ten companies as well as with related actors such as venture capitalists. The cumulative interview time has amounted to forty-four hours, and the interviews have been conducted over a period of three years. The main reason that this paper is built on more than one case is that our research interest ultimately relies on the phenomenon of SMEs in biotech businesses, and not on an individual case. In accordance with Stake (1994), we believe that one case cannot be understood without knowing about other cases. The cases in this study are chosen because understanding them will lead to better understanding, and perhaps better theorizing, about a still larger collection of cases.

## **The Cases**

### **Background: The biotech industry**

A broad definition of biotechnology, offered by OECD (2005), defines biotechnology as “*The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.*”

The biotech industry is young; only about 25 years old. During 2001 and 2002, the industry experienced the first significant backlash in the industry’s history (Ernst and Young, 2003a). The market downturn slowed down the global expansion of the biotechnology industry. Even though the downturn has impacted the industry negatively, biotech companies have not suffered the same drastic decline in venture capital funding that other high-tech industries have experienced (Ernst and Young, 2003a). In Europe, biotech firms garnered 26 percent of the venture capital investments in all industries, which is the joint highest proportion, along with computer software (Ernst and Young, 2003b).

The Swedish biotech industry belongs to the leading biotech industries in the world. With 230 biotech firms, Sweden has the largest share of biotech companies per capita in the world (SwedenBio, 2005a). Most of these companies are small enterprises. 60 percent have fewer than 10 employees and 28 percent have between 10 and 49 employees (SwedenBio, 2005b). One factor that has benefited the growth of Swedish biotechnology significantly is the characteristic close collaboration between academia, industry and hospitals. The Swedish biotechnology industry has had the most rapid growth of all sectors in Sweden during the last 10 years (SwedenBio, 2005c). It is still tough for Swedish Life Science firms to obtain venture capital financing, despite a general improvement of the financial climate during the last few years (Nyctelius and Wistrand, 2005).

## **The firms**

### **Spectra<sup>1</sup> - a case of an industrial firm**

In 1996, a famous research group from the Royal Institute of Technology (KTH) in Stockholm makes a breakthrough. They create a system that allows fast analyzes of DNA-samples. The research group contacts Pharmacia, one of the worlds largest pharmaceutical groups, and Pharmacia decides to start an external project called Spectra around the new system. As this external project continues to develop, a few top managers at Pharmacia try to influence Pharmacia's board to start producing and selling analytical instruments based on the new technology. Pharamcia's board, however, decides that this project is too large to undertake at this particular time. The managers that are involved in the project then decide to start a new firm around the system together with the research group from KTH. In 1997, Spectra is founded with the mission to develop, manufacture and sell tools for genetic analysis. Since 98 percent of the market is outside of Sweden, the firm has an international outset from the start.

Since Spectra descends from a Pharmacia-project, several of the firm's employees are recruited directly from Pharmacia. Spectra's approach is, furthermore, to focus on employing industrialists that have participated in internationalization-processes earlier and have well developed personal networks in the business. Spectra is from the start involved in many relationships with partners from the industrial as well as from the academic world. The new technology that Spectra is built around and the experienced management from Pharmacia together makes the firm interesting to investors. The first year Spectra receives about twelve

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<sup>1</sup> To maintain anonymity, the firms studied and their products are represented by aliases.

million dollars from Swedish and foreign investors. In 1999, Spectra starts to sell its first generation of products and in 2000 the firm is established on the stock market.

Already from the beginning, Spectra works along an explicit strategy in order to reach its goals. The strategic plan is foremost developed by the firm's Marketing Manager and CEO, who have significant experience of international marketing from previous employments. In broad outlines the internationalization strategy states that the firm shall establish its own subsidiaries in the most important geographical markets and let distributors manage the rest of the world. This strategy is initially very expensive, but Spectra finances this strategy with resources from its introduction to the stock market where the firm received about 127 million dollars. The main reason for following this strategy is that it enables the firm to manage the relationships with its most important customers. Since Spectra's products is based on brand new technology, it is important for the firm to keep a close contact with its customers in order to get instant feedback regarding how the products work and what features that need improvement. It is also important to work on the firm's responsiveness. If the customers have any problems with the products, Spectra instantly sends out a team to help them on location. Spectra wants to ensure that the firm receives a good reputation in international markets. One of the reasons for this is that the firm hopes to be able to use its first customers as reference-customers in order to allure others.

When we first visited Spectra in 2003, the Marketing Manager said that the most important function of his and the other employees' networks is to find the right person to court in a potential customers' organization, which is hard since the business is in a state of constant change. To know the hierarchical structures within organizations makes it easier to reach the right level in a customer firm.

