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THE EFFECT OF UPSTREAM AND DOWNSTREAM INTERNATIONALIZATION ON THE ACQUISITION OF MARKET AND TECHNOLOGICAL KNOWLEDGE: THE MODERATING ROLE OF PRIOR KNOWLEDGE

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ABSTRACT

Grounded in the learning literature, this study examines: 1) the effect of downstream internationalization and upstream internationalization on the acquisition of market knowledge and technological knowledge in small and medium sized enterprises (SMEs), and 2) the moderating role of SME prior knowledge on these relationships. Using longitudinal data on SMEs, the results show that international downstream operations directly and positively impact the acquisition of market and technological knowledge. Prior knowledge does not moderate these relationships. The study shows that SMEs acquire new knowledge also from upstream international activities; and that this process is facilitated by the firm’s prior knowledge.

INTRODUCTION

Over the last decade, small and medium sized firms (SMEs) have increased their international operations along a broad range of value-chain activities such as sales, marketing, purchasing, R&D and production (Observatory of European SMEs, 2003). The organizational learning perspective suggests that undertaking these diverse activities in international markets can enhance the acquisition of new skills and knowledge (Zahra, Ireland & Hitt, 2000). In turn, these new skills can augment a venture’s knowledge base which could be used in the firm’s current and future operations (Huber, 1991). Importantly, SMEs acquire different types of knowledge from different activities along their international value chain (Zahra, Zheng, Yu & Yavuz, 2006). Thus, whether internationalization involves upstream activities (e.g., purchase, inbound logistics and operations) or downstream activities (e.g., marketing and sales) might influence the type of knowledge SMEs could gain from their international operations. Still, learning is constrained or enabled by SME knowledge base (Cohen and Levinthal, 1990) that encompasses current technological know-how and market know-how (Penrose, 1959).

Prior research on SME learning in international markets has three limitations. First, prior researchers have not considered the different value-chain activities that SMEs perform in international markets and their potential implications for they type of knowledge acquired. Past research has focused mainly on export-related activities. As a result, import-related activities have received much less attention (Karlsen, Silseth, Benito, & Welch, 2003). Second, though research shows that international activities can promote the acquisition of technological knowledge (Zahra et al. 2000) and market knowledge (Blomstermo et al., 2004), the impact of international operations on both types of knowledge has not been investigated simultaneously. Third, previous studies have overlooked the importance of SMEs’ endowment of knowledge resources in the acquisition of knowledge from foreign markets.

This study uses the organizational learning theory to address these gaps in the literature by (a) examining the effect of downstream internationalization (sales and marketing completed abroad) and upstream internationalization (purchase, R&D and production completed abroad) on the acquisition of market knowledge and technological knowledge, and (b) exploring the moderating effect of prior knowledge resources on the relationship between the different (up/down-) streams of internationalization and the acquisition of market and technological knowledge. Our study makes the following contributions. First, it improves our understanding of the relationship between SME internationalization and the
acquisition of knowledge, setting the stage for further research that explores their influence on business performance and growth. Second, the study adds to the literature on organizational learning by differentiating when a firm’s existing knowledge base enables the acquisition of new knowledge. For entrepreneurs and small business managers, our study suggests ways through which international SMEs can increase their knowledge-base, a process that can enhance survival probability and growth prospects.

FORMS OF LEARNING FROM INTERNATIONAL ACTIVITIES

The literature on organizational learning (Huber, 1991; Levitt & March, 1988) suggests that there are several forms through which SMEs can acquire new knowledge from cross-border activities. Traditionally, these forms of learning have been thought as ranging along a continuum from more to less based on direct personal experience (Bengtsson, 2004). Towards one end are those forms involving learning from ‘hands-on’, direct experience, where learning-by-doing is the most common. Of crucial importance in this regard is the firm’s experiencing diversity and variation in its new foreign markets (Barkema, Bell, & Pennings, 1996). Firms operating in international markets are exposed to a much wider and diverse operating circumstances than firms competing in local markets (Jones, 2001). By tackling the different challenges inherent with these diverse circumstances, firms are able to accumulate a great deal of knowledge (Zahra, Neck, & Kelley, 2004). Another form of learning from direct experience is experimental learning. This learning is oftentimes triggered by responding to mistakes or small losses (Huber, 2004). International markets are initially unfamiliar in terms of customers, suppliers and competitors. Thus, SME learning might result from responding to mistakes as well as from searching for new solutions (Buckley, 1997).

Towards the other end of the continuum there are forms of learning from the experience of others. Huber (2004, pp. 132) explains that ‘firms possess knowledge, but the amount they possess is minuscule compared with the knowledge already existing in the industry, in adjacent industries, in the business world and in society in general”. Consequently, in international markets SMEs can acquire externally held knowledge which supplements their current knowledge base. Specifically, firms can learn from observing the behavior of competitors and other business actors- also labeled vicarious learning (Zahra, Neck, & Kelley, 2004). In addition, firms can learn from grafting or scanning the environment for information. Recent studies also suggest an additional form of learning which lies somewhere in the middle of the continuum: learning from interacting with different business stakeholders or actors. This form of learning combines learning from direct experience and learning from the experience of others, as it involves the knowledge gained by interacting with foreign customers, suppliers and business partners (Sapienza, De Clercq, & Sandberg, 2005).

All the previously mentioned forms of knowledge acquisition -even those involving learning from the experience of others- occur as the firm becomes engaged in cross-border activities. For instance, even learning as imitation of international competitors would not take place if the firm was not present in international markets. In addition, these forms of learning are not mutually exclusive. When exporting, for instance, a firm can simultaneously learn from its own direct experience, from observing foreign competitors and from interacting with foreign customers, business partners or third parties. As our interest is on the content of SMEs learning from different international activities, in the following subsections we will distinguish between learning-by-doing on the one hand, and the other forms of learning on the other hand. Cohen and Levinthal (1989) argue that learning-by-doing is a process by which the firm becomes more practiced, and, hence, more efficient at doing what it is doing. Via learning by doing, an organization builds knowledge and capabilities around the tasks it performs (Henderson & Clark, 1990). Thus, learning-by-doing implies the acquisition of new knowledge in the domain of the activities performed. Instead, other forms of knowledge acquisition may accommodate learning that transcends the specific domain of activities performed. For instance, by observing others, organizations can potentially learn a myriad of marketing strategies, but also administrative practices and technologies (Levinthal & March, 1993). Hence, other forms of learning may lead to a more diverse knowledge base (Tsang, 2002a).
LEARNING-BY-DOING FROM INTERNATIONAL ACTIVITIES

Learning-by-doing suggests that firms acquire new knowledge in the domain of the activities they perform. Thus, it is logic to expect that the completion of international downstream activities enhances the acquisition of market knowledge; and that the completion of international upstream activities enhances the acquisition of technological knowledge. There is vast literature that supports this argument, ranging from studies on the learning curve (Argote, 1999) to models developed especially for explaining firm internationalization, e.g. the Uppsala internationalization model (Johanson & Vahlne, 1977).

Downstream Activities and the Acquisition of Market Knowledge

International downstream activities, such as exporting or marketing abroad, provide SMEs with important insights into foreign markets and foreign customers. The accumulation of this knowledge might be easier for SMEs than for large multinational firms. In large multinational firms, market knowledge held by subsidiaries is difficult to pass on to others (Bjerre & Sharma, 2002). In contrast SMEs are noted for having processes and structures that are less rigid, sophisticated and complex (Coviello & Martin, 1999), which favors the sharing of market knowledge (Carson & Gilmore, 2000).

It has been argued that knowledge about foreign markets and foreign customers is market-specific and thus has no value outside that one local market (Blomstermo, Eriksson, Lindstrand, & Sharma, 2004; Johanson & Vahlne, 1977). Yet, there is also evidence of the contrary. For instance, Carlsson et al. (2005) find that firms with pre-existing international experience performed better in the Chinese market than competitors without that experience. Similarly, Eriksson et al. (1997) find that accumulated international experience which affects knowledge about markets, customers and institutions is not related to a specific country markets. As they write: “It is a firm-specific experience relevant to all markets” (pp. 352). The knowledge firms might acquire from downstream activities is not limited to insights into foreign customers and foreign markets. It might also include information on foreign trade regulations (Eriksson, Johanson, Majkgard, & Sharma, 1997) and how to overcome export barriers (Yang, Leone, & Alden, 1992). Relevant for the acquisition of this knowledge are also other downstream activities such as investments in formal marketing research. More importantly, engaging in downstream activities across national borders can foster the firm’s ability to further develop such activities in international markets. For instance, downstream activities enhance a firm’s ability to gather information, co-ordinate activities and identify market trends in foreign markets (Chetty & Eriksson, 2002). This is probably one reason Eriksson et al. (1997) stress the importance of the acquisition of knowledge concerning what the firm is capable of doing when exposed to new and unfamiliar markets. This evidence suggests that:

Hypothesis 1: Downstream internationalization is positively related to the acquisition of market knowledge

Upstream Activities and the Acquisition of Technological Knowledge

International upstream activities affect technological learning, as demonstrated by the acquisition of new technological skills and know-how (Zahra, Ireland, & Hitt, 2000). Evidence of the link between the engagement in upstream activities and technological learning is provided by the literature on the learning curves. This literature focuses on the effect of cumulative production experience on production skills and shows that the average costs of production decrease with increased production (Argote, 1999). It has also been shown that productivity improvements come from performing other upstream activities, e.g. R&D or sourcing (Malerba, 1992). Learning-by-doing is a common way of acquiring new technological know-how, especially in SMEs. Buckley (1997, pp. 75) posits that in host countries SMEs acquire technological skills mainly through personal experience. Also, international transfer of technologies occurs through learning-by-doing (Buckley, 1997). Learning by-doing might offset some of the problems associated with attaining and transferring technological knowledge as well. First, learning by doing facilitates the acquisition and transfer of the know-how based dimension of technological knowledge. Indeed, Kogut
and Zander (1992) maintain that know-how is not easily transmitted and replicated, and that its transfer calls for interaction within small groups and mutual adaptation. Second, learning-by-doing allows SMEs to take advantage of different international knowledge bases (Zahra, Ireland, & Hitt, 2000), while neutralizing, at least in part, some of the problems associated with cultural distance. For instance, learning-by-doing overcomes the problems associated with the acceptance of ‘imported’ technologies (Teece, 1986; 77), especially from culturally distant countries (Andersen, 1999; Sapienza, Autio, George, & Zahra, 2006).

Upstream internationalization also influences the depth and breadth of SME technological learning. Research shows that high-control modes of entry in international markets, such as fully owned production units overseas, promote a deeper and broader technological learning in smaller and younger firms (Zahra, Ireland, & Hitt, 2000). Yet, technological learning is not only related to production overseas. For instance, studies confirm the importance of international suppliers to the company’s technical development (Andersen, 1999) and of cross-border R&D activities to technological learning (Kim & Inkpen, 2005). Also SMEs’ motives for going abroad reflect the importance of upstream activities for the acquisition of technological knowledge. A recent survey on European SMEs shows that the traditional cost-driven motives for engaging in both foreign production and foreign sourcing are increasingly supplemented by the need for accessing new technologies and complementary competences (The Observatory of European SMEs, 2003). This evidence suggests that:

Hypothesis 2: Upstream internationalization is positively related to the acquisition of technological knowledge

OTHER FORMS OF LEARNING FROM INTERNATIONAL ACTIVITIES

SMEs undertaking different (up/down-streams) activities in international markets may learn directly from their own experience, indirectly via observation of competitors and scanning of the environment, and from interacting with partners and third parties. Hence, the engagement in one specific set of activities across national boarders might simultaneously prompt different forms of learning. Yet, while learning-by-doing brings knowledge in the domain of the activities performed, other forms of learning facilitate the acquisition of a more diverse knowledge base. For instance, when carrying out after sales support activities SMEs can also gain technical insights, e.g. via discussing with customers who use the products (Malerba, 1992). Similarly, when sourcing from other countries SMEs can also acquire market knowledge, e.g. via listening to suppliers who describe the local market conditions (Korhonen, Luostarinen, & Welsh, 1996). Thus, it is logic to expect that downstream internationalization enhances also technological learning and that upstream internationalization enhances also market learning. Hypothesis 3a and Hypothesis 4a below build on this logic. Having said that different forms of learning might occur simultaneously does not imply that they have the same intensity. Knowledge arises primarily from experiencing certain situations and can be best acquire through learning-by-doing (Penrose, 1959). Thus, ceteris paribus, the engagement in downstream international activities is likely to bring more market learning than technological learning; and the engagement in upstream international activities is likely to bring more technological knowledge than market knowledge. Hypothesis 3b and Hypothesis 4b below build on this logic.

Downstream Activities and the Acquisition of Technological Knowledge

There are several reasons to expect SMEs to broaden their technological knowledge when engaged in international downstream activities. First, interacting and working closely with international customers may provide SMEs with opportunities to improve their technological know-how. Tighter relationships and close interactions with customers characterize SMEs’ internationalization (Karagozoglu & Lindell, 1998). Indeed, the limited scale of operations leads most of SMEs to enter niche international markets and offer customized solutions their clients (Buckley, 1997.) Such a direct involvement with customers can promote technological learning (Zahra, Ireland, & Hitt, 2000). Second, SMEs can also learn indirectly by...
observing foreign competitors. For instance, SMEs selling in international markets have an opportunity to learn about state of the art technologies from international competitors (Bengtsson, 2004). Third, downstream internationalization can also provide opportunities for systematic experimentation and improvement. SMEs selling in foreign markets face new and diverse customers’ needs, which can trigger experimental learning (Buckley, 1997). International competition also requires more efficient and effective management of upstream and value added activities (Karagozoglu & Lindell, 1998). In fact, Wolff and Pett (2006) show that exporting has a positive effect on both product improvement and process improvement. Finally, a multinational presence may foster technological capabilities in other ways as well. Oftentimes, the volume generated in domestic markets it is not enough for supporting competitive levels of R&D (Karagozoglu & Lindell, 1998). Foreign sales increase the returns from innovation and allow firms to recoup R&D investments (Barkema & Vermeulen, 1998, pp. 10). These arguments suggest:

**Hypothesis 3a:** Downstream internationalization is positively related to the acquisition of technological knowledge

The previous hypothesis suggests that SMEs might acquire technological knowledge by engaging in downstream activities. However, the learning literature maintains also that direct experience is the prime source of learning (Barkema & Vermeulen, 1998). Following this reasoning, when involved in downstream activities, SMEs are expected to primarily become more practiced, and more efficient at performing market related activities. Consequently, they are expected to primarily acquire knowledge on how to market and deliver products and services to others across national boarders. Tsang’s (2002b) study on firms’ learning from international joint venturing experiences provides empirical support for this asymmetrical learning pattern. Tsang finds that firms mainly achieve experiential rather than vicarious learning. Likewise, van Geenhuizen and Indarti (2005) find that learning-by-doing and experimentation are considered as the most important knowledge sources by a sample of SME managers. Thus, ceteris paribus, it is logical to expect that SMEs involved in downstream internationalization learn more market knowledge than technological knowledge. This argument suggests:

**Hypothesis 3b:** The relationship between downstream internationalization and the acquisition of technological knowledge is weaker than the relationship between downstream internationalization and the acquisition of market knowledge

### Upstream Activities and the Acquisition of Market Knowledge

International upstream activities give SMEs a range of opportunities that can broaden their market knowledge. First, when engaged in value-added activities oversees SMEs can acquire knowledge on foreign markets via intentional environmental scanning (Bengtsson, 2004). For instance, Karlsen et al.’s study (2003) shows that initial importing activities into foreign markets allow firms to gather information “about the market and new prospects, who was important and how to operate, in the face of high perceived risk and uncertainty” (pp. 394). Second, SMEs can also come across relevant market knowledge via unintentional noticing (Bengtsson, 2004). Indeed, they can learn about foreign market by observing the behavior of local businesses (Karagozoglu & Lindell, 1998). Third, upstream relationships with foreign actors provide important learning platforms. Research confirms that relationships with international suppliers enhance market knowledge (Karlsen, Silseth, Benito, & Welch, 2003). Lee and Jang (1998) posit that these relationships often go beyond just buying and selling and include the sharing of information about the market situation. Besides long-term relationship with specific suppliers, smaller firms are also renowned for their networking capability (Chetty & Blankenburg Holm, 2000). Upstream internationalization fosters SME involvement in established networks of international firms which, in turn, are sources of relevant market knowledge (Korhonen, Luostarinne, & Welsh, 1996). Similarly, studies in the industrial network tradition stress the network-connecting role of upstream international activities (Johansson & Mattsson, 1988). Here, networks of international suppliers function as potential sources of knowledge which firms can use to further expand in the international arena (Johansson &
Vahlne, 1990). Market knowledge incoming from upstream activities is found to be particularly important at the earliest stages of international development (Welch & Luostarinen, 1993). Upstream internationalization also provides knowledge to overcome ‘liability of foreignness’, which stems from doing business in unknown markets. This knowledge has been found to be crucial for SME development in international markets (Lu & Beamish, 2001). These observations suggest that:

**Hypothesis 4a: Upstream internationalization is positively related to the acquisition of market knowledge**

The previous hypothesis proposes that SMEs might acquire technological knowledge when engaged in upstream international activities. Yet, as we discussed for Hypothesis 3a, organizational learning theorists have long contended that knowledge arises primarily from direct experience (Barkema & Vermeulen, 1998). Thus, when engaged in upstream activities, SMEs are primarily expected to become more experienced, and hence more efficient at performing production/supply-related activities. SMEs are expected to primarily improve their technological know-how. To date, there is a lack of large scale studies that investigate different strands of learning from upstream international involvement (Zahra, Ireland, & Hitt, 2000). On this issue, most empirical evidence comes from case studies investigating the connections between upstream internationalization and downstream internationalization. For instance, Kuada and Sorensen’s (1999) study confirms that the interaction with foreign suppliers provides firms primarily with crucial high quality technological know-how and, to a lesser extent, with information on foreign market opportunities. Hence, ceteris paribus, those SMEs involved in upstream internationalization can be expected to gain and learn more technological knowledge than market knowledge. These observations suggest that:

**Hypothesis 4b: The relationship between upstream internationalization and the acquisition of market knowledge is weaker than the relationship between upstream internationalization and the acquisition of technological knowledge**

**THE ROLE OF PRIOR KNOWLEDGE RESOURCES**

The learning literature maintains firms are repositories of knowledge and have a certain endowment of knowledge resources. Penrose (1959) talks about ‘inherited resources’ that include the firm’s stock of resources, e.g. current technological know-how and market know-how; while Cohen and Levinthal (1990) use the expression ‘prior knowledge’ and argue that “prior knowledge permits the assimilation and exploitation of new knowledge” (pp. 135-136). Likewise, Kim (1998, pp. 507) suggests that prior knowledge base consists of individual units of knowledge available to make sense of and to assimilate and use new knowledge. As such, prior knowledge is an important component of a firm’s absorptive capacity. Here, Zahra and George (2002) go even further and posit that prior knowledge is a part of firm’s acquisition capability described as the firm’s capability to identify and acquire new knowledge.

A firm’s prior endowment of knowledge resources is a key contingency of SME learning from internationalization. First, prior knowledge facilitates the absorption knowledge incoming from international markets. This knowledge is oftentimes complex in nature (Zahra, Neck, & Kelley, 2004) and difficult to absorb (Lane, Koka, & Pathak, 2006). Firms having within themselves a high level of intellectual capital in the form of knowledge workers are more able to assimilate the complex information incoming from the international marketplace (Huber, 2004). Second, prior knowledge enables SMEs to leverage their limited resources. When faced with the opportunity to learn from international markets, larger firms might afford costly, trial and error processes to develop experience-based learning. Instead, SMEs, in their quest for new knowledge, need to capitalize on the know-how they already have (Almor & Hashai, 2004). Huber (2004) suggests that the depth of a firm’s knowledge in one area is not the only variable that determines the firm’s ability to absorb new knowledge. The breath or diversity of its expertise is relevant as well. This is consistent with Penrose (1959) who views a firm’s stock of ‘inherited resources’ as including both market know-how and technological know-how. Thus, market knowledge
and technological knowledge, taken together, represent important knowledge-based resources applicable to SME ability to assimilate knowledge from international activities. Accordingly, the following section of this chapter develops hypotheses building on the logic that SME prior knowledge moderates the relationship between different (up/down-) streams of international activities and the acquisition of market and technological knowledge.

Prior Knowledge Resources and Learning-By-Doing from Internationalization

Accumulated prior knowledge influences a firm’s learning by doing. When experiencing an event organizations need to have an understanding of the context of that event to seek and gain new knowledge (Inkpen & Dinur, 1998). For instance, a firm needs to have knowledge and understanding in a given area if it is to learn from its partner in that area. Kim and Inkpen (2005) find that the ability to learn from alliance partners is partly influenced by the firm’s prior knowledge in alliance management. Conversely, not having an adequate prior knowledge base might inhibit learning by doing. Kim (1998) reports the case of Hyundai Motor company which needed to expand its prior technological knowledge base in order to intensify technological learning efforts.

The view presented here on the importance of prior knowledge resources to firms’ learning-by-doing parallels that expressed in previous research on SME internationalization. In the Uppsala model, at any given stage of a firm internationalization process, the acquisition of experiential foreign market knowledge is influenced by the knowledge gained during previous stages (Johanson & Vahlne, 1977). Also the literature on international new ventures acknowledges the role prior knowledge plays in this regard, though individual prior knowledge substitutes for firm-level prior knowledge. Specifically, this line of research posits that the knowledge embodied in prior managerial experience influences the learning process by importing previously learnt routines into the firm’s repertoires of emerging routines (Sapienza, Autio, George, & Zahra, 2006). Previously, I suggested that using learning-by-doing in the downstream domain, SMEs can acquire market knowledge and that using learning-by-doing in the upstream domain, SMEs can acquire market knowledge. Now, I propose that a firm well endowed with knowledge resources will be even more likely to: 1) acquire market knowledge from performing international downstream activities; and 2) acquire technological knowledge from performing international upstream activities. Thus:

Hypothesis 5a: Prior knowledge resources moderate the relationship between downstream international activities and the acquisition of market knowledge. Prior knowledge resources enhance the positive relationship between downstream international activities and the acquisition of market knowledge

Hypothesis 5b: Prior knowledge resources moderate the relationship between upstream international activities and the acquisition of technological knowledge. Prior knowledge resources enhance the positive relationship between upstream international activities and the acquisition of technological knowledge

Prior Knowledge Resources and Other Forms of Learning from International Activities

The firm’s stock of prior knowledge resources makes it possible for companies to engage in different types or forms of learning other than learning by doing. As already mentioned, the capacity to recognize and draw into the firm unfamiliar and not-previously available knowledge depends on what the firm knows when it encounters the new knowledge (Autio, Sapienza, & Almeida, 2000). As Cohen and Levinthal (1990) remark: “the prior possession of relevant knowledge and skills is what gives rise to creativity permitting the sort of associations and linkages that may have not been considered before” (130).
Hence, scarcity of prior knowledge limits a firm’s ability to seek and recognize the value of externally held knowledge (Huber, 2004). For instance, scarce endowment of prior knowledge limits a firm’s vicarious learning. Eden et al. (1997) argue that the mere observation of competitors possessing relevant knowledge will not lead to its full acquisition by knowledge-deficient firms. Limited prior knowledge also restricts a firm’s learning from international business actors. Indeed, without an adequate knowledge base firms cannot recognize or grasp the knowledge that customers or alliance partners provide (Huber, 2004). For instance, limited prior knowledge restricts a firm’s ability to gain technological insights from interacting with foreign business customers (Yli-Renko, Autio, & Sapienza, 2001). Lane and Lubatkin (1998) suggest that a firm must also possess some amount of prior knowledge to acquire knowledge incoming from international alliance partners. Also in their 2001 follow-up study, Lane and his colleagues find support for a positive relationship between a firm’s prior knowledge and current learning from international partners. Earlier, I proposed a positive relationship between downstream international activities and the acquisition of technological knowledge and a positive relationship between upstream internationalization and the acquisition of market knowledge. Now, I propose that a firm that is well endowed with knowledge resources will be even more likely to: 1) acquire market knowledge from performing international upstream activities; and 2) acquire technological knowledge from performing international downstream activities. Thus:

Hypothesis 6a: Prior knowledge resources moderate the relationship between downstream international activities and the acquisition of technological knowledge. Prior knowledge resources enhance the positive relationship between downstream international activities and the acquisition of technological knowledge

Hypothesis 6b: Prior knowledge resources moderate the relationship between upstream international activities and the acquisition of market knowledge. Prior knowledge resources enhance the positive relationship between upstream international activities and the acquisition of market knowledge

METHOD

Sample and Data Collection

Our initial sample comprises 979 SMEs that in 1997 reported having international operations. Since no comprehensive list of international SMEs exists in Sweden, we used the following steps to identify our initial sample. First, we constructed a stratified probability sample of 2,455 Swedish SMEs. Second, in 1997 a questionnaire mailed to the CEOs of these firms allowed us to identify the businesses which had international operations. The questionnaire gathered information on a broad range of international operations, such as import and export activities, direct investments in other countries, joint ventures in other countries, and strategic alliances and cooperations with firms or third parties in other countries. In addition, the questionnaire focused on issues relating to companies’ endowment of resources and their competitive environment. 1300 firms responded to the mail questionnaire and 979 reported having at least on of the above listed international operations. These 979 firms, which constitute our initial sample, were surveyed other two times. Specifically, in winter 2000 they were administered a questionnaire over the phone and in late spring 2000 they received a mail questionnaire. In addition, data from secondary sources were gathered. Full information from all survey rounds is available for 202 firms. Non-response bias has been checked for. However, we acknowledge that there is an inevitable problem of sample attrition. In addition, the firms in our sample cannot be strictly regarded as being representative of all types of international Swedish SMEs.

Measurements and Data Analysis

Data for the dependent variable were obtained in spring 2000. Data for the independent variables was collected in winter 2000. The data for the moderator variable was collected in 1997. The data for the control variables was collected in 1997 and from different registers. The acquisition of market knowledge
and technological knowledge is measured by eight items that were extracted from the literature (Zahra, Ireland, & Hitt, 2000). A varimax factor solution yielded two significant factors, each with an eigenvalue above 1. The first factor (four items, Cronbach Alpha = .92) captured the *acquisition of market knowledge*. Items covered insights and skills in the following areas: 1) promotion, 2) sales, 3) distribution, and 4) customers relationships. The second factor (four factors, Cronbach Alpha = .87) captured the *acquisition of technological knowledge*. Items covered insights and skills in the following areas: 1) production technology (ways to produce products/services); 2) production design (ways to work out the production process); 3) production planning; 4) Research and development. Instead of using the factor scores, we constructed two indices using simple means.

To measure downstream internationalization and upstream internationalization, we used five items adopted from George et al. (2002). The items measured the percentage share of a firm’s business activities conducted internationally: export shares, share of advertising budget directed at international markets, share of purchase from abroad, share of R&D expenditure abroad and share of production completed abroad. These are the international activities most commonly conducted by European SMEs, according to a study by the Observatory of European SMEs (2003). A varimax factor solution yielded two significant factors, each with an eigenvalue above 1.00. The two factors explained 66 percent of variance. The first factor captures the degree of *downstream internationalization* and covers export shares and share of advertising budget directed at international markets. The measure has a satisfactory Cronbach alpha of .85. The second factor captures the degree of *upstream internationalization* and covers share of import, share of R&D expenditure abroad and share of production completed abroad. This measure has a somewhat unsatisfactory Cronbach alpha of .58. Following George et al (2005), instead of using the factor scores, we constructed two indices using the items’ standardized values.

To measure *prior knowledge resources* we used Wiklund and Shepherd’s (2004) scale. Following Gupta and Govindarajan (2000), the authors constructed an instrument consisting of eleven items pertaining to market and technological knowledge (α=0.69). The study also included controls for several variables which might influence the relationship between (up-down streams) internationalization and the acquisition of market knowledge and technological knowledge. Specifically, *environmental heterogeneity* was taken from Miller and Friesen (1982) and included three of the original four items. The scale for measuring *environmental munificence* was adopted from Dess and Beard (1984) and comprises four items. Both scales were included in the mail survey conducted in 1997. *Industry type* was measured by four dummy variables for the firm main line of business (manufacturing, professional service, retail and other services). *Prior performance* was measured by the return on equity (ROE) in 1997. *Firm age* was measured as the number of years since incorporation. *Class size* was measured by dummy coding whether the firm was small (10-49 employees) or medium-sized (50-249 employees). This data along with the information on major industry type, prior performance and firm age were gathered from secondary sources.

The hypotheses were tested using seemingly unrelated regression (SURE) analysis. SURE is a statistical technique that solves a set of regression equations simultaneously and allows for error covariances among the equations (Zellner, 1962). SURE uses a Chi-Square test for the overall fit of the model. SURE allows joint tests to investigate the effect of the independent variables across the equations (Chen, Ender, Mitchell, & Wells, 2007). Thus, it is an appropriate technique for testing our hypotheses.

**RESULTS**

In this section, we present the results from the empirical study. Regression diagnostics revealed a lack of serious multicollinearity among the studied variables. As mentioned above, the hypotheses were tested with SURE analysis involving two equations. Table 1 reports the SURE equations with the acquisition of market and technological knowledge as dependent variables. The analysis is performed in subsequent steps. Model 1 includes only the control variable, as predictors. Model 2 considers also the independent
variables: downstream internationalization and upstream internationalization. Model 3 and Model 4 include the interaction terms. Specifically, Model 3 includes the interaction between prior knowledge resources and downstream internationalization, while Model 4 includes the interaction term between prior knowledge resources and upstream internationalization. All four models have a significant fit.

To test Hypothesis 1, which suggests that downstream internationalization is positively related to the acquisition of market knowledge, we can examine the coefficient of downstream internationalization on the acquisition of market knowledge in Model 2 (Table 1). This hypothesis is supported as downstream internationalization has a significant positive relationship with the acquisition of market knowledge (beta = 0.686; p<0.01). To test Hypothesis 2, which expects upstream internationalization to be positively related to the acquisition of technological knowledge, we can look at the coefficient of upstream internationalization on the acquisition of technological knowledge in Model 2 (Table 1). This coefficient is positive and significant (beta = 0.373; p<0.01), providing support for Hypothesis 2. Hypothesis 3a suggests that downstream internationalization is positively associated with the acquisition of technological knowledge. The results for Model 2 show that downstream internationalization has a positive and significant impact (beta = 0.393; p<0.01) on the acquisition of technological knowledge. Thus, support is found for Hypothesis 3a. Hypothesis 3b expects the relationship between downstream internationalization and the acquisition of technological knowledge to be weaker than the relationship between downstream internationalization and the acquisition of market knowledge. The results for Model 2 show that downstream internationalization has a higher impact on the acquisition of market knowledge (beta = 0.686; p<0.01) than on the acquisition of technological knowledge (beta = 0.393; p<0.01). SURE allows testing for equality of coefficients across equations. Hence, we test whether the coefficient of downstream internationalization on the acquisition of technological knowledge and on the acquisition of market knowledge are equal. The chi test is significant at p<0.05, suggesting that these coefficients are different. Thus, support is found also for Hypothesis 3b.

Hypothesis 4a suggests that upstream internationalization is positively associated with the acquisition of market knowledge. In Model 2 upstream internationalization is not significantly related to the acquisition of market knowledge, providing no support for Hypothesis 4a. Only partial support is found for Hypothesis 4b, which expects the impact of upstream internationalization on the acquisition of market knowledge to be weaker than the impact of upstream internationalization on the acquisition of technological knowledge. Indeed, Model 2 shows that upstream internationalization is positively related to the acquisition of technological knowledge (see discussion on Hypothesis 2), but not significantly related to the acquisition of market knowledge. Hypothesis 5a predicts that prior knowledge resources moderate the relationship between downstream international activities and the acquisition of market knowledge. Model 3 (Table 1) presents the equation that tests this precondition. The interaction of prior knowledge resources and downstream internationalization has no significant impact on the acquisition of market knowledge, providing no support for Hypothesis 5a. Hypothesis 5b suggests that prior knowledge resources moderate the relationship between upstream international activities and the acquisition of market knowledge. The equation that tests this precondition is shown in Model 4 (Table 1). Consistent with Hypothesis 5b, the interaction of upstream internationalization and prior knowledge resources has a positive and significant association with the acquisition of technological knowledge (beta = 0.0417; p<0.01). Hypothesis 6a proposes that prior knowledge resources moderate the relationship between downstream international activities and the acquisition of technological knowledge. As revealed in Model 3 (Table 1) the interaction of prior knowledge resources and downstream internationalization has no significant impact on the acquisition of technological knowledge, providing no support for Hypothesis 6a. Hypothesis 6b suggests that prior knowledge resources moderate the relationship between upstream international activities and the acquisition of market knowledge. The equation that tests this precondition is shown in Model 4 (Table 1). Consistent with Hypothesis 6b, the interaction of upstream internationalization and prior knowledge resources has a positive and significant association with the acquisition of market knowledge (beta = 0.0612; p<0.01).
Increasingly, SMEs gain new knowledge from their international operations. Our study shows that different (up/down-) streams of international activities influence the content of this new knowledge, namely new market knowledge and new technological knowledge. In addition, the study sheds new lights into the role of prior knowledge resources by identifying when SME prior endowment of knowledge resources enhances the relationship between (up/down-) streams of international activities and the acquisition of new market and technological knowledge. The results support our predictions that, via learning by doing, SMEs engaged in downstream internationalization acquire new market knowledge; and that, via learning by doing, SME engaged in upstream domain acquire new technological knowledge. Specifically, consistent with the literature (Johanson & Vahlne, 1977), our study shows that exporting and marketing abroad provide SMEs with important insights into foreign markets and foreign customers. Also, in support of prior research (Buckley, 1997), our results show that international upstream activities enhance the acquisition of new technological skills and know-how. This is an encouraging result as it indicates that SMEs engaged in importing, producing or conducting R&D abroad are likely to gain important technological skills which can strengthen their competitive position.

Only partial support was found for our prediction that SMEs would acquire knowledge which transcends the specific domain of the international activities performed. Our results show a positive association between downstream internationalization and the acquisition of new technological knowledge. Yet, the results do not show a significant relationship between upstream internationalization and the acquisition of new market knowledge. The positive association between downstream internationalization and acquisition of new technological knowledge is consistent with the assumption that international customers act as key sources of technological inputs (Buckley, 1997). Furthermore, in accordance with our prediction, we found that the engagement in downstream activities brings more market knowledge than technological knowledge. Thus, SME managers should recognize all the potentials associated with exporting and marketing abroad. Beside the short-tem payoff in terms of increased sales, these activities are important sources of market knowledge and, to a lesser extent, of technological knowledge. There are several reasons for the no significant relationship between upstream internationalization and the acquisition of new market knowledge. One possible explanation is that when importing or producing abroad SME are extremely focused on the attaining technological know-how and do not devote efforts to scanning the local market or gaining other information from their local partners. Especially upstream activities as compared to downstream activities are rather demanding in terms of coordination of activities and exchange of technological information (Andersen, 1999). As a result, there is little time for acquiring other information. Another explanation is that market knowledge is mainly acquired through learning by doing. Thus, other form of learning, such as scanning the environment and observing other companies, per se, might not be conducive to the acquisition of market knowledge.

In accordance with our prediction, prior knowledge resources emerge as a significant moderator of the relationship between upstream internationalization and the acquisition of new market knowledge and technological knowledge. Thus, accumulated prior knowledge resources influences a firm’s learning by doing as well as other forms of learning from upstream international activities. These results are important also in the light of the no significant relationship between upstream internationalization and the acquisition of new market knowledge, discussed above. Indeed, international upstream activities seem to give SMEs an opportunity to broaden their market knowledge only when the firm has a prior endowment of knowledge resources. This result supports theorists who emphasize the importance of prior knowledge when seeking and recognizing the value of externally held knowledge (Huber, 2004). In addition, this result has important implications for SME managers. It highlights the importance of investing in the firm’s knowledge base. Surprisingly, prior knowledge resources do not moderate the relationship between downstream internationalization and the acquisition of new market knowledge and technological knowledge. These results might be attributed to the nature of SMEs’ downstream activities in international markets. Tighter and close relationships with customers characterize SMEs’ internationalization (Buckley, 1997; Karagozoglu & Lindell, 1998); and such direct involvement with
customers promotes the acquisition of relevant market and technological knowledge, also in the absence of prior market or technological knowledge.

To conclude, our results show that downstream and upstream internationalization are important sources of new knowledge for resource constrained SMEs. Yet, while for downstream internationalization the acquisition of new knowledge is immediate, for upstream internationalization the process is mediated by the firm’s prior endowment of knowledge resources. Our results invite further research into the link between SMEs’ newly acquired knowledge resources and growth prospects.

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REFERENCES


Table 1: Seemingly Unrelated Regression (SURE) Results
* p<.10; ** p<.05; *** p<.01

<table>
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<tr>
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