

The Propensity To Export Of Software SMEs

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Abstract

This study validates a path model which explains the propensity to export of small and medium sized software firms. Drawing on theoretical contributions from international entrepreneurship literature, the stages model and the theory of the growth of the firm, we show how and why foreign market knowledge barriers influence international entrepreneurship orientation. Moreover, we investigate how international experience of SME executives, the business model of software firms and research collaborations influence both antecedents of export propensity. The study has practical relevance as it gives clues regarding the question of how SMEs might enhance their chances to become successful exporters.

INTRODUCTION

Many small and medium sized enterprises (SMEs) face a set of distinctive barriers to exporting, in particular when located in countries with large, attractive domestic markets and when managerial, foreign market knowledge, language skills or international experience are scarce among their executives. How SMEs, in such a context, might enhance their chances to become successful exporters is central to this study. To answer this question, we need to go beyond mere determinants for exporting and cast light on the heart of the problem, in particular, on the relationship between international entrepreneurship orientation and knowledge barriers, as well as on the factors which influence both constructs. For this reason, we draw on elements of the extant internationalization literature, the stages model and international entrepreneurship, as well as on their foundations, the (resource based) theory of the growth of the firm.

While the stages model of internationalization (U-Model) claims that a lack of foreign market knowledge may contain or delay foreign market commitment, the more aggressive international entrepreneurship approach calls for foreign market commitment in order to make value creation possible. However, the relationship between lack of foreign market knowledge and international entrepreneurship and their combined impact on foreign market commitment has rarely been addressed. *Therefore, we focus on the question of how and why foreign market knowledge barriers may impact international entrepreneurship and how, both combined, may influence export propensity.*

We argue that international entrepreneurship orientation and foreign market knowledge reinforce themselves mutually with respect to the propensity to export. In other words, the higher (lower) foreign market knowledge barriers, the weaker (stronger) international entrepreneurship and the lower (higher) export propensity will be. In addition, we argue that international management experience and language skills of SME executives enhance foreign market knowledge, international entrepreneurship and, indirectly, export propensity.

International entrepreneurship has been defined as “a combination of innovative, proactive, and risk-seeking behavior that crosses national borders and is intended to create value in organizations” (McDougall & Oviatt, 2000, p. 903) and, more recently, as “the discovery, enactment, evaluation, and exploitation of opportunities - across national borders - to create future goods and services” (Oviatt and McDougall, 2005b, p. 540). Different from the 1994 definition of the same authors (Oviatt and McDougall, 2005a), firm size and firm age are not part of these more recent definitions which makes them applicable also to established enterprises. This research intends to refine theory, because both constructs (international entrepreneurship and knowledge barriers) represent two different though complementary approaches (Autio, 2005, p. 12).

In view of this, the construct of international entrepreneurship represents the internationalization “enabling” or encouraging factors while the construct of “international knowledge barriers” reflects the internationalization constraining factors, as a lack of foreign market knowledge may limit internationalization. Likewise, foreign market knowledge can be seen as a product of learning. SME executives learn about foreign markets by interacting with clients, suppliers, competitors or governmental agencies abroad. However, the relationship between foreign market learning and international entrepreneurship is also theoretically and empirically under-researched (Zahra, 2005, p. 26).

In the present study, we intend to address the gap drawing on Schumpeter’s and Penrose’s works concerning entrepreneurship and managerial constraints. Thus, the contribution of this article is to develop and empirically test a model covering the relationships among three main constructs, international entrepreneurship, international knowledge barriers and export propensity, as well as contextual variables.

The remainder of this paper is structured as followed: the next section presents the general theoretic approach, Penrose’s theory of the growth of the firm. Then, we present our research model and its hypotheses. The method section also describes in some detail sampling characteristics and the path modeling technique used for small samples. After the results section, we will discuss some theoretical and managerial implications.

THEORY & HYPOTHESES

This section lays out the main hypotheses drawing on international entrepreneurship and internationalization process literature as well as their roots in Schumpeterian and Penrosian thinking on entrepreneurship, innovation and firm resources. The research model containing all main relationships is displayed in Figure 1.