Another task that the staff's networks are used for is the generation of information regarding the choice of which distributors that should be allowed to sell Spectra's products, in the markets where the firm does not have own subsidiaries. A distributor's performance differs a lot from firm to firm and it is important to find out as much as possible about a distributor before a contract is signed.

The management of Spectra is convinced that the employees in the foreign subsidiaries have to descend from the local markets in order for them to be successful. Previous experiences have taught the management team that local sales staff is necessary in order to avoid potential confusion regarding different languages and cultures. Local sales staff is also necessary for the acquisition of knowledge about local networks in new international markets. Since Spectra's international customers often are financed by grants it is important to

get insight into their local networks. The networks are used to acquire information about the financial situation of potential customers. Spectra has to know that the customer will be able to pay for a series of products already before the cooperation is initiated with them.

The management of Spectra is, furthermore, aware of that the first years of business will demand a lot of capital. Biotech SMEs traditionally are loss-making for a significant period of time before they turn into profit. As time goes by it, however, becomes evident that even though Spectra has a large amount of capital to spend, the firm's profitability is not increasing in a sufficient manner. One reason for this is that Spectra's main customers are research institutes that have very limited resources to spend on new technology at this point in time.

In 2003, Spectra decides to buy two other companies in order to extend its product portfolio and create benefits from synergistic effects. When Spectra buys the second company it also changes its name to Mirovir. At the same time as Spectra changes its organisation; it also changes its management. One reason for this is that the owners believe that the old management was too focused on the research aspect of the products and not enough on making a profit. The new management consists of persons that have experience from making successful business deals and are very focused on profitability.

Today, Mirovir's range of products derives from three market-leading companies in three related areas. The product line that derives from Spectra only amount to approximate 15 percent of Mirovir's present product offerings. A look in the rear-view mirror reveals that it was hard to make a profit on the Spectra-products because of the target customers' lack of capital. Today, Spectra's old lines of products are also more niched and not so customer-specific, as a mean of making them more profitable. The firm's new CEO is trying to cut the costs in every possible manner and the firm has succeeded to reduce its losses during the last years. Mirovir has among other things been able to make savings by coordinating the three firms' R&D as well as their marketing and sales departments.

### **Multivite - a case of a metamorphic firm**

After about 20 years of experience of making ceramic materials stronger, Multivite's founder is challenged by his wife, a dental hygienist by profession, to develop a safe and strong tooth-filling material. He accepts the challenge and after about 10 years of research he discovers Multivital, a tooth-filling material based on a ceramic powder that works as a concrete for the teeth. This is the start of Multivite.

During the first years of Multivite's existence the founder works by himself in the firm. As a researcher, he does not know much about running a firm but he acquires this knowledge in the same speed as Multivite develops. Even though the founder does not have any experience of managing a firm, he considers his background in the academic world to be of great importance for the development of Multivite. One important academic partner that the founder cooperates with is Uppsala University, where the founder still works part-time. An agreement between Multivite and Uppsala University even enables Multivite to utilize the university's equipment and facilities.

In the beginning, the founder finances Multivite by working as a consultant in the ceramic-business, but he soon realizes that more money is needed in order for the company to grow. In 1998, twelve years after Multivite's inception, an emission is made in order to collect more capital. Some investors are private acquaintances of the founder, but also a small venture capitalist firm participates in the emission. Multivite can now afford to move into new premises and employ more staff. The founder also continues to present Multivite to other venture capitalists and today; three well-known venture capitalist firms are together with the founder, the four largest owners of Multivite. Another consequence of the investments in Multivite is that a new management is introduced in 1998 and the founder retreats from his role as CEO and becomes head of R&D. In 1999, clinical studies on Multivital are conducted and in 2000 the product receives its CE-certification. The certification means that Multivite can begin to sell Multivital in the European market and in 2000 the new product is launched in Sweden.

By this time a new CEO starts at Multivite. The new CEO has a vast amount of experience from working with international marketing from his previous place of employment Pharmacia, a large pharmaceutical firm. The CEO has not heard of Multivite before and is recruited by an old colleague from Pharmacia, one of Multivite's investors that also is chairman of Multivite's board. The initial plan is that the CEO shall use his experiences of international marketing to build up a large market and sales department for Multivite's dental products. Multivite shall first focus on the Scandinavian market and if that goes well, Multivital will be introduced in other European countries. Multivital will also be launched in the USA, when the product receives its FDA-approval. The marketing department is built up and during 2001 Multivital is launched in Norway, Finland, and Denmark.

