

**Pre- and post entry learning of young technology firms:
antecedents of objective and tacit foreign market knowledge**

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Abstract

This paper examines and tests a model for the acquisition of foreign market knowledge and the performance of German technology firms by drawing on the Process Theories of Internationalization (PTI) (Johanson & Vahlne, 1977/1990) and the International New Venture Theory (INV) (Oviatt & McDougall, 1994). We make two contributions to the current knowledge in the literature. First, a theoretical integration of PTI and INV allows for an examination of what firms learn in the pre- and in the post-entry phase of foreign market entry. Based on our integrative framework we examine the relationship of prior foreign market analysis, own market interaction and networks on objective and tacit foreign market knowledge. Second, we elaborate imprinting effects of objective and tacit foreign market knowledge on subsequent performance. Thus, we make a contribution to the literature examining what firms learn prior to and in the course of their internationalization operations. Hypotheses derived from our integrated theoretical framework are tested on a dataset (n=248) of German firms from the technology areas of Nanotechnology, Biotechnology, Microsystems and Renewable Energies. Results show that firms are able to acquire objective foreign market knowledge through prior market analysis in the pre-entry phase, whereas in the post-entry phase firms learn in particular tacit knowledge through own market interaction and through networks.

Key words: learning; internationalization; foreign market knowledge; technology firms

1. Introduction

The current theoretical debate in the field of international entrepreneurship is mainly characterized by two different directions. First, the Process Theories of Internationalization (PTI) (Johanson & Vahlne, 1977/1990) elaborate the research question *why* the internationalization process of the firm unfolds in an incremental manner. The second dominating approach, namely the International New Venture Theory (INV) (Oviatt & McDougall, 1994), focuses on *how* it is possible that young firms venture into foreign markets right from inception.

These two different schools of internationalization theories appear contradictory at a first glance. Whereas PTI views the internationalization of the firm as a gradual and reactive process unfolding in an incremental manner out of an established domestic market, INV Theorists challenge this view by perceiving internationalization as a risk-seeking, proactive pattern starting right from firm establishment. However, a closer look at the two different theoretical approaches shows that they are more complimentary rather than contradictory (Autio, 2005; Autio & Sapienza, 2000; Yli-Renko, Autio & Tontti, 2002). On the one hand the approaches have some key elements in common and on the other hand they supplement each other by emphasizing different phases of the internationalization process (Autio, 2005; Autio & Sapienza, 2000; Chetty & Campbell-Hunt, 2004).

One of the key elements that both theoretical approaches emphasize is the role of *foreign market knowledge* in the internationalization process. The PTI views “[...] foreign organizing knowledge [...], as a key regulator of the firm’s tangible and intangible commitments to foreign markets” (Yli-Renko, Autio & Tontti, 2002: 280), whereas INV theory views knowledge more as a resource enabling an early foray into foreign markets (Yli-Renko, Autio & Tontti, 2002: 280; Autio, Sapienza & Almeida, 2000). Thus, whereas the PTI view mainly studies the regulating role of foreign market knowledge once the internationalization process has been started (post-entry phase of internationalization) the INV theory mainly focuses on foreign market knowledge as an enabling factor in the pre-entry phase of internationalization. So far, studies emphasizing foreign market knowledge in the internationalization process from a PTI background have mainly focussed on the role of experiential learning during a firm’s commitment to international markets. According to Pedersen & Petersen (2004: 107) this “[...] emphasis on postentry learning has been associated with the limited role assigned to objective knowledge.” The dominating view in most theoretical and empirical works is that “[t]he experiential and context-specific character of local-market knowledge implies that most

learning needs to take place postentry, and opportunities for preentry learning a correspondingly low” (Pedersen & Petersen, 2004: 105). However, we perceive this view to be too narrow. The focus of INV Theory shows that pre-entry learning plays a key role for the entrant firm. Although experiential learning and tacit knowledge is an important element of foreign market knowledge, the role of objective knowledge should not be ruled out completely. We agree that the acquisition of complex tacit knowledge may to a large extent happen in the post-entry phase. In contrast, we expect “[...] entrant firms to acquire the necessary objective/explicit market knowledge [...] before entry takes place” (Pedersen & Petersen: 2004: 110). Thus, we agree with Pedersen & Petersen (2004: 106) that “[...] preentry learning is conceivable” depending on the type of knowledge.

Therefore, the idea of our paper is that supplementing the traditional PTI perspective with elements of INV theory having a focus on the pre-entry phase, allows for analyzing the learning behavior of the firm both in the pre-entry and the post-entry phase of internationalization emphasizing both objective and tacit foreign market knowledge.

Thus, the aim of this paper is to study the role of objective and tacit knowledge in the internationalization process of young technology firms. Differing between objective and tacit foreign market knowledge allows us to answer our major research question of *what young technology firms learn before and in the course of operations in a foreign market*. Thus, the focus of this paper is on studying the antecedents, timing and outcomes of foreign market knowledge in more depth.

To achieve our research objective we build up on an integrated framework consisting of elements of PTI and INV. There have already been attempts to integrate the two different approaches (Autio, 2005; Autio & Sapienza, 2000; Chetty & Campbell-Hunt, 2004), however, quantitative empirical testing of an integrated PTI/INV framework is largely lacking so far. By integrating the two different frameworks we identify complementarities in terms of three factors namely prior foreign market analysis, networks and own foreign market interaction. This framework allows us to study the relationship of these factors on objective and tacit foreign market knowledge as well as on subsequent performance of the firm.

We are going to proceed as following in order to answer our major research question. We will first give a literature review on existing studies on the topic of foreign market knowledge and internationalization. After that we introduce PTI and INV by outlining their major foci and deficits. The theoretical part closes with an integration of the two different schools. Based on our theoretical framework we derive hypotheses for pre- and post-entry learning as well as

subsequent performance implications. We test our hypotheses on a dataset of young German technology firms from the areas of Nanotechnology, Biotechnology, Microsystems and Renewable Energies. Based on the discussion of our empirical results we finally conclude our study and give some implications for future research.

2. Literature review on foreign market knowledge

According to Johanson & Vahlne (1977: 29) foreign market knowledge consists of two components: objective knowledge which can be taught and tacit knowledge that can only be learned through personal experience. Objective knowledge may include facets such as knowledge about the foreign market's institutional framework, rules, values and norms or more precisely aspects such as legal prerequisites, financial practices, knowledge about import and export tariffs, or local taxes in the foreign market. Tacit knowledge is more fine-grained and includes knowledge about foreign customers, competitors and knowledge about business and technology trends in the focal market as well as knowledge about the preferences and styles of customers, competitors and suppliers in the foreign market.

Although the absorption of foreign market knowledge plays a major role in the dominating PTI (Johanson & Vahlne, 1977/1990) and in the INV theory (Oviatt & McDougall, 1994) existing studies on the knowledge generation process are still rather limited. Detecting this deficit of the research field, several studies have asked for research to identify the antecedents of foreign market knowledge and their development over time respectively (Ling-yee, 2004; Li & Cavusgil, 2000; Morgan & Katsikeas, 1998). In the following we are going to review the state of the art of this research.

Ling-yee (2004) extends the foreign market knowledge literature in several ways. First, the study develops a conceptual model of determinants of foreign market knowledge, based on the social capital theory. The study elaborates how structural and relational social capital affects the creation of foreign market knowledge. Hypotheses derived from the theoretical framework are tested on a dataset of firms from different industrial types and product categories from China. Also emphasizing the role of social capital in the foreign market knowledge generation process, Yli-Renko, Autio & Tontti (2002) explain the role of intra- and inter-organizational relationships in building the firm's distinctive knowledge base and in achieving international growth. Testing hypotheses on a longitudinal dataset of Finnish technology-based new firms, Yli-Renko et al. (2002) show that internal and external social capital influences the acquisition and creation of knowledge, and that knowledge is a key resource driving the international growth of technology based new firms.

The study by Eriksson & Chetty (2002) addresses how market knowledge and market commitment are developed in supplier/customer relationships in international markets and examines relationship specific experiential knowledge development through mutual commitment. It shows that the relationships in a business network influence how the focal relationship develops (Eriksson & Chetty, 2002: 305). Further, empirical results clarify that the foreign market knowledge of a firm is affected by the firm's absorptive capacity generated in dyadic relationships with foreign customers and the customer's network.

Based on the resource-based view of competitive advantage, Wang & Olsen (2002) propose and test a model of exporter satisfaction as both a dependent variable and an indicator of export success. Pedersen & Petersen (2004: 103) address how managers' perceived familiarity with local markets develops during a period of entry or expansion. Their study is one of the few attempts providing evidence in how far foreign market familiarity changes over time.

All of the above mentioned studies emphasize the importance of foreign market knowledge in the internationalization process and give performance and outcome implications. However, most studies focus on the role of social capital and its importance for the development of foreign market knowledge in the post-entry phase. Although the role of social capital has been stressed extensively, an elaboration of what type of knowledge is acquired at which stage of internationalization has not been answered so far. Most studies emphasize foreign market knowledge as *one construct*, but as stated by Johanson & Vahlne (1977) we need to differ the types of knowledge between objective and tacit knowledge. Due to different degrees of complexity and comprehensiveness there is reason to believe that firms acquire different types of knowledge at different stages of the internationalization process. So far none of the studies has answered the question what a firm venturing into foreign markets learns before and in the course of its operations in this market.

Further, the performance implications of foreign market knowledge that have been elaborated in the current status of the literature are restricted to the international sales growth (Yli-Renko, Autio & Tontti, 2002), export intensity (Ling-yee, 2004) and export profitability and exporter satisfaction (Wang & Olsen, 2002). Studies elaborating the effect of objective and tacit knowledge on firm performance are lacking so far. Our study is an attempt in order to reduce the deficits as outlined above mainly emphasizing the role of tacit and objective knowledge in the pre- and post-entry phase of internationalization.

An integration of the different foci and elements of PTI and INV may be a valuable theoretical base in order to study the deficits as outlined above. In the following we will

introduce the PTI and the INV Theory in more depth and integrate the different approaches in order to emphasize pre-entry and post-entry learning. This framework allows us for studying the relationship of prior foreign market analysis, networks and own market interaction on tacit and objective foreign market knowledge. Further, we derive hypotheses for the relationship between objective and tacit knowledge and the performance of the firm.

3. Integrative Framework

The Process Theories of Internationalization (PTI) build up on the behavioral theory of the firm (Cyert & March, 1963) and on the theory of the growth of the firm by Penrose (1959). The basic idea is that companies are lacking knowledge about foreign markets hampering foreign market entry and subsequent internationalization patterns. Further, knowledge can only be acquired in a gradual manner. Due to these assumptions, “[t]he model focuses on the gradual acquisition, integration and use of knowledge about foreign markets and operations, and on the incrementally increasing commitments in foreign markets” (Johanson & Vahlne, 1977: 23). The internationalization process is depicted as a learning process in which the development of knowledge over time is considered as a firm’s resource. The gradual internationalization process is expressed by the psychic distance between home and host country (Johanson & Wiedersheim-Paul, 1975) and by the establishment chain. According to the latter, foreign market treatment occurs in different steps: no regular export, independent representative (agent), sales subsidiary and finally production (Johanson & Vahlne, 1977: 24). Thereby firms begin to export, because they receive requests to sell their products abroad (Aharoni, 1966). The psychic distance is defined as “the sum of factors preventing the flow of information from and to the market” (Johanson & Vahlne, 1977: 24). Examples are legal, educational, linguistic and cultural barriers.

Since the end of the 70s the PTI have been supported in a vast number of empirical studies (Johanson & Vahlne, 1977/1990). However, as it is likely for most established theoretical approaches, the model has been criticised by a number of scholars. Besides general critique on the approach (for an extensive review see Andersen, 1993), with respect to the phenomenon of early internationalization the theory may not be able to explain an early foray into foreign markets by entrepreneurial companies. Further, although implicitly suggesting that pre-entry learning is possible, the major focus is on experiential learning emphasizing the post-entry phase of firm internationalization (Pedersen & Petersen, 2004).

On the opposite **the International New Venture Theory** (INV) explains a phenomenon incongruent with the assumptions of traditional internationalization process theories mainly

due to the young firm age at which companies start their internationalization process on various steps of the establishment chain. Elaborating on the phenomenon of early internationalization, Oviatt & McDougall (1994) “[...] highlighted the importance of smaller and younger firms and their distinguishing characteristics that position them to internationalize quickly and create value for their founders and owners” (Zahra, 2005: 20). The main purpose of the theory is to explain how it is possible that new firms internationalize right from or shortly after inception.

Oviatt & McDougall (1994: 53) distinguish between four necessary and sufficient elements for the existence of International New Ventures. 1) Organizational formation through internalization of some transactions distinguishes those transactions that take place in organizations from those that are governed by markets. 2) Strong reliance on alternative governance structures separates the subset of transactions associated with New Ventures from the transactions in established firms. 3) The establishment of foreign location advantages separates the transactions conducted by International New Ventures in contrast to those conducted by New Ventures focusing on the home market. 4) The control over unique resources differentiates sustainable International New Ventures from those likely to be short-lived.

The model found widespread acceptance in the international entrepreneurship literature. “[...] Oviatt and McDougall (1994) have started an important and influential research stream, whose contributions have been insightful, powerful and varied” (Zahra, 2005: 27). The International New Venture Theory has made valuable contributions for research examining how it is possible that young companies internationalize rapidly on various steps of the establishment chain. However, as it primarily focuses on the phase prior to foreign market entry, the model does not appear applicable in order to explain the consequences of early internationalization on the firm’s subsequent learning processes.

In particular because of the timing to internationalization the two views appear at conflict. However, a more recent research stream identifies complementarities of the two different approaches fostering the discovery of new ideas (Autio, 2005: 9). According to Autio (2005: 10) “[...] the Oviatt & McDougall challenge to the PTI provides an important, self-sufficient complement to the PTI, because it mostly addresses aspects of the PTI that Johanson and Vahlne ignored, either explicitly or implicitly. Thus, [...] an important aspect of the Oviatt and McDougall contribution is that they open a way towards building a more comprehensive theory of new firm internationalisation – one that addresses the initiation, implementation and

outcomes of internationalisation processes in new and entrepreneurial firms.” Agreeing on this, in the following we make an attempt to establish **an integrated framework** in which PTI and INV supplement and complement each other. The integrated framework in particular focuses on three elements that PTI and INV stress implicitly or explicitly: *prior foreign market analysis, the role of networks and own foreign market interaction*.

Although the main focus of PTI is on experiential post-entry learning “[...] the Uppsala school theorists implicitly suggest that preentry learning takes place to some extent. [...] Foreign markets in which a firm already operates function as stepping stones to new markets. This stepwise geographical expansion enhances foreign market familiarity before entry into an individual foreign market, because managers of entrant firms have acquired valuable knowledge through operations in similar foreign markets” (Pedersen & Petersen, 2004: 106). Thus, in PTI pre-entry learning is conceivable through prior internationalization activities. However, this is not an answer to the question, whether pre-entry learning is possible for young entrepreneurial firms venturing into foreign markets for the first time on which the Oviatt & McDougall (1994) framework focuses on. According to Pedersen & Petersen (2004) PTI does not give an answer to this aspect as it primarily focuses on experiential learning in the foreign market. However, as objective knowledge plays an important role in the works by Johanson & Vahlne (1977/1990) as well, pre-entry learning might be possible for this type of knowledge which is easier to grasp and comprehend than experiential knowledge. This is supported by Pedersen & Petersen (2004: 107) arguing that “[i]f the assumption about experiential knowledge’s key role in the international expansion process is eliminated, international market research appears to be an obvious instrument for preentry learning”. Thus, whereas the likelihood for pre-entry tacit knowledge generation is pretty low due to its more complex character, the opportunity to acquire objective foreign market knowledge through foreign market analysis in the pre-entry phase is high. INV’s focus on the pre-entry phase of internationalization complements PTI in terms of pre-entry learning through *prior foreign market analysis*. On the other hand, PTI shows openness through the implicit consideration of pre-entry learning. Thus, PTI and INV supplement each other in respect to the possibility of pre-entry learning through prior foreign market analysis.

Besides prior foreign market analysis, the PTI and INV supplement each other in terms of *networks*. Johanson & Vahlne (2003) themselves show openness and recognize the importance of networks and the complementarities with recent network theoretical approaches in the internationalization literature. “It seems that we have a situation where old models of

internationalization processes are still applied quite fruitfully at the same time as a number of studies have suggested that there is a need for new and network-based models of internationalization. We think that it might be worthwhile to reconcile and even integrate the two approaches” (Johanson & Vahlne, 2003: 84). Other recent works from different Uppsala scholars (Eriksson et al., 1997) also point at the opportunity for learning by getting an access to knowledge of other firms without having to follow exactly the same experiences as these firms (Pedersen & Petersen, 2004: 106).

One of the necessary elements for early and rapid internationalization in the INV approach is the use of alternative governance structures such as networks (element 2). Networks help young entrepreneurial firms – usually characterized by resource scarcity – to get an access to new knowledge and resources. This access may allow for an early venturing into foreign markets. Focussing on the role of networks in the pre-entry phase, the INV theory does not make profound assumptions about the importance of networks in the post-entry period. On the contrary, based on the theoretical debate on the appropriateness of PTI to explain an early venturing into foreign markets, Johanson & Vahlne (2003) themselves outlined a network model of the internationalization process of the firm – again with an emphasis on experiential learning in the post-entry phase.

Thus, whereas INV emphasized the role of networks to enter foreign markets, Johanson & Vahlne (2003) adopt the idea of the role of networks in order to explain how firms learn in relationships in order to advance their internationalization patterns in the post-entry phase. Whereas the role of networks as a determinant factor in the pre-entry phase has been researched in a number of empirical studies on the topic of early internationalization¹, the role of networks in the post-entry phase is largely understudied for early internationalizers. Thus, PTI fertilize INV by emphasizing the importance of networks in the post-entry phase of internationalization. Therefore, we think it is worthwhile to incorporate the role of networks in the post-entry phase into our theoretical framework.

One of the major focuses of PTI is experiential learning of the firm through *own market interactions* in the foreign market. Thus, firms learn “how the game is played at a deeper level” in the post-entry phase influenced by the values of the foreign country and its basic assumptions. According to PTI “[t]he vital requisite knowledge about the local business environment is inherently experiential and specific to the individual foreign market” (Pedersen & Petersen, 2004: 110). Although not explicitly focussing on post-entry experiential learning, INV theory implicitly considers post-entry learning behavior of the firm

¹ E.g. Yli-Renko, Autio & Tontti, 2002; Zahra, Matherne & Carleton, 2003; Preece, Miles & Baetz, 1998; Saarenketo, 2002; Reuber & Fischer, 1997.

in the fourth element of the framework. The sufficient element of unique resources stresses, that in order to achieve sustainable international firm development, firms need to continuously improve the uniqueness of their resources, based on the experiences made in the foreign market. A continuous experiential learning process is implicitly suggested by INV theory showing another complementarity of the two different approaches. Thus, PTI and INV supplement each other in terms of the importance of own learning through foreign market experience.

The following table summarizes in how far PTI and INV explicitly or implicitly supplement each other in terms of the three factors prior foreign market analysis, post-entry role of networks and own foreign market interaction.

	Prior foreign market analysis	Post-entry role of networks	Own foreign market interaction
PTI	Implicitly suggests that pre-entry learning appears to some extent possible through existing foreign markets functioning as stepping stones for further internationalization	Original work by Johanson & Vahlne (1977) implicitly considers networking as a learning mechanism, whereas Johanson & Vahlne (2003) explicitly address networks to play an important role in the (post-entry) internationalization process of the firm.	Explicitly considered as the original major focus of PTI is on experiential learning through own experiences made during interactions in the foreign market (experiential learning).
INV	Explicitly considers pre-entry learning through foreign location advantages such as prior international experience of the management team	Explicitly address alternative governance structures (e.g. networks) as an enabling resource allowing for an early foray into foreign markets (pre-entry). The post-entry role of networks is only implicitly suggested.	Only implicitly addresses learning through own foreign market interaction by emphasizing the role of unique resources development as a sufficient element for sustainable firm survival and international growth.

Based on this framework, the basic idea of our empirical model is that firms learn different types of knowledge at different stages of their internationalization development.

Objective foreign market knowledge, which is easier to grasp and comprehend compared to tacit knowledge, may be acquired primarily through prior foreign market analysis in the pre-entry phase. Prior foreign market analysis may help the firm to get an understanding about foreign market's institutional norms and values such as legal prerequisites, financial practices or export tariffs and rules, however, it may not be a means in order to acquire fine-grained tacit knowledge at a deeper level.

In the post-entry phase the firm is exposed to new knowledge through the interaction with its environment. According to Ghoshal (1987) the diversity of the environment in which the firm operates may provide the firm with a superior knowledge base. “This diversity exposes it [the firm] to multiple stimuli, allows it to develop diverse capabilities, and provides it with a broader learning opportunity [...]” (Ghoshal, 1987: 431). Some of the new knowledge a firm is exposed to while doing business in foreign markets “[...] is stored in the firm’s routines and processes, thereby transforming the firm’s current stock of knowledge” (Eriksson et al., 2000: 28; Nonaka, 1991). Thus, tacit knowledge, which is more fine-grained and is not as easy to grasp, is primarily acquired through networks and interaction in the foreign market. This new knowledge is what makes the difference of a firm compared to other firms in the foreign market. Thus, according to our argumentation tacit knowledge leads to higher firm performance. Figure 1 shows our research model and its underlying hypotheses. We elaborate on the relationships outlined in figure 1 in more depths in the following and derive hypotheses out of our theoretical framework.

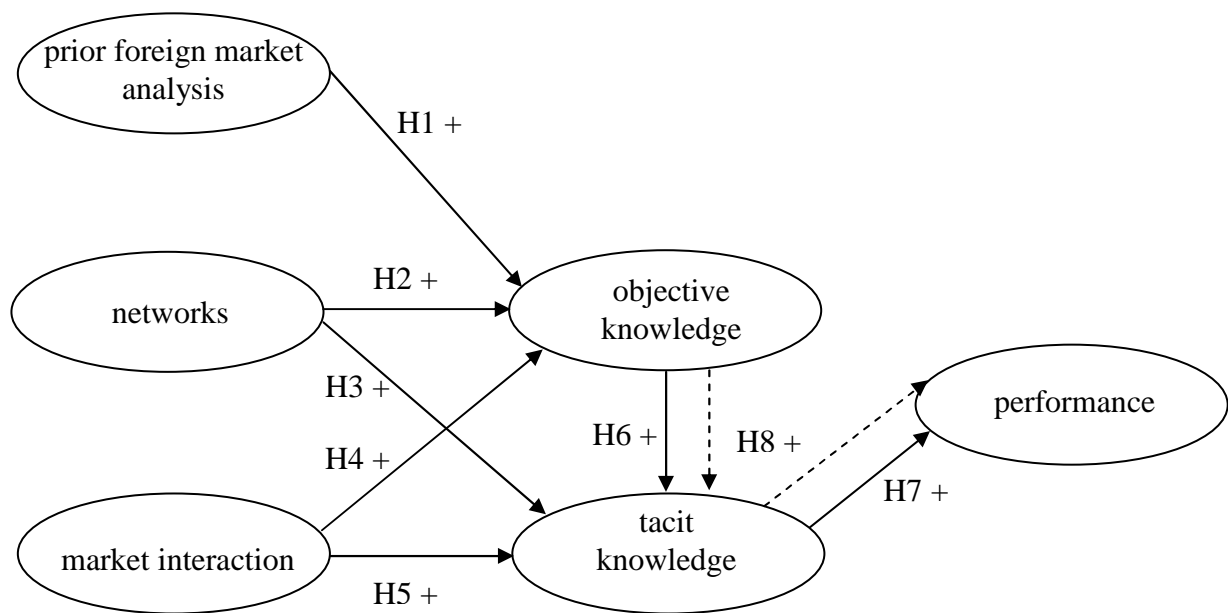


Figure 1: Hypothesized research model. The drawn through lines show the direct effects between the different constructs. The dashed lines describe a mediating effect of business knowledge for the relationship between institutional knowledge and performance as elaborated in more depth in H8.

Prior foreign market analysis

Prior foreign market analysis describes the degree to which the firm has conducted analysis about the foreign market situation as well as collected market specific information prior to market entry.

Prior to venturing into foreign markets firms are at a disadvantage to those companies already operating in the market due to certain liabilities of foreignness. A firm is lacking both objective and tacit knowledge prior to entering the market. Prior foreign market analysis is a means in order to reduce these liabilities of foreignness in the pre-entry phase. "Objective knowledge is acquired through standardized methods of collecting and transmitting information, i.e. market research, and can easily be transferred to other countries and replicated by other firms" (Eriksson et al., 1997: 339). Thus, foreign market analyses may include foreign market site analysis, analysis of the foreign market situation including aspects such as legal, political, or economic aspects or simply the collection of available information about the foreign market via market research. Such foreign market analysis helps the firm to gain an understanding about the basic prerequisites and norms and values in the foreign market. This knowledge may be highly beneficial in order to realize a first foreign market access and in order to reduce the risks of a foreign market engagement. Thus, prior foreign market analysis may be an appropriate means in order to gain objective information about the foreign market prior to foreign market entry.

However, prior foreign market analysis has its limitations when it comes to more fine-grained and more tacit knowledge. "The vital requisite knowledge about the local business environment is inherently experiential and specific to the individual foreign market. Opportunities for preentry learning are accordingly low for this experiential or tacit knowledge." (Pedersen & Petersen. 2004: 110). Understanding foreign customer's needs or technological trends and developments are not that easy to grasp as foreign market financial practices and rules and norms about taxes and export tariffs. Preferences and styles of customers in the foreign market as well as behaviors and reactions of foreign competitors may not be as easily available and may not be identified via prior foreign market analysis. Further it is hard to extrapolate new market trends and technological developments without knowing styles, competencies and preferences of customers, competitors and suppliers.

In summary, we argue that prior foreign market analysis is a valuable means in order to increase the objective knowledge about a foreign market such as institutional settings and environments. "Some knowledge is easy to acquire. It can be learned by reading written material produced by the partner-objective knowledge" (Johanson & Vahlne, 2006: 170).

Thus, we expect the firm to absorb necessary objective knowledge prior to entering the foreign market, whereas acquisition of tacit knowledge primarily takes place in the post-entry phase. Hypothesis 1 summarizes our argumentation:

H 1: The higher the degree of the prior foreign market analysis of the firm, the higher the objective knowledge of the firm.

Networks

The degree of networks describes in how far interaction with foreign customers, suppliers or other cooperative partners helped to develop the foreign market. Existing literature on the complex topic of foreign market knowledge has emphasized the role of social capital/networks as a major determinant factor for gaining foreign market knowledge (Ling-yee, 2004; Yli-Renko, Autio & Tontti, 2002; Eriksson & Chetty, 2002; Wang & Olsen, 2002). Network contacts provide the entrant firm with an access to its network partners' knowledge about foreign markets. Interacting with cooperative partners, customers or even competitors may help the firm to get an access to objective knowledge about the market. Thus, besides prior foreign market analysis, also networks and more precisely the interaction with network partners helps the firm to absorb objective knowledge about the foreign market after foreign market entry. Hypothesis 2 summarizes this argumentation:

H 2: The higher the extent to which the firm uses networks in order to develop the international market, the higher the objective knowledge about the market.

However, this is not our major theoretical emphasis. Our emphasis is that in the post-entry phase, networks appear to be a valuable means in order to acquire tacit knowledge not ruling out the opportunity for further objective knowledge acquisition.

The INV approach emphasizes the role of networks as an enabling factor to get a first access to a foreign market. "Hybrid partners share complementary assets to their mutual benefit" (Oviatt & McDougall, 1994: 54) allowing for an early venturing into foreign markets.

However, "[f]oreign market entry or internationalization is not an issue. The important issue will be the subsequent international expansion and network development" (Johanson & Vahlne, 2003: 95). Firms with a limited set of networks in a particular foreign market have a limited access to other's knowledge, preferences, styles and norms. As the number of interactions with customers, suppliers or other cooperative partners are limited as well, there

may also be a lower degree of innovation, since “[...] such firms experience only a limited set of problems and of technical and market-related solutions” (Eriksson et al., 2000: 31). Thus, firms with a limited degree of networks in a foreign market may not be able to accumulate sufficient knowledge about foreign business practices.

Customers have different preferences and perceptions about the foreign market than competitors or suppliers. Firms with a high degree of networks in the foreign market e.g. with customers, suppliers or other cooperative partners or institutions, can accumulate knowledge from a number of sources which are not accessible by firms not having such variations of networks. Further, interacting with customers, suppliers or other cooperative partners forces a firm to question existing routines. The higher the degree of network contacts a firm has in the foreign market, the more interactions it has forcing it to reflect current routines, structures and behaviors finally inducing a learning process. Interacting with customers, suppliers or other cooperation partners to improve products, sales activities or product development exposes the firm to new knowledge challenging existing routines and processes. Thus, the firm experiences learning processes having an impact on business perceptions such as customer’s needs or new technological trends. Networks provide access to other’s resources and information (Burt, 1992) and help to overcome liabilities of foreignness. Thus, in line with Brown & Duguid (1991) we argue that learning is a social construction. What is learned is closely linked to the conditions under which learning takes place. The sources of learning do not reside explicitly within the firm, however, they are commonly found in the interaction among firms, cooperation partners or customers and suppliers respectively (Powell, 1990). Thus, the degree to which firms learn about new market particularities is a function of the extent of their participation in such activities (Levinthal & March, 1994).

Thus, foreign network contacts allow for sharing knowledge from different sources thereby leading to new information, understanding and knowledge. Hypothesis 3 summarizes our argumentation:

H 3: The higher the extent to which the firm uses networks in order to develop the international market, the higher the tacit knowledge about the market.

Market interaction

Market interaction describes the degree to which the firm has gained competences about foreign market’s prerequisites, experienced new market segments and gained competences in tracking new customers’ needs.

While doing business abroad the foreign market entrant firm experiences new objective knowledge that may not have been available through prior foreign market analysis. Absorbing objective knowledge does not end at the timing of foreign market entry, but it is a continuing process in the post-entry phase depending on the degree of foreign market interaction. Thus, the firm adapts new objective knowledge that is easily adaptable, but also easily to replicate after foreign market entry. The extent to which the firm absorbs new objective knowledge depends on the intensity to which the firm interacts with the foreign market. Therefore we argue:

H 4: The higher the degree of foreign market interaction experienced in the course of internationalization, the higher the objective knowledge about the market.

Besides the role of networks, the degree of interaction with the foreign market in which the internationalizing firm is involved has an impact on tacit knowledge. Comprehensive experiences in tracking customer needs as well as continuous interaction with foreign distributors or license-partners exposes the firm to new knowledge complementary to the research stock existing at the timing of foreign market entry. Designing and marketing products that better meet foreign customers' needs induces a learning process helping to understand the particularities of the foreign market as well as its norms, values and structures. Customer preferences from the domestic market may not fit the customer preferences in the international market. Interacting with customers exposes the firm to the foreign customers' particular preferences and norms. Thus, interacting with e.g. foreign customers or cooperation partners helps to learn customer preferences or new technological trends that may change current routines or processes and leads to a learning process. Firms with low levels of market interaction do not experience such variations of knowledge and thus are not able to learn to such a high extent. Firms with limited market interaction experience only a limited set of particularities of foreign markets and new environments. Thus, the degree to which a firm is interacting in the particular foreign market determines the tacit knowledge about foreign markets. Hypothesis 5 summarizes our argumentation:

H 5: The higher the degree of market interactions experienced in the course of internationalization, the higher the tacit knowledge about the market.

Objective and tacit knowledge

As mentioned earlier, objective knowledge implies the firm's knowledge about the foreign market's institutional framework, rules, values and norms. Thus, it may be a question of "[...] the import and export of goods and services, tariffs, local taxes, general conditions in the market, as well as related problems and prospects" (Eriksson et al., 1997: 342). Knowledge about these aspects as well as about the language and culture are highly necessary for doing business abroad. Without knowing about import and export goods and services it is hard to get an access to customers or to realize a first foreign market access. Without having an understanding about some "general rules of the game" in the particular foreign market, it is hard to comprehend and track competitor's moves and product developments as well as to anticipate future trends and technologies in the particular market. A basic understanding of the institutional settings is necessary for getting an access to the market at all. Thus, objective knowledge is helpful in order to acquire tacit knowledge. Though not explicitly, but implicitly Eriksson et al. (1997: 342) support this argumentation by stating that "[...] the extent to which tacit knowledge constitutes the knowledge base of the firm, and how it is formatted and used are powerfully shaped by the broader [understanding of the] institutional context." Institutional knowledge is perceived to be more objective, whereas the business knowledge about a foreign market is more tacit and fine-grained. A general understanding of the institutional prerequisites in foreign markets impacts the degree of business knowledge in the foreign market. The higher the knowledge about the institutional settings the higher the firm's ability to gain an understanding about foreign market business trends. Hypothesis 6 summarizes our argumentation.

H 6: Objective knowledge about the foreign market has a positive effect on tacit knowledge about the foreign market.

Tacit knowledge and performance

Venturing into foreign markets early in their lifecycles, young technology firms are often lacking the time to conduct extensive foreign market analysis prior to entering the foreign market. They use other mechanisms such as the access to a beneficial network in order to compensate for lacking knowledge and scarce resources. However, acquiring knowledge about the foreign market is essential for future firm growth and sustainable firm development, which is emphasized by both PTI (Johanson & Vahlne, 1990) and INV Theory (Oviatt & McDougall, 1994). For example, new technological trends identified in the foreign market,

may also be useful for developing products further and to increase competitive advantage. Knowledge about foreign market's competitors, customers and technology trends will have an impact on future firm development and will therefore impact the performance of the firm. Knowledge is the primary source of any competitive advantage leading to higher performance of the firm. Thus, knowledge about the foreign market business practices and trends should enhance "[...] the effectiveness and efficiency of the firm's export operations [...]" (Wang & Olsen, 2002: 49). This may cause economies of scale and scope leading to cost reductions and growth in profits. This leads us to conclude that the higher the foreign tacit knowledge the higher the performance of the firm. Hypothesis 7 summarizes our argumentation:

H 7: The higher the tacit knowledge about the market, the higher the performance in the foreign market.

Business knowledge as a mediator for the relationship between institutional knowledge and performance

In contrast to hypothesis 7, we do not expect a direct relationship between objective foreign market knowledge and performance. Objective knowledge, which is primarily (not exclusively) generated prior to foreign market entry is easy to replicate may not be a source of competitive advantage within a foreign market. Objective knowledge is necessary in order to do business abroad, however, it is not sufficient in order to be successful in the foreign market. Firms need to adapt to certain particularities and environmental conditions in the foreign market. This may not happen by having information about e.g. legal prerequisites or export tariffs. However, it is the more fine-grained knowledge about business practices - the tacit knowledge that makes the difference between competitors. Therefore we argue that objective knowledge alone is not sufficient in order to be successful in the foreign market. The relationship between objective knowledge and performance is mediated by tacit knowledge. Thus, objective knowledge does only have an impact on performance through tacit knowledge. Therefore we summarize in hypothesis 8:

H8: The relationship between objective knowledge about the foreign market and performance is mediated by tacit knowledge about the foreign market.

In the next section we will test our hypotheses on a dataset of young technology firms from the areas of nanotechnology, biotechnology, microsystems and renewable energies.

4. Data and methods

To collect data we conducted a questionnaire-based statistical survey of young German technology firms. In order to include a reasonable number of 1) young technology firms with 2) a high degree of internationalization we searched for technology populations that fit these prerequisites. We finally defined the total populations of firms from four different future-oriented technology areas: Nanotechnology, Biotechnology, Microsystems and Renewable Energies.² From February until April 2007 we sent out questionnaires to the total populations of German firms from these technology fields. The survey took place in a close cooperation with the Association of German Engineers (VDI/VDE-IT) and the German Energy Agency (dena).

Questionnaires were sent to CEOs, export managers, or owners of the firms as they are perceived to have the most profound knowledge about the internationalization practices and strategic decisions of the firm. In total we sent out N=1944 questionnaires. The response rate was about 17.2%, which is a total number of 335 questionnaires. As we surveyed the total populations of German Nanotechnology (N=305), Biotechnology (N=526), Microsystems (N=292) and Renewable Energies (N=821) firms, our sample included both international firms and firms only having activities in the domestic market. Our final sample includes a number of n=248 firms with international activities and n=87 firms with explicit activities only on the domestic market. This is a percentage of 74% of internationally acting and 26% domestically acting firms, which is consistent with secondary data that we collected prior to the questionnaire-based survey. The average firm age of the companies in our sample was 9.13 years and the average age at first internationalization was 2.8 years. These statistics show a very proactive internationalization behavior of the young firms in our sample.

The variables in our model have been adapted from established items in the entrepreneurship and internationalization management literature. Whenever possible, multiple-item measures were used to minimize measurement error and to enhance the content coverage for the constructs in our model. Statement-style items were measured on 5-point Likert-scales.

Performance in the first market was measured by a three-item scale (Cronbach's $\alpha=.886$) adapted from existing literature (Cavusgil & Zou, 1994; Madsen, 1998; Nakata & Sivakumar, 1996). The respondents were asked in how far the firm is satisfied with the success of the first

² The German Ministry of Education and Research identified all four technology populations as future-oriented growth technologies and set up several programmes in order to support the establishment of new firms and to boost the growth of these firms.

foreign market engagement, whether the firm has achieved its turnover aims for the first market and whether the firm has achieved its market objectives for the first market.

To measure the knowledge items we followed Eriksson et al. (1997) and adapted items from their study. The construct of objective knowledge consists of knowledge of the institutional framework, rules, values and norms. Tacit knowledge includes knowledge about customers, competitors and knowledge about business and technology trends in the focal market. For objective knowledge respondents were asked on a 5-point Likert-scale in how far they possess knowledge about the first market in terms of business law and rules in the market, financial practices in the foreign market and local business culture (Cronbach's $\alpha=.878$). For tacit knowledge we asked for the knowledge in terms of products of customers, products of suppliers and knowledge about business trends and technologies (Cronbach's $\alpha=.772$).

Prior analysis of the foreign market before foreign market entry was measured by an adapted three-item scale (Cronbach's $\alpha=.854$) asking in how far the firm conducted comprehensive analysis of the foreign market situation prior to market entry, in how far the firm conducted comprehensive site analysis prior to foreign market entry and in how far the firm minimized risks by extensive collection of information prior to market entry.

Social capital in the in the first market was measured by asking in how far cooperative relationships with customers, suppliers and other cooperation partners influenced the sale, production and technological development of the products. We adapted a four-item scale (Cronbach's $\alpha=.662$) from existing studies on cooperative learning (Burgel & Murray, 2000; Ellis & Pecotich, 2001; Eriksson et al., 2000, Shrader et al., 2000).

Market interaction in the first market were measured by asking in how far the firm was exposed to new knowledge in terms of local market needs, new market segments, competences in dealing with foreign partners and to track foreign market trends. We adapted a four-item scale (Cronbach's $\alpha=.854$) from marketing learning and marketing strategy literature (Cavusgil & Zou, 1994; Madsen, 1998; Nakata & Sivakumar, 1996). Table 2 (page 20f.) shows our endogenous and exogenous variables and the way we measured them. Besides the endogenous and exogenous variables we included firm size as a control variable into our analysis. We controlled for firm size by including the logarithmed number of employees of the firm.

Hypotheses generated from our integrated theoretical framework were tested using structural equation modelling (AMOS). Structural equation modelling is a combination of factor analysis and path analysis.

To estimate our model we applied a two-stage approach as consistent with dominating structural equation modelling literature (Anderson & Gerbing, 1988). First, we estimated the measurement model using confirmatory factor analysis in order to test the constructs' reliability and validity. In a second step we identified the structural model that best fit the data, and tested the hypothesized relationships between the constructs. As our research question elaborates pre- and post foreign market entry learning perspectives, we had to exclude domestic firms from our empirical analysis. Therefore, n=248 entered our final structural equation model. In the next section we present the results of our structural equation model.

5. Results

Table 1 shows the means, standard deviations and bivariate correlations between the independent, dependent and control variables. Looking at the bivariate correlations, all correlations stay below 0.7. Thus, no serious risk of multicollinearity between the independent, dependent and control variables can be detected.

	Variable	mean	s.d.	1	2	3	4	5	6	7
1	prior market analysis	2.53	1.16	1						
2	networks	2.86	.852	.166*	1					
3	market interaction	3.37	.916	.306*	.238*	1				
4	objective knowledge	2.86	.987	.484**	.264**	.331**	1			
5	tacit knowledge	3.56	.909	.358**	.350**	.450	.527**	1		
6	performance	3.28	1.07	.245**	.204**	.255**	.278**	.240**	1	
7	firm size	62.67	138.11	-.077	-.054	-.058	.013	-.128	-.155*	1

Table 1: Means, Standard deviations and bivariate correlations (mean = mean value; s.d. = standard deviation; Significance levels: *** $\leq .001$; ** $\leq .01$; * $\leq .05$)

Table 2 summarizes the latent constructs, their measurement items, the estimate values and the reliability of the item batteries. All standardized factor loadings are above .51 (minimum recommended by Ford, McCallum & Tait, 1986 is above .40) whereas most loadings are higher than .70. Cronbach's alpha values are all above .60 showing good internal consistency and thus reliability in all of the constructs.

Factor name	Measurement item	Estimate	Cronbach's α
prior foreign market analysis	Conducted comprehensive analysis of the foreign market situation prior to market entry	.928	.887
	Conducted comprehensive site analysis prior to foreign market entry	.869	
	Minimized risks by extensive collection of information prior to market entry	.762	
networks	Gained new technological knowledge with help of cooperation partners	.517	.662
	Close relationship with customers made product selling easier in the foreign market	.583	
	Close relationship with supplier made product selling easier in the foreign market	.757	
market interaction	Conducted product adaptations to the foreign market's prerequisites	.728	.854
	Gained experience with new market segments in the foreign market	.744	
	Gained competences in dealing with foreign partners in the foreign market	.778	
	Gained competences in tracking customers' needs in the foreign market	.830	
objective foreign market knowledge	Comprehensive knowledge about institutional rules in the foreign market	.866	.878
	Comprehensive knowledge about financial practices in the foreign market	.873	
	Comprehensive knowledge about cultural issues in the foreign market	.794	

Factor name	Measurement item	Estimate	Cronbach's α
tacit foreign market knowledge	Comprehensive understanding about the products of the customers in the foreign market	.783	.772
	Comprehensive understanding about the products of the competitors in the foreign market	.680	
	Comprehensive knowledge about upcoming technologies in the foreign market	.729	
performance	Satisfied with the overall success of the market	.813	.886
	Goals for revenues achieved in the foreign market	.928	
	Goals for market share achieved in the foreign market	.838	

Table 2: Model estimates

Measurement model

Prior to testing the final structural model we estimated the measurement model. The measurement model had a Chi-square of 143.146 (df = 94; $p < .001$). The results of the measurement model showed good model fit. The Tucker Lewis Index (TLI) which has been viewed as robust to sampling characteristics was .954 suggesting good model fit. The comparative fit index (CFI), comparing the target model with the null model is also above .95 with a value of .968. According to Hu & Bentler (1999) a CFI > .95 shows good model fit. Also the incremental fit index (IFI) with a value of .969 shows good model fit (Bollen, 1989). The root mean square error of approximation (RMSEA) expressing whether the model is a good approximation to the population model had a value of .046. According to Hu & Bentler (1999) RMSEA values < .06 suggest a good model fit. Thus, according to all fit indices the measurement model shows a good model fit.

Final structural equation model

Having satisfied the requirements of the descriptive statistics, the model estimates and the measurement model, we tested the final structural model as hypothesized (results see figure 2).

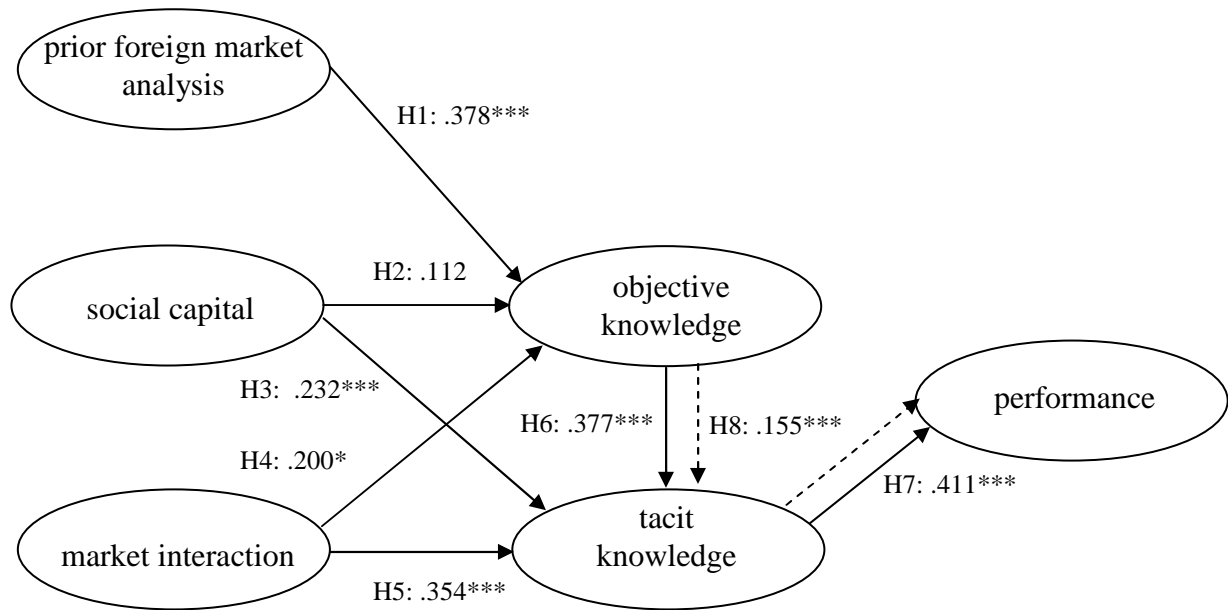


Figure 2: Final model. This is a simplified version of the actual model. It does not show error terms, control variables, or the indicator variables of the latent constructs. An exogenous unobserved error variable was attached to each of the endogenous variables to account for the variance not explained by the observed exogenous variables. The error coefficients were fixed to unity to enable model identification. Firm size was included as control variable. Path coefficients are standardized maximum likelihood parameter estimates. Latent variables are represented by ovals. The drawn through lines show the direct effects between the different constructs. The datched lines describe a mediating effect of business knowledge for the relationship between institutional knowledge and performance as elaborated in H8.

Table 3 shows the results of our final (hypothesized) structural equation model. The proposed model has a good model fit as evidenced by the fit indices. The Tucker Lewis index (TLI) was .955 suggesting good model fit. The comparative fit index (CFI) is also above .95 with a value of .966. Also the incremental fit index (IFI) with a value of .967 shows good model fit (Bollen, 1989). The root mean square error of approximation (RMSEA) had a value of .042. The final structural equation model had a Chi-square of 227.358 (df=159). Thus, according to all fit indices the model shows a good model fit suggesting high consistency.

Chi-square	Degrees of freedom	CMIN/DF	TLI	IFI	CFI	RMSEA	P
227.358	159	1.430	.955	.967	.966	.042	.000

Table 3: Final Structural Equation Model Fit Indices (N=248)

Table 4 includes the path coefficients of the final structural equation model. The completely standardized path coefficients indicate significant relationships among the different constructs. All path coefficients were significant in the hypothesized direction except for the

relationship between networks and objective knowledge (H2). Although in the right direction, the result according to this relationship was not found as significant. Table 4 gives an overview on the path coefficient, their significance and the hypotheses tested. For controlling the mediating effect that tacit knowledge has on the relationship between objective knowledge and performance we controlled for the following three conditions as suggested by Baron & Kenny (1986: 1176). First we controlled whether variations in levels of objective knowledge (independent variable) significantly account for variations in tacit knowledge (mediator variable). Second, we tested whether variations in tacit knowledge (mediator variable) significantly accounted for variations in performance (dependent variable). Finally, we controlled whether there has been a previously significant relationship between objective knowledge (independent variable) and performance, which is no longer significant when the relationships between objective knowledge (independent variable) and tacit knowledge (mediator variable) and tacit knowledge (mediator variable) and performance (dependent variable) are included. Empirical testing approved all three conditions. Therefore, we find evidence for the mediator effect as hypothesized in hypothesis 8.

Coefficient	Hypothesis	Coefficient (significance)
Prior analysis → Objective knowledge	H 1	.378***
Networks → Objective knowledge	H 2	.112
Networks → Tacit knowledge	H 3	.232***
Market interaction → Objective knowledge	H 4	.200*
Market interaction → Tacit knowledge	H 5	.354***
Objective knowledge → Tacit knowledge	H 6	.377***
Tacit knowledge → Performance	H 7	.411***
Objective knowledge → Tacit knowledge → Performance	H 8	.155***
Firm size → Business knowledge	Control	-.001*
Firm size → Performance	Control	.001**

Table 4: Path coefficients and tested hypotheses (Significance levels: *** $\leq .001$; ** $\leq .01$; * $\leq .05$)

6. Discussion

Our research results verify most of the hypotheses derived from our theoretical framework. The empirical results show that prior analysis of the foreign market is positively related to objective knowledge about the foreign market. Firms can learn about the institutional setting of the foreign market prior to entering the foreign market. Hence, hypothesis 1 is supported by

our results. Networks influence the tacit knowledge of the firm and market interaction has an impact on objective knowledge and tacit knowledge (H3-H5). Thus, networks expose the firm to a variation of knowledge increasing the subsequent tacit knowledge about the foreign market. Firms absorb new knowledge while interacting with foreign cooperation partners and while engaging in different foreign marketing activities. Hypothesis 2, implying that networks impact foreign objective knowledge was not found as significant. Thus, social capital helps to increase foreign tacit knowledge, but firms learn more about foreign institutional settings by interacting in the foreign market and through prior foreign market analysis.

Further, our results show that the objective knowledge a firm has about a foreign market impacts the tacit knowledge of the firm (H6). An understanding about legal prerequisites, norms, and values impacts the knowledge about customer preferences and technological trends in the foreign market.

Further our research results support hypothesis 7 showing that foreign tacit knowledge impacts the performance of the firm within the foreign market. Whereas foreign objective knowledge is necessary for a firm to be able to absorb new knowledge about new technological trends and business practices in the foreign market, the foreign tacit knowledge directly leads to higher firm performance. Thus, in order to increase the performance of the firm it is not enough learn about the focal market's rules, norms, and values, but it is necessary to build up on this knowledge in order to learn about business practices and to gain a more profound understanding about the foreign market's business practices, customer preferences and new technological trends. Only such an understanding about the foreign market may help to improve foreign market performance.

Our results verify hypothesis 8 showing that the influence of objective knowledge on performance is mediated by the tacit knowledge of the firm about the foreign market. The mediating effect is highly significant but its strength suggests only partial mediation.

Finally, the control variable firm size indicates that the smaller the firm is, the higher the tacit knowledge of the firm. This may be an indicator for so called learning advantages of smallness, meaning that smaller firms are faster and better able to identify, value, select and assimilate new knowledge to existing knowledge. However, as the coefficient is rather small (.001) this effect should not be over-interpreted. Firm size also has a positive impact on firm performance, which shows that bigger firms are more successful than smaller versions. This is in line with traditional internationalization literature arguing that bigger firms compared to smaller versions no longer have to suffer from resource scarcity resulting in higher firm performance.

7. Conclusion and directions for future research

The aim of our study was twofold. In order to answer the question what technology firms learn before and in the course of internationalization in a particular foreign market, we elaborated the impact of prior foreign market analysis, networks and market interaction on foreign market knowledge or more precisely on objective and tacit knowledge. Second, we elaborated the impact of tacit knowledge on subsequent firm performance. Empirical results show that prior foreign market analysis and also market interaction have an impact on foreign objective knowledge. Further we found that networks and market interaction have an impact on tacit knowledge. The variations of activities a firm is involved in the foreign market exposes it to new knowledge resulting in a higher tacit knowledge base. Further, results illustrate that besides post-entry experiential learning of tacit knowledge, pre-entry learning of objective knowledge takes place prior to foreign market entry through market analysis.

Whereas objective knowledge is primarily gained through foreign market analysis in the pre-entry phase, tacit knowledge is acquired in the course of internationalization via networks and market interaction. Objective knowledge is more easily transferable to other countries and may also be replicated more easily. However, tacit knowledge is more fine-grained and valuable for the firm. To acquire tacit knowledge existing structures and norms and patterns in the firm may get reformulated. This explains why there is a positive relationship between tacit knowledge and performance, whereas we do only find a relationship between objective knowledge and performance mediated by tacit knowledge.

Our results are unique in several ways. Focussing on the degree of networks and market interactions we elaborated the variations of knowledge a firm is exposed to in a particular market (the first international market) and how these variations lead to higher tacit knowledge. Differing between objective and tacit knowledge we were able to elaborate what the firm learns before and during its internationalization process. The content of knowledge a firm acquires during internationalization has not been studied in depth so far. However, we need to have an understanding about what firms learn in order to be able to elaborate how the firm can benefit from the new knowledge it is exposed to in international markets.

Further our results show that we need to differ between objective knowledge and tacit knowledge that a firm absorbs while internationalizing. Objective knowledge appears easier to grasp and therefore necessitates different mechanisms than tacit knowledge in order to be installed. A basic understanding about the institutional settings in a foreign market influences the firm's ability to install more fine-grained tacit knowledge. Tacit knowledge is more complex and harder to replicate than objective knowledge and thus leads to higher

performance. The mediating effect between objective knowledge and performance through tacit knowledge supports this assumption. However, as the strength of the effect suggests only partial mediation we assume that the time lack between establishing foreign objective knowledge and foreign tacit knowledge may be rather small in particular for young technology firms. However, the effect may become stronger while researching more traditional branches with a more incremental and less proactive pattern of internationalization. This might be an avenue for future research based on the findings from our paper.

Theoretically our paper followed recent streams in the research field calling for an integration of PTI and INV perspective of internationalization (Autio, 2005; Autio & Sapienza, 2000; Chetty & Campbell-Hunt, 2004). Several authors suggested that although appearing at conflict at a first glance the perceptions of the two internationalization views provide opportunities for a theoretical integration. Integrating the two approaches in terms of prior foreign market analysis, networks and own foreign market interaction is a first step into creating a framework incorporating elements of both views supplementing each other. This helps to get a more holistic understanding about the internationalization process emphasizing both pre- and post-entry learning behavior of young technology firms. As our attempt of integrating the different schools of internationalization is not comprehensive, we suggest further theoretical and empirical works emphasizing elements of both schools. The traditional PTI perspective of internationalization can benefit from the INV perspective and vice versa. Thus, supplementing the different views is an important avenue for future research for both the traditional fields of internationalization and the research field of international entrepreneurship.

Empirically we have focussed our work on new technological areas that have not been studied in depth so far. In particular the areas of Nanotechnology and Renewable Energies have not found widespread consideration in academic research. This is surprising as they are both perceived as future oriented high growth technological areas. Having an emphasis on these technologies our work makes a first step into researching these future oriented areas. However, future research has to elaborate on these fields in more depth in particular in the field of international business and entrepreneurship as they are both young fields with a high emphasis on international markets.

In terms of the aspect of learning and internationalization there may also be further avenues for future research. We have only just started to elaborate the patterns of learning so far. Learning is a complex issue and future research has to focus on learning and internationalization in more depth. However, our study could not answer whether the foreign

market learning process is a linear process or whether there is a certain degree of market interaction and network contacts that a firm can handle and process into new knowledge. Thus, future studies should elaborate whether there is a linear relationship between market interaction and networks and the absorption of new knowledge or whether the effect is saturated during the process over time. This may closely be related to the role of absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002) of a firm to be able to identify, value select and assimilate new knowledge. Future research needs to elaborate on these issues in more depth.

Further, to elaborate the learning patterns in more depth, future research needs to clarify in how far new knowledge generated in the course of internationalization spills-over into further foreign markets and/or even into the domestic market. There may be reason that in particular tacit knowledge acquired in the course of internationalization is beneficial for domestic market operations. Firms learn about new technological trends in the foreign market that may also be valuable for technological product development in the domestic market. Thus, internationalization is not necessarily a trade-off decision, but it may expose the firm to new knowledge inducing a learning process beneficial for both: the activities in the international arena and in the domestic market. Future research should elaborate on this issue in more depth.

For practitioners our results clarify that internationalization is not only an option for increasing market size and the scope of customers, but also an option to gain more profound knowledge about customer's necessities. Results show, that internationalization is an important mechanism in order to expose the firm to new knowledge and to enhance firm performance. Further, the results clarify that a basic understanding about the foreign market's norms, values, financial practices or legal circumstances is not sufficient enough in order to be successful. Firms need to put continuous effort into researching customer's needs and new technological trends in the foreign market. Our results show that cooperative partners and a higher degree of market interaction help to gain new knowledge leading to higher firm performance.

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