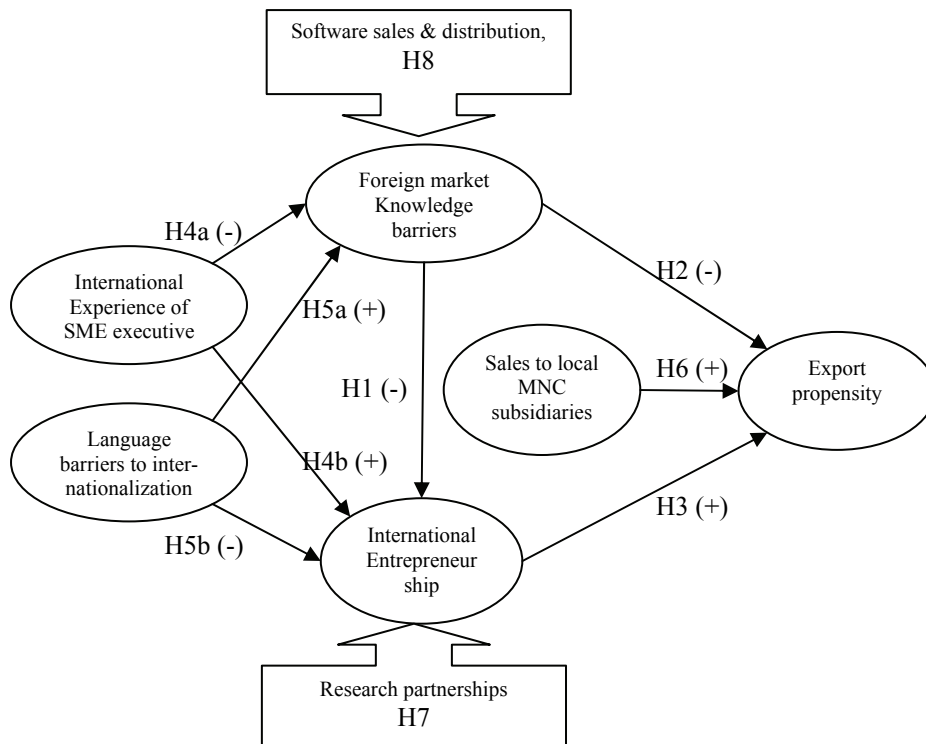


Figure 1 – conceptual model

Knowledge about foreign markets and international entrepreneurship

Firm expansion is limited by risk, uncertainty, product or factor markets and by the availability of managerial resources (Penrose, 1959). Penrose (1959, p. 58) draws attention to 'subjective uncertainty' and 'subjective estimates of risk of disappointment' which may result from the personal characteristics of the entrepreneur or from insufficient information. Consequently, incomplete information on markets is likely to limit firm expansion.

This notion also underlies the Uppsala model of firm internationalization: entering and expanding in foreign markets constitutes a risky activity. Therefore, firms need to acquire information and knowledge about the markets they are entering in order to reduce their risk of failure (Johanson & Vahlne, 1977).

If, however, learning about foreign market environments is thwarted for whatever reason, the perceived risk of entering foreign markets becomes high. In line with this, previous empirical research has evidenced that the lack of internationalization knowledge, foreign business and institutional knowledge increases the perceived cost of the internationalization processes (Eriksson, Johanson, Majkgard & Sharma, 1997).

Having said this, it remains to be examined *how* entrepreneurs adjust to given risk, uncertainty and, basically, insufficient information.

On the one hand, Penrose (1959, p. 58) claims with respect to the behavior of the entrepreneur in face of uncertainty and risk that

“Uncertainty and risk become a limit to expansion which is ‘given’, as it were, and to which the entrepreneur must adjust but which he cannot affect; they therefore become the same type of explanation of the limits to expansion as those which stress the state of demand or the availability of capital.”