Soon after Multivital's Scandinavian launching, the CEO starts to review the number of Multivital-units that have been sold since the product first was launched in Sweden in 2001. He discovers that only a few of the dentists that have tried Multivital on their patients

have decided to repurchase the product. In order to find out why so many dentists have disliked the product, he distributes a market survey to about 50 of the dentists that did not repurchase it. The survey shows that these dentists are dissatisfied with Multivital. They believe that the filling material is hard to work with and that the result of the filling looks unaesthetic since it lacks the luster of real teeth. The CEO tells Multivite's board about the findings from the survey and points out that he wants to terminate the coming international launch of Multivital at present. The board agrees and the introduction of Multivital outside of Scandinavia is postponed until the R&D-department can present a more aesthetic version of Multivital that is easier to work with.

The decision to postpone the international marketing efforts outside of Scandinavia is a setback for Multivite. The main market for dental products is the American market and it is, therefore, considered as a matter of importance to enable fast acquisition of knowledge about the needs of the American customers. Because of this, the CEO sets up a task force that includes persons with knowledge about the American market and the dental industry. The persons that participate in this task force are network connections of the CEO or acquaintances of other members in Multivite's board of directors. The task force members are not employed full-time by Multivite, but paid on an hourly basis. The CEO believes the task force to be beneficial for Multivite's development. He likes to work in networks and the task force enables him to work with persons that are experts in their field, without having to employ them on a full time basis.

Even though the task force is useful to Multivite by the means of providing information about the needs and demands of customers in the American market, its main object is to come up with a business plan for launching Multivital in the USA. When looking at the alternatives, the task force concludes that it will be too expensive for Multivite to launch Multivital in the USA by itself. The CEO supports this argument. He, however, does not believe the use of distributors to be a good alternative. One of the problems with using distributors, besides the loss in profits, is that they prevent a firm from having a direct contact with the end users. This would make it hard for Multivite to find out the customers' opinion about the product. The most prominent difficulty in using distributors is, however, that Multivital will end up in a catalogue with hundreds of other products that the customers can choose from. Since Multivital is a brand new material, the use of it requires a new way of thinking. It can, therefore, be difficult to sell the product in this kind of standardized manner. Taking these ideas under consideration, Multivite's management finally decides that the firm shall start to look for a large partner to cooperate with in order to commercialize Multivital.

The CEO makes a profile of the ideal partner and starts to establish contacts with the five leading dental companies that fit this profile.

Since Multivite decides not to start selling Multivital outside of Scandinavia the firm's finances have been constrained for a long time. In 2002, the development of the new and improved version of tooth-filling material is, however, finished. In the end of 2004 Multivite, furthermore, makes a deal with a very large partner in the dental business. This deal provides Multivite with a new source of income since the exclusive right to develop, manufacture and commercialize this second generation of tooth-filling material is sold. Besides the dental area, Multivite also sees forthcoming business opportunities within other areas of medicine where several applications based on bio-ceramic technology can be identified.

### **Innovia - a case of an academic firm**

Innovia develops and markets measuring methods for different diseases. The measuring methods are applied in the products that Innovia sells, which are ready-to-use analysis kits, pre-packaged with standardized ingredients, controls and instructions that are needed for analyzes. The analysis kits are for example used to determine the level of HIV-virus in a person's blood. Since the test-kits that Innovia has developed make it possible to measure the level of HIV-virus in the blood in a more easy and cost-effective manner than many other techniques, the market for HIV/AIDS control is presently the most important for Innovia.

Innovia's products are based on the work of two researchers from Uppsala University. The firm is started already in 1984 as a consequence of a patent that generated some royalties for them. Between the years of 1984 to 1996 Innovia is located in Uppsala University's facilities since the founders, at this time, still are employed by the university. 1996 to 1997 is a time of change for Innovia as the two founders are dismissed from the university due to the lack of funding. They are, however, able to bring the equipment that they have used in their research to a new location. The two founders also continue to tutor five doctoral students, which generate some incomes to the firm.

This research team, now consisting of the two founders and five doctoral students starts to develop the firm. They make an emission among friends and acquaintances in order to receive capital to run the business. At the same time, they receive some financial support from a governmental institute and are able to construct a line of products that they can start selling in 1997. The founders also come in contact with an investment capitalist firm that, at this time, sees a lot of potential in the biotech business and is interested in investing in

Innovia. When one of the employees at this investment capitalist firm later changes his place of employment to a new capitalist firm, also this company decides to invest in Innovia.

The main market for Innovia's tests, ready-to-use analysis kits, is located to the regions where most persons with HIV live. Africa, Eastern Europe and Asia are, therefore, important regions for Innovia. The staff at Innovia sometimes finds it hard to acquire knowledge about how these markets work and it is, furthermore, almost impossible to buy structured market analysis about these markets. In order to deal with the challenging market situations in many development countries, Innovia often tries to cooperate with governmental institutions when it is possible. In Nigeria, Innovia for instance cooperates directly with the country's institute for infectious disease control.

Even though the problem of HIV is most evident in development countries, it is, however, often industrialized countries that administer the products used for determining the level of HIV-virus in the blood. Innovia sees an opportunity to increase their sales in the western world by starting to cooperate with large international organizations (for instance the American organisation Centres for Disease Control and Prevention) that are operating in developing countries. Via these organizations Innovia's products can be introduced in the industrialized-country markets where these organizations often have their central units. Besides these ways into new markets, Innovia also cooperates with researchers in USA, France, Australia, Thailand and Burkina Faso.

Apart from working with existing network connections, Innovia does not use any particular strategy to initiate relationships with new customers. Even though Innovia today performs tests all around the world, the management does not know which market that has the potential of being the most profitable in the future. One of the most important matters to focus on is at present to find the right channels, i.e. the persons with the right connections. One of the founders relates that finding the right persons to cooperate with can be as easy as by chance running into someone that seems interested in the products. Innovia is opportunity driven and if a member of the staff comes in contact with someone who are interested in the products, this person often is invited to Uppsala and taught how to run the tests. If the invited persons visit Uppsala, the staff at Innovia tries to do something outside of work, with them.

Social activities help to generate a social contact which increases the likelihood that customers will tell Innovia about eventual problems with the tests that may emerge later on. When potential customers have visited Uppsala, they also bring knowledge about running the tests back with them to their own countries. If they achieve positive results there, Innovia sometimes offers to travel to them and perform workshops on location. In this way the firm

can establish some international centres that are willing to run the tests. Uganda is one place where Innovia has had the possibility to work in this manner. One problem with this approach is, however, that it is hard for a resource constrained, small company to afford to educate everyone that is interested in the products. There is no way of knowing how much profit a workshop actually will generate in the end.

When Innovia first was started, the founders were involved in every aspect of running the business. As time has gone by, the investment capitalists have become more and more involved and they have also recruited a number of different CEOs to manage the firm. An interviewed adviser at one of the venture capital firms that own a large part of Innovia, says that his firm mainly uses the networks of its staff to find suitable persons to recruit to its portfolio-firms (i.e. the firms that the venture capital firms have invested in). The reason that venture capitalists want to recruit a new CEO or management to a portfolio-firm is that it often needs the input of experienced management in order to be successful.

Innovia's incomes are still not sufficient and the firm survives with the help of venture capital investments. Its losses have been reduced since 2003 and the management expects further increases in sales within a soon future, but the company still runs at a loss every year.

## **Analysis**

### **Beginning of internationalization**

The three cases described, all show that these firms use their existing social capital in their internationalization process. Spectra is founded by a network of researchers from a university and top managers from a large pharmaceutical company and other employees are in the beginning recruited via these people's networks. Multivite's founder uses his research network to get access to the equipment and facilities he needs for the start up. In the case of Innovia the founders use their network to get equipment, but also to recruit employees.

Concerning the two critical resources needed for the internationalization of high-tech firms; financial capital and foreign market knowledge, there is evidence of use of social capital connected to both. For instance, at Spectra the founders' and management's social capital brings the firm financial resources in the form of an immense amount of venture capital from the start. Later, their social capital will also bring capital from the stock market. Spectra's management has international experience but also recruits, based on their networks,

persons with experiences of international expansion. This together gives Spectra access to a high level of foreign market knowledge.

Multivite on the other hand, does not receive enough access to critical resources through the founder's social capital in the beginning. After a long time, Multivite's founder is able to develop relationships with venture capitalists, which invest in Multivite and thereby gives the firm financial resources. These relationships also bring new management to the firm. The social capital of the new management later gives Multivite a new CEO who has experience of working in foreign markets; i.e. foreign market knowledge, and the other resources needed for the internationalization.

Innovia has access to financial resources through the founders' personal networks as it receives money from an emission among friends. The founders are also able to develop a relationship to a venture capitalist that not only brings capital from one firm, but two. The founders have no international business experience so their social capital cannot provide them with the foreign market knowledge they need and they do not know how to get it in any other way. Therefore the firm is left without much needed foreign market knowledge.

These differences in resources have influenced the firms' international development in different ways. First, the firms with a lot of resources seem to grow faster and therefore have a larger turnover (see table 1.) Another difference is the way the firms expand internationally. Spectra, which is managed by industrialists, and has the resources needed for internationalization, works to a greater extent towards establishing subsidiaries on their most important markets. In comparison, the firms that have been founded and managed by researchers and have less resources, Multivite and Innovia, uses other ways, such as distributors, to reach foreign markets.

Spectra's management's international experience, tells them that subsidiaries can continue to develop the firm's social capital through customer relationships. They see this as the most important way to acquire new foreign market knowledge because they believe that it is the interaction in the relationships that will give them useful foreign market knowledge. Therefore they want to use the local employees' networks in and knowledge of local markets. But despite these efforts it becomes increasingly apparent that it is not enough for Spectra's international expansion and profitability.

Multivite launches its first product, Multivital, in Sweden in 2000. Based on the new CEO's international experience, the product is launched on the Scandinavian market in 2001. Multivite does not have the necessary social capital and market knowledge, since it does not get direct feedback from customer relationships, instead Multivite relies on surveys

to acquire the knowledge it needs. This information of low product quality, however makes Multivite postpone its further international expansion until a new product has been developed.

Innovia still does not have all the resources needed for internationalization. The firm tries to develop social capital by building relationships to governments in developing countries, international organizations and potential customers. Innovia tries to get access to foreign market knowledge through the potential customers, but there is no guarantee that the relationships will lead to purchase and further internationalization.

**Continued internationalization**

It is evident in all three cases that the social capital the firms have is not useful enough for their continued international expansion. Two of the firms, Spectra and Multivite, realize this, while Innovia does not. Spectra cannot get useful foreign market knowledge and the firm decides to get new management, with new networks, in to rectify this problem. The new management is even more business oriented and decides that the best for Spectra is to diversify its product range to become profitable. It is apparent in the case that the old managements’ social capital and experiences were not useful enough for the firm to become successful on international markets. Multivite’s solution to the problem of lack of foreign market knowledge is to create a task force which members come from the management’s personal network and social capital. The task force members have a vast amount of international experience. Their solution is that Multivite should find a large partner to cooperate with, so Multivite will not have to use a distributor, but instead get the resources needed by developing social capital through customer relationships, i.e. gain foreign market knowledge by direct interaction. Innovia does not have a solution to the problem of not having enough foreign market knowledge, as the firm itself does not appreciate the problem. On the other hand it seems as the venture capitalist involved in the firm has started to react and have tried to recruit management with international experience.

The three cases were chosen as representatives of the three different groups identified: the Industrialist Firms, the Metamorphic Firms and the Academic Firms. The analysis of these three groups of firms has been summarized in the tables below.

Table 2

The Industrial Firms				
Firm	Spectra	Note	Deoprof	Medlink

<b>Beginning of internationalization</b>				
<b>Useful social capital?</b>	Yes	Yes	Yes	Yes
<b>Use of social capital</b>	For grafting, reaching customers and gain venture capital.	For grafting, reaching customers and gain venture capital.	For grafting and reaching customers.	For grafting, reaching customers and gain venture capital.
<b>Network configuration</b>	The network is based on the staff's social relationships.	The network is based on the staff's social relationships.	The network is based on the staff's social relationships.	The network is based on the staff's social relationships.
<b>Access to critical resources?</b>	Receives an immense amount of venture capital from the start. Copes with the help of capital from the stock market. Needs to accumulate more foreign market knowledge.	Receives an immense amount of venture capital from the start. Copes with the help of venture capital investments. Needs to accumulate more foreign market knowledge.	The firm is one of the most profitable firms in the region and grows organically. No evident need to accumulate more foreign market knowledge.	The firm is one of the most profitable firms in the region and grows organically. No evident need to accumulate more foreign market knowledge.
<b>Continued internationalization</b>				
<b>Useful social capital?</b>	No	No	Yes	Yes
<b>Search for new social capital?</b>	New management is grafted.	New management is grafted.	No major changes in existing social capital	No major changes in existing social capital
<b>New network configuration?</b>	Tries out the new management's network.	Tries out the new management's network.	No major changes in network configuration.	No major changes in network configuration.
<b>Access to critical resources</b>	Not yet, the firm still makes a loss.	Not yet, the firm still makes a loss.	Yes, there is no evident need to accumulate more foreign market knowledge.	Yes, there is no evident need to accumulate more foreign market knowledge.

Table 3

<b>The Metamorphic Firms</b>			
<b>Firm</b>	<b>Multivite</b>	<b>Cycode</b>	<b>Rapido</b>
<b>Beginning of internationalization</b>			
<b>Useful social capital?</b>	Yes	Yes	Yes
<b>Use of social capital</b>	Not much social capital has been used in the start of the firm.	For grafting, reaching customers and gain venture capital.	Not much social capital has been used in the start of the firm.
<b>Network configuration</b>	Strong research network, but few relationships with industrial actors.	Strong research network, but few relationships with industrial actors.	Strong research network, but few relationships with industrial actors.
<b>Access to critical resources?</b>	Survives with the help of venture capital investments. Needs to accumulate more foreign market knowledge.	Survives with the help of venture capital investments. Needs to accumulate more foreign market knowledge.	Survives with the help of venture capital investments. Needs to accumulate more foreign market knowledge.
<b>Continued internationalization</b>			
<b>Useful social capital?</b>	No	No	No
<b>Search for new social capital?</b>	The use of task-forces is implemented.	New CEO with vast amount of industrial experience is	New management team with vast amount of industrial

		grafted.	experience is grafted.
<b>New network configuration?</b>	Tries out the ideas of the task-force and the CEO.	Tries out the new CEO's network and ideas.	Tries out the new management's network, customer leads and ideas.
<b>Access to critical resources?</b>	Yes, the firm still makes a loss but has found a large partner to cooperate with.	Not yet, the firm had long-going plans to emerge with a larger partner, but the deal fell through at the last minute. The firm still makes a loss.	No, the customers derived from the new management's network were not enough. The firm went bankrupt in 2003 but is now reconstructed.

Table 4

<b>The Academic Firms</b>			
<b>Firm</b>	<b>Innovia</b>	<b>Zamic</b>	<b>Byolin</b>
<b>Beginning of internationalization</b>			
<b>Useful social capital?</b>	Yes	Yes	Yes
<b>Use of social capital?</b>	For grafting, reaching customers and gain venture capital.	For grafting, reaching customers and gain venture capital.	For grafting, reaching customers and gain venture capital.
<b>Network configuration?</b>	Strong research network, but few relationships with industrial actors.	Have previously used Pharmacia as the main worldwide distributor, but have just started to work with another firm with global coverage.	Strong research network, but few relationships with industrial actors.
<b>Access to critical resources?</b>	Copes with the help of venture capital investments. Needs to accumulate more foreign market knowledge.	Copes with the help of venture capital investments. Needs to accumulate more foreign market knowledge.	Copes with the help of venture capital investments. Needs to accumulate more foreign market knowledge.
<b>Continued internationalization</b>			
<b>Useful social capital?</b>	Yes	Yes	Yes
<b>Search for new social capital?</b>	No major changes have occurred in the management's responsibilities.	No major changes have occurred in the management's responsibilities.	No major changes have occurred in the management's responsibilities.
<b>New network configuration?</b>	No major changes in network configuration.	No major changes in network configuration.	No major changes in network configuration.
<b>Access to critical resources?</b>	Not yet, but the firm has reduced its losses during 2004.	Not yet, the firms' losses are still increasing.	Not yet, but the firm has reduced its losses during 2004.

### **Model of the usefulness of social capital in the internationalization of biotech SMEs**

As could be seen in the cases as well in many other studies regarding business expansion, it is the expectations for future events and the opportunities that lie within those expected events that guide a firm's behavior (Penrose, 1959; Hitt, Ireland, Camp and Sexton, 2001). Based on this statement and on the results of the analysis of the ten biotech firms we have developed a conceptual model concerning the usefulness of social capital in the

internationalization process of firms (see figure 1). We propose that in seeking an international business opportunity, a firm will consider how useful its existing social capital is. The firm's evaluation of whether its social capital is useful or not is based on the firm's assessment of which and how many critical resources can be accessed. Perceived usefulness of social capital implies "the perceived potential social capital has for usage (cf. Menon and Varadarajan, 1992). The perceived usefulness of a firm's social capital depends on its ability to solve today's business problems and to exploit business opportunities. The perception of what existing social capital is useful is important for analyzing and resolving problems, since the social capital used by management is likely to influence the internationalization of the firm. The perceived usefulness has also been found to be a good predictor of user behavior (Davis, Bagozzi and Warshaw 1989; Venkatesh and Davis, 2000).

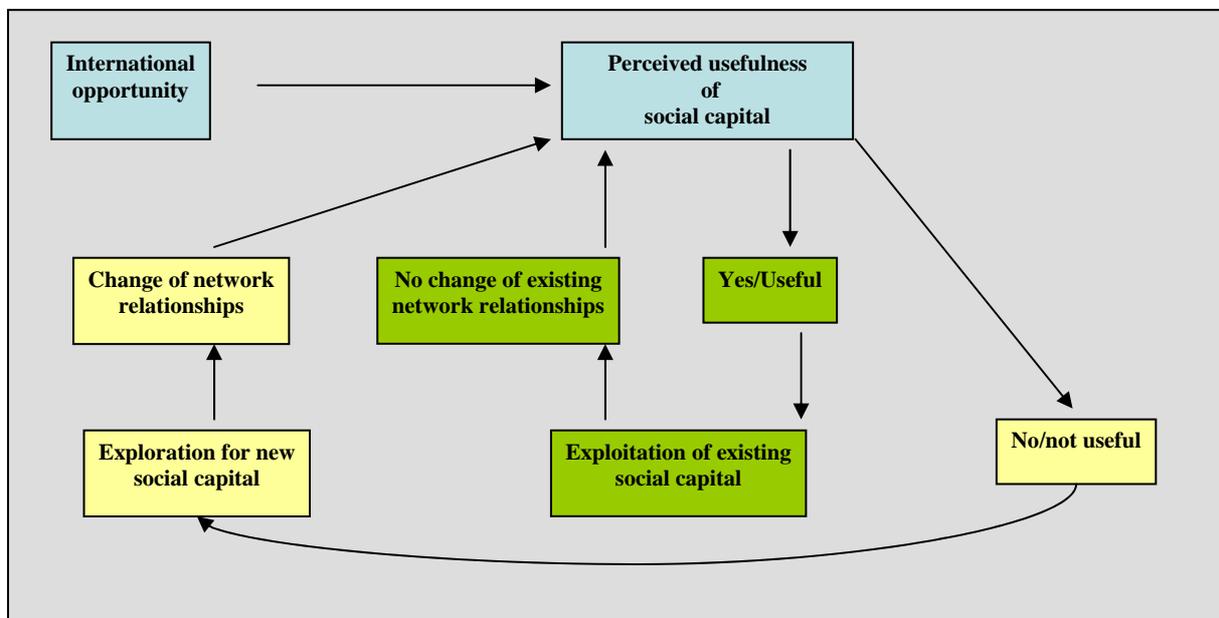


Figure 1: A high-tech SME's use of social capital in the internationalization process.

The usefulness of social capital is recognized through interaction with other actors in the network. This interaction generates experiences that increase the knowledge of how to use social capital (i.e., future usefulness) (Venkatesh and Davis 2000). Studies have shown that usefulness of knowledge decreases when it does not confirm firms' prior beliefs and knowledge (Deshpande and Zaltman, 1982; 1987; Henderson and Clark, 1990). Consequently, a firm that encounters an international opportunity will initially perceive its social capital and network configurations as useful because they are its resources for developing business, as seen in all the cases. Thus, firms use and exploit their social capital

as they engage in business activities in international markets. During its international expansion a firm can come to realize that its existing social capital is not as useful as perceived, and that new social capital is needed instead (see figure 1). Evidence of this can be found in the late phase of the Spectra and Multivite cases. It also seems typical for the metamorphic firms (see table 3). The firm might or might not be able to develop the social capital it needs, depending on its existing social capital, which guides as well as restricts the firm's behavior, as a part of the network structure.

Social capital gives a firm's access to foreign market knowledge and financial resources. Deviation in access to these resources, leads to changes in social capital. The lower the deviation, the more likely that search for more resources will be made in the firm's existing social capital, and will bring about only minor changes in the firm's network relationship (cf. March, 1991). The firm will thus continue to exploit its existing social capital but the use of it might change to get access to new resources. This can be seen in Innovia and the other academic firms (see table 4). These firms see no great change for the worse and therefore believe that the social capital they have is enough for continued expansion. Interestingly enough this is also evident in two of the industrialist firms, Deoprof and Medlink (see table 2). The reason is that the firms are two of the most profitable in the business and their international expansion continues with no need for change.

Higher deviation, i.e. the perception that the existing social capital is not useful creates a need for more explorative search for new social capital and network partners. This type of exploration is needed when critical resources cannot longer be accessed through the firm's employees' existing social capital and when the continued international expansion of the firm depends on it. The other two industrialist firms, Spectra and Note, explore new useful social capital by grafting new management and diversifying their products, while the metamorphic firms explore to find new larger network partners.

The realization of need for radical change is not always obvious for the firm, which the academic firms are evidence of. Existing relationships that have taken a long time and a lot of effort to build are the main obstacle in this process, because of their strong connection to the firm's resource access and capability. Perhaps the firm must try several times to modify its existing social capital and its network relationships, through exploitation, before even realizing that exploration is needed. Multivite for instance grafts a new CEO and tries exploitation of his social capital before realizing that it is not useful enough. The results of exploration have strong and long-term impact on the firm's ability to expand into international markets. Thus, the social capital gained through exploration will likely provide

good reason for change in a firm's network relationships, meaning that the firm's existing relationships will be transformed fundamentally. Old network relationships might be terminated, and new ones created.

Change of network relationships will also lead to change in a firm's resources, as can be seen in the two of the industrialist firms and all the metamorphic firms. The transformation of social capital and network relationships through exploration requires time to become useful because social capital needs development of trust and commitment before becoming useful. Also, new relationships take time and resources to develop. New counterparts, who have the resources that the firm needs for exploitation of its international business, might be difficult to find. For example, to sell its product on a specific market, the firm might need a new larger network partner as in the metamorphic cases. But where does the firm find one, and how will the firm know that the partner has the necessary resources? Multivite seems to have succeeded in finding a new partner with resources, while Cycode failed the first time and are still looking (see table 3). Because of the time and resources involved, exploration can be difficult to accomplish. But if the firm succeeds, the new social capital that results from exploration becomes the firm's new network configuration: that is, its continued capability to exploit opportunities, develop its business and expand into international markets.

## **Discussion**

This study has shown that the internationalization processes of the investigated biotech SMEs are closely connected to the individuals' who work in them, the experiences that they make and their personal networks, i.e. the social capital of the firms. The study also indicates that these individuals' abilities to gain experience of foreign markets and their use of social capital will influence the firms' expansions on international markets. One conclusion that can be drawn is that the usefulness of social capital and the social capital itself often changes during the internationalization processes of the firms. Social capital, consequently, cannot be seen as a static form of capital that always has positive effects for the international expansion of biotech firms. Internationalization process theory states that the experiences that are acquired when operating in foreign markets are the most important factor in the process. This study shows that the learning processes of the individuals in the firms are closely connected to their experiences of using social capital during their international expansion. When a firm is founded, all the individual relationships of a firm's staff can be viewed as social capital since

the firm has not built up any business relationships yet. The firm's staff, furthermore, has different experiences of international business from their previous careers. These differences in social capital lead to different internationalization processes for different firms.

In this paper we have shown that expectations guide the firm's perceived usefulness of its social capital, and also that existing social capital, in the form of previous experiences of international business, guide the firm's perception of useful social capital in international expansions to come. What a firm perceives as its current successfully applied options, with respect to similar situations in the past, will thus affect what other social capital the firm perceives as useful. But the assertion that decision makers in a firm perceive a certain piece of social capital, as being useful is not to claim that this perception is necessarily correct and will improve the firm's internationalization.

A firm that does not have any useful social capital also has limited foreign market knowledge, and limited financial resources. But the real problem for such a firm lies in recognizing that new social capital is required in order to get access to the critical resources needed for further internationalization. SMEs are often resource constrained and therefore the social capital is believed to help them to expand internationally. This study, however show that bad decision can be made as a consequence of the wrong perception of social capital. A majority of the investigated firms, for instance used social capital to graft new staff that had experience of the biotech branch of trade. The use of previously acquired experience and social networks did, however, not work out as expected, in several of the cases and the firms had to change its approach once again. The social capital was not useful enough. The constant change of management in many of the firms, perhaps, was a hindrance in their international development. It stopped the firms from making the experiences that could have provided them with much needed knowledge about foreign markets. The firm's social capital thus affected its access to new experiences. In that way existing social capital determined the collection of new experiences (c.f. Cohen and Levinthal, 1990).

Another conclusion of this study is that it sometimes is necessary for small firms to go outside the boundaries of the well-known surroundings, and through learning-by doing, discover new and unknown ways to reach success. Small firms should avoid to be locked in its social capital, relationships and network structure. The use of social capital and previously acquired experiences might lead to a more rapid internationalization but, as most of the cases in this study shows, the most rapid internationalization is not necessarily the most successful. It might be that the pace of internationalization is a hindrance because learning requires extensive analysis of cause and effects.

The purpose of this study was to examine how high-tech SMEs use social capital in their internationalization process. We sought to fill a research gap in our knowledge of social capital and its effects on firm internationalization. The model developed in this paper contributes to our understanding of social capital in the internationalization process of high-tech SMEs. However, the model is far from conclusive, and should be considered as a first step towards development of a theory of entrepreneurial change in international SMEs. For instance, there is a need to develop the framework theoretically and to support it empirically on a larger scale.

In this paper we did not have the possibility to particularly analyze the different dimensions of social capital and their effects on SMEs' internationalization. It may be that the structural, relational and cognitive dimensions each have different effects. We have nevertheless found some indication of structural effects on inertia of network development because of embeddedness. This is can be related to the relational dimension of trust and commitment development in the relationships. It also seems like the cognitive aspects of usefulness of social capital, such as interpretation, affect the internationalization process

An additional topic that was not discussed or included in the model is the network as a source for business opportunities, and its effect on perceived usefulness of social capital. According to several studies, firms acquire knowledge about business opportunities through their business networks (Achrol and Kotler, 1999; Burt, 1992; Gulati, 1999; Sharma and Johanson, 1987). The framework presented in this paper identifies opportunities as an independent trigger for the identification of the usefulness of social capital. However, perceptions of opportunities may be conditioned by the network, and thus there is a need to investigate the extent to which the network configuration conditions a firm's perceptions of opportunities. Presumably, a given network configuration can make the firm either more myopic or more eclectic, so there is a need to investigate this also.

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