This becomes more apparent when considering the genesis of innovation, a key element of entrepreneurship. Entering a new market has been considered a particular form of innovation. Innovation can be defined as the recombination of existing resources (Schumpeter, 1934). Hence, market innovation presupposes that the firm disposes over existing resources, in particular, knowledge about the foreign market the firm is about to enter. A lack of such resources is likely to restrict possible recombinations and consequently preclude market innovation. In other words, a lack of market knowledge is likely to reduce the perception of market opportunities by entrepreneurs and thus contain entrepreneurial behavior.

On the other hand, entrepreneurs are said to have a different attitude towards risk compared to ordinary executives, being often regarded as innovators, proactive and risk-seekers (McDougall & Oviatt, 2000). Thus, facing risk could even make the entrepreneur increase his stake. In a similar vein, though from a distinct theoretical perspective, Johanson & Vahlne (1977, p. 29) suggest that more information about a market can be obtained by increasing commitment to this market as “the natural solution to problems will be the extension of the operations on the market to complementing operations”.

This somewhat contradictory picture can be resolved, going back to Penrose (1959, p. 60) who concludes that:

“In principle, therefore, uncertainty which a firm’s entrepreneurs refuse to tolerate because it arises from a lack of confidence in the completeness of planning, and which they believe could be eliminated by further information and more detailed planning, will limit expansion only to the extent that managerial resources are limited. When more resources are available, more information can be obtained, more uncertainty eliminated, and more expansion planned.”

In summary, whether international entrepreneurs become encouraged or discouraged by a lack of foreign market knowledge depends on the availability of sufficient managerial resources. If managerial resources are scarce, a lack of knowledge and the associated high risk may contain entrepreneurial behavior. This is generally the case with SMEs, the object of our study: scarcity of managerial resources in SMEs tends to reduce opportunities to acquire information and knowledge with the aim of controlling risk and uncertainty when entering

foreign markets. Hence we expect a negative relationship between lack of foreign market knowledge and international entrepreneurship in SMEs.

H 1: The lack of foreign market knowledge as perceived by SME executives is negatively related to international entrepreneurship.

Knowledge about foreign markets and the propensity to export

The role of knowledge as a critical resource for firm growth has been highlighted by Penrose (1959, p. 79) who distinguishes between knowledge related to the “productive possibilities inherent in the resources of the firm” and “experience and knowledge of the external world”. As the latter type of knowledge reduce risks, uncertainties and costs associated with firm expansion into new markets (Penrose, 1959; Johanson & Vahlne (1977); Eriksson et al., 1997), exporting or internationalizing firms need to increase their knowledge regarding the business (clients, competitors) and institutional environments (cultural norms, legislation, informal business practices) in their foreign target markets.

With respect to foreign market knowledge, Johanson & Vahlne (1977) distinguish objective from experiential knowledge. While the former is easily accessible by means of explicit communication, the latter needs to be acquired by operating in the foreign target market. These scholars argue that an increase in experiential knowledge makes firms to perceive new market opportunities abroad and to engage into higher commitment in foreign markets. Higher commitment, in turn, increases market knowledge provided the market environment is somewhat stable. Thus, gaining foreign market knowledge and increasing commitment constitutes an incremental, self-re-enforcing process explaining firm growth abroad.

It is important to notice that experiential knowledge about foreign markets does not necessarily derive from a permanent physical presence abroad as suggested by Eriksson et al. (1997), because international entrepreneurs may have collected information on international markets due to their personal international experience prior to working for their current employer. Also, Johanson & Vahlne (1977, p. 29) remain open as to how foreign market knowledge may be gained and market uncertainty be reduced, referring to the whole range between “increases in communication with customers” to “the take over of customers”. Due to technological revolutions in telecommunications and computing over the past 30 years, nowadays, knowledge about foreign markets may be collected virtually, by means of internet communication (e-mail, messaging, web-based research, online business networks or even virtual worlds with business presence) provided that the exporter has knowledge of foreign languages (see H5a and H5b below). Moreover, many SME executives participate in international fairs or roadshows, i.e., short-term visits which allow them to increase their foreign business and institutional knowledge without a permanent physical presence abroad.

In short, increased foreign market (business and institutional) knowledge is likely to enhance awareness of export opportunities which the firm may exploit scaling up current exports or setting short to medium term export goals. Conversely, the lack of such knowledge may curb present or future exports. Thus, we posit that:

H 2: The lack of foreign market knowledge as perceived by SME executives is negatively related to the propensity to export.

International entrepreneurship and the propensity to export

As mentioned, an entrepreneur in Schumpeter’s view is someone who realizes new combinations of existing resources such as information, knowledge or production factors. To achieve this, an entrepreneur needs mental freedom and the willingness to create something new and to be stronger than everyday habits (Schumpeter, 1934). When entrepreneurs break with their habit of serving exclusively domestic markets, becoming international, they

innovate with respect to their existing firm practice. Thus, entering a new market can be considered as one of Schumpeter's five types of innovation (product, process, supply, organizational and market innovation).

In international management research, several studies have implicitly or explicitly considered exporting as a firm-level innovation (Bilkey & Tesar, 1977; Cavusgil, 1980; Andersen, 1993). Similar to international entrepreneurship literature, these studies are mainly concerned with the individual decision-maker in SMEs covering different stages from pre-export to mature exporters, such as no export ambitions, firms planning to export, passive exporters, active exporters, exporters with low and high sales abroad, among others (Bilkey & Tesar, 1977; Cavusgil, 1980; Cavusgil, 1982). Revising early studies on export behavior, Bilkey (1978, p. 35) already observed that management attitudes, such as "managerial apathy" or a lack of an intrinsic motivation, can be important predictors for non-exporting.

Oviatt & McDougall (1994) identify with international entrepreneurship individual strategic choice, risk taking and aggressive international expansion seeking to capitalize on new business opportunities abroad. Earlier works on born global firms, or international new ventures related international entrepreneurship orientation to foreign market entry at or shortly after inception (Oviatt & McDougall, 1994; Autio, Sapienza & Almeida, 2000) however, this definition was revised later on in order to take account of corporate entrepreneurship. We adopt the definition of Oviatt & McDougall (2000, p. 903) who consider international entrepreneurship as "a combination of innovative, proactive, and risk-seeking behavior that crosses national borders". This ampler definition is important as older firms may hire international entrepreneurs to integrate their executive board in order to accelerate foreign market entry.

Empirical research suggests that international entrepreneurship orientation may have a positive impact on performance in international markets (Knight & Cavusgil, 2004). Accordingly, we posit that different degrees of export involvement may be associated with different degrees of international entrepreneurship orientation.

H 3: International entrepreneurship is positively related to the propensity to export.

The influence of international experience on foreign market knowledge barriers and international entrepreneurship

In the following, we will argue that both international entrepreneurship and lack of foreign market knowledge are likely to be influenced by the international experience of SME executive board members. International experience can be considered a managerial resource which may contribute to the growth of the firm abroad (Penrose, 1959). The basic assumption is that managerial resources, i.e. the skills and knowledge of executive board members influence SME export and internationalization behavior (Oviatt & McDougall, 1994).

In a broader sense, international experience of SME executives is assumed to be a result of working, living or traveling experience abroad, knowledge of foreign languages, decision-makers previous export experience before joining the firm or general interest in foreign countries (Langston & Teas, 1976 in Bilkey & Tesar, 1977: 94; Wiedersheim-Paul, Olson & Welch, 1978; Reubner & Fischer, 1997). It has been argued that these international experiences may foster an international orientation which is likely to impact a firm's pre-export behavior (Wiedersheim-Paul, Olson & Welch, 1978: 49). Thus international experience of executive board members prior to joining the SME may have helped them to gain knowledge on foreign markets; then, after joining the SME, these managers may leverage their foreign market knowledge in order to initiate or increase their firm's export business. Hence, we propose that:

4a: Executive board members with international experience are less likely to perceive foreign market knowledge barriers.

In line with above reasoning, recent studies on international entrepreneurship have argued that knowledge generated prior to the firm's founding may become imprinted in a new firm (Shane, 2000). McDougall, Oviatt & Shrader (2003) found that international experience is related to early internationalization and Autio (2005) regards international competences of founding entrepreneurs as a reason for aggressive international growth. Oviatt & McDougall (1994) theorize that internationally experienced business people are likely to internationalize as long as they belong to a firm's founding team. In summary, mentioned theoretical and empirical work suggests that international experience is likely to influence international entrepreneurial orientation.

H 4b: Executive board members with international experience are more likely to have an international entrepreneurship orientation.

As foreign language skills have probably been acquired prior or during international experience, foreign language skills may influence foreign market knowledge barriers and international entrepreneurship orientation in a similar fashion as does international experience.

H 5a: Executive board members who perceive language skills as a barrier to internationalization are more likely to perceive foreign market knowledge barriers.

H 5b: Executive board members who perceive language skills as a barrier to internationalization are less likely to have an international entrepreneurship orientation.

Sales to MNCs located in the domestic market and the propensity to export

The propensity to export does not only depend on specific foreign market knowledge, but also on general knowledge which can be transferred from one country to another (Johansson & Vahlne, 1977, p. 28). General knowledge comprises operational knowledge, marketing methods, inter-firm networking and contracting, processes, product or software development methodological knowledge, among others. Thus, general knowledge represents a further managerial resource which might be critical for firm expansion abroad.

General knowledge may be obtained by supplier-client or outsourcing relationships, as clients may require their suppliers to develop skills, pass quality certifications or stick to specific contract terms. Quality certifications may trigger the redesign of organizational, production, product or software development processes implying in considerable internal learning processes. In addition, supplier-client contracting may provide opportunities for experience based, relationship learning (Williamson, 1991; Johanson & Vahlne, 2003). We assume that relationship learning, international certifications and their internal offspring such as software development process improvements can be transferred from local to international contracts.

Compared to small firms, large firms such as MNCs or their subsidiaries tend to be more demanding when contracting local firms, since large firms and particularly MNCs stick to global standards, quality certifications or technological platforms. Hence, local SMEs may become more familiar with international standards of quality or technological platforms when they are negotiating, drawing and closing contracts with MNC subsidiaries. Feedback, requirements and specifications provided by MNCs to local subcontractors may play a significant role in this learning endeavor. In addition, existing outsourcing contracts may draw local firms' attention to new global market opportunities and provide incentives for spurring up internal learning processes in order to qualify themselves for future opportunities.

For instance, *Instituto Atlântico*, a research and software development institute, carried out several software development projects for Brazil based subsidiaries of major MNCs, such as SonyEricsson, Samsung, IBM or HP, which, in turn, transferred the resulting products to peer

MNC units abroad. All along the past years, *Instituto Atlântico* has persistently invested in process improvements and international certifications, such as ISO, PMI and CMMI level 3 (expected to reach CMMI level 5 in 2008), which are still rare in Brazil and, particularly, in the northeastern part of the country. These certifications have opened up new opportunities like off-shore outsourcing. According to industry experts, certifications are a must when a software firm carries out projects for large firms or multinationals, while SME clients generally care less about certification and more about price.

In addition, the director of a small software developer of broadcasting and mobile applications drew attention to a particular form of relationship learning: many large firms and MNCs or their subsidiaries tend to exploit their high bargaining power; learning how to negotiate with customers within an extremely asymmetric relationship may help to get a foot into international markets where business relationships are likely to be equally asymmetric, in particular, when suppliers from developing countries with inexistent international reputation or brand assets try to sell in the highly competitive markets of the developed world.

Thus, SMEs' commercial relationship with MNCs seems to be beneficial to upgrading processes which increase local SMEs' chances to get involved in direct exporting.

H 6: Sales to MNCs located in the domestic market are positively related to the propensity to export.

Other local linkages and their influence on international entrepreneurship orientation and foreign market knowledge barriers

Entrepreneurship is by definition related to the introduction of significantly improved or new products and services, development of new markets or technological innovation (Schumpeter, 1934; Penrose, 1959). Empirical studies on international entrepreneurship have confirmed this relationship (Knight & Cavusgil, 2004). This trait of entrepreneurs seems to be invariable across cultures (Thomas & Mueller, 2000, p. 296).

Furthermore, entrepreneurship has often been associated with inter-organizational networking. Coviello (2006) argues that networks are essentially related to international entrepreneurship; in particular, network ties are probably result of activities carried out before initiating export activities or even before firm creation. Elango & Pattnaik (2007) show empirically the importance of parental networks for the capability building process of internationalizing emerging market firms. Zhou, Wu & Luo (2007) identify a mediator role of local social networks in internationalization of new ventures. Social networks contribute to knowledge accumulation in terms of experiential learning and information about foreign market opportunities.

Combining both lines of reasoning, we argue that local networking, in particular with research institutes, universities or other software firms, may promote the development of significantly improved or new products, this is innovation, and therefore be associated with international entrepreneurship orientation.

H 7: Research partnerships are positively related to international entrepreneurship.

The process school of internationalization claims that firms tend to develop their domestic market presence first, before they expand in international markets (Johanson & Vahlne, 1977). It is in these domestic markets where such firms are shaped, imprinted and develop specific routines which may be difficult to unlearn and may hold back future international expansion (Autio, Sapienza & Almeida 2000).

With respect to software SMEs, it is likely that domestic imprinting may constitute a result of the product or service characteristics or the business model. Some software applications, such as enterprise resource planning, generally need intensive client visits in order to map out the customer's needs, engineer business processes, install and configure the

solution as well as train its users. Yet, other applications may be easily downloaded by the Internet, configured and learned intuitively.

Though intensive direct contacts with clients may provide firm staff with in-depth knowledge about the markets where they are operating and therefore be beneficial to the development of new customized solutions and innovation, these contacts eat up a large part of resources (time and traveling). The impact of these activities is particularly high for SMEs with limited managerial resources. Consequently, SMEs whose business model implies intensive direct client contacts may be forced to limit their geographical scope to their local region. As a result of this, only very few managerial resources may be left to acquire knowledge on foreign markets, let alone to undertake export activities. Thus a trade-off arises between strong direct contact with local clients and searching for foreign market knowledge. Hence, such firms may perceive more barriers with regard to foreign market knowledge.

H 8: On-site software sales and implementation is positively related to foreign market knowledge barriers.

METHOD

Sample

This study draws on a small sample of Brazilian software SMEs. Data was collected in the first half of the year 2007 using an electronic questionnaire distributed by e-mail. As no reliable or complete database was available prior to our survey, we built our own sample frame using information about the four software clusters in the northeastern region of Brazil. We obtained company contact data from the leading industry association (ASSESSPRO), the Brazilian SME promotion agency (SEBRAE) and the Association for Promoting the Brazilian Software Excellence (SOFTEX). We only included firms whose main activity was software development; this information was checked by phone and by exploring the firms' website. This preparatory work was necessary because some publicly available information tended to overestimate the actual number of firms; moreover, mortality of SMEs tends to be high and, as a consequence of this, some publicly available information has been out of date.

The final sample frame counted 195 software development firms from the four main software development agglomerations in the northeastern region, which are concentrated in Fortaleza (capital of Ceará state), Recife (capital of Pernambuco state), Salvador (capital of Bahia state) and Campina Grande (main software agglomeration of Paraíba state). We contacted the chief executives of these firms by e-mail and by phone in order to present the research project, convince them to participate and assuring confidential data treatment. An executive report with consolidated data was also promised (and delivered a few weeks after the conclusion of the survey) as an incentive to fill out the questionnaire with diligence. Non-respondents were contacted again (up to 10 times by phone and e-mail) or until a filled questionnaire was received. Altogether, we received 76 questionnaires from a population of 195 established software developing firms in the northeastern region, which corresponds to a response rate of 39%. Two responses had to be eliminated, as one firm did not develop any software and the other one was a large firm with over 800 employees.

In order to check for potential non-response bias, we used the procedure suggested by Armstrong and Overton, 1977); systematic differences between late and early respondents were not found. There were a few missing values (generally one or two responses and in a few cases more, but less than 10% of responses) which we tried to complete using follow-up telephone calls. The remaining missing values were substituted by mean values; however statistical results after missing value treatment did not significantly differ from results obtained without missing value treatment.

The average size of software firms is of 50 full time and direct employees. The main fields of software development are applications for government and public administration, commercial applications and enterprise resource planning. Main distribution channels are direct sales to client, partner firms and the Internet.

There are several reasons why we drew a sample from a developing country (Brazil) and why we focused on a traditionally less developed region within that country. Some characteristics of our research setting differ considerably from other samples, obtained in developed countries where similar studies have been carried out to date. These characteristics may impact several of the variables used in this study (see below). Therefore, this study constitutes a pertinent test of the hypothesized relationships proposed upon existing academic literature.

Thus, our regional focus allows us to evaluate factors that may precede exporting or the propensity to export, international entrepreneurship or foreign market knowledge. An empirical test in this unfamiliar and somehow harder setting may thus provide a more ambitious test of theory. Consequently, this study, though embedded into the international entrepreneurship literature, permits to cast light on specificities of international entrepreneurship in developing country settings and thus establish a link between global literature and developing country specificities.

Measures

Dependent variables

Propensity to export. Exporting is not at all common among Brazilian software SMEs, due to several reasons, such as the sheer size of the Brazilian domestic software market, lack of English language skills and, reputation, certifications, among others (SOFTEX, 2002 and 2005). Therefore, we decided to consider not only existing exports but also a firm's intention to export within the next three years. This is in line with Wiedersheim-Paul, Olson & Welch (1978) who also focused on pre-export behavior. Both indicators, (item no. xiv) percentage of foreign software sales relative to all sales of products developed in-house and (item no. xv) percentage of software exports in three years time compared, loaded strongly on the Export orientation construct (see table 1). We used a six-point Likert scale, ranging from 0% to 100%. Construct reliability was acceptable for exploratory or basic research (Cronbach's $\alpha = 0.70$).

International entrepreneurship orientation. To measure international entrepreneurship, we adapted indicators from the international entrepreneurship orientation constructs from Knight and Cavusgil (2004). Using a five-point Likert scale ranging from fully agree (1) to fully disagree (5), we asked whether (item i) 'top management tends to see the world, instead of just Brazil, as our firm's marketplace', (item ii) 'the prevailing organizational culture at our firm is conducive to active exploration of new business opportunities abroad', (item iii) 'management communicates its mission to succeed in international markets to firm employees'. Moreover we added two indicators, (item iv) 'the firm expects to expand internationally in short term' and (item v) 'the products developed by the firm have potential to enter foreign markets'. The last item was dropped due to a factor loading below 0.8 on the construct. Construct reliability was very good (Cronbach's $\alpha = 0.90$).

Foreign market knowledge barriers. Seeking to measure different kinds of foreign market knowledge barriers on the same five-point Likert scale (fully agree – fully disagree), we adapted four indicators from Eriksson, Johanson, Majkgard & Sharma (1997) to the specificities of our research setting: (item vi) lacking fluency in foreign languages is a barrier to the internationalization of your firm; (item vii) lacking knowledge about laws, norms,

international standards is a barrier to the internationalization of your firm; (item viii) lacking experience with foreign clients and distributors is a barrier to the internationalization of your firm and (item ix) lacking knowledge about competitors in the foreign market is a barrier to the internationalization of your firm. Contrary to our expectation, data analysis (principal component and PLS analysis) revealed that the loading of item i) on the construct was very low (0.388), which is why we separated it from the construct and treated it as a further independent variable. This practice makes sense also from a theoretical point of view, as language skills may be seen as antecedents of foreign market knowledge. Construct reliability of the remaining three-item construct was high (Cronbach's alpha = 0.83).

Independent variables

International work experience. International work experience of SME executives was measured using a binary indicator, coded "1" if executive board members gained international working experience and "0" if not. This indicator (item xvii) is based on Reuber & Fischer (1997).

Sales to MNCs located in Brazil. Sales to MNCs located in Brazil (item xiii) was measured on a six-point Likert scale ranging from 0% to 100% of all product sales ("Of all products developed by your firm, what is the percentage commercialized to multinationals located in Brazil?").

Research partnerships. Research partnership with universities or research institutes are often funded by Brazilian government agencies which may concede individual research grants and funds destined to the acquisition of equipment and software; in exchange government requires that firms cooperate formally with universities or research institutes. Hence, key informants were asked: "Of all products and services developed by your firm, how many have been developed in cooperation with universities and research institutes?" For this one-item measure (item no. xii), we used a six-point Likert scale (from 0% to 100%).

Business model: on-site software sales and implementation. We developed a two-item measure which intends to capture how important to the business model are direct client contacts from software sales through implementation. Using a five-point Likert (from 1 – fully disagree to 5 – fully agree) we asked whether (item no. x) the implementation of the software developed by your firm requires the presence of technicians in the client's location; (item no. ix) the commercialization of the software developed by your firm requires direct contact with your client. Construct validity was moderate (Cronbach's alpha = 0.61) and the two items loaded significantly on the construct (see table 1).

Analytical technique

Data was analyzed using PLS-Graph, version 3.00, built 1126. Though our sample size is relatively small (n=76), Chin's rules of thumb suggest that for our purposes a sufficient sample size would be of a minimum of 50 cases¹. The small size of the sample and the large number of indicators relative to sample size were the main reasons justifying the use of PLS. Furthermore, to our knowledge, some variables were used for the first time in internationalization research, particularly those relating to the business model, hiring of temporary workers, sales to MNCs located in the home country. Thus a part of this study has exploratory character and PLS is the recommended approach in this case (Fornell and Bookstein, 1982). Finally, PLS does not require multivariate normal distribution of indicators and variables.

RESULTS

Measurement model

Item validity. Hulland (1999, p. 198) recommends for the application of PLS in management research that item loadings on the constructs should be higher than 0.7 which would indicate that at least half of the indicators variance be explained by the construct on which it loads. In this study, we used item factor loadings of 0.8 or higher as benchmark criterion (Herrmann, Huber & Kressmann, 2004). Significance tests of each loading should result in t-values above 1.98.

Convergence validity. While Nunally (1978) recommends alpha coefficients above 0.7, for research in initial stages, coefficients between 0.5 or 0.6 may suffice (Churchill, 1979, p. 68). In this study, all alpha coefficients were higher than 0.6 and therefore fulfilled this criterion (see table 1).

Furthermore, Average Variance Explained (AVE) shows the average size of the variance of the indicators explained by the construct. AVE should at no events fall below 0.5, because this would mean that “the variance due to measurement error is larger than the variance captured by the construct” (Fornell & Larcker, 1981, p. 46). Many researchers suggest that AVE be higher than 0.6 (Herrmann, Huber & Kressmann, 2004) which was the case for all four constructs with more than one indicator (see table 1).

Constructs and indicators	Loading	t-value	Cronbach's alpha	Variance explained
<i>International entrepreneurship</i>			0.90	31.9%
(i) Market	0.8173	8.3676		
(ii) Culture	0.8881	29.6750		
(iii) Mission	0.9013	29.9300		
(iv) International expansion	0.8822	37.4964		
<i>Foreign Market Knowledge barriers</i>			0.83	23.6%
(vii) Laws	0.8122	10.4696		
(viii) Experience	0.9044	29.4763		
(ix) Competitors	0.8747	25.7556		
<i>Propensity to export</i>			0.70	30.1%
(xiv) Sales abroad	0.9190	38.6191		
(xv) Exports within 3 years time	0.8447	20.8553		
<i>Executive board members with international experience)</i>				
(xvii) International work experience	1.0000	0.00000	-	-
<i>Sales to MNC subsidiaries</i>				
(xiii) Sales to MNCs	1.0000	0.00000	-	
<i>Research partnerships with universities and research institutes</i>				
(xii) Research partnerships	1.0000	0.00000	-	
<i>On-site implementation</i>			0.61	-
(x) Implementation	0.8941	4.3001		
(xi) Comercialization	0.7967	3.0164		
<i>Foreign Language barriers</i>				
(vi) Language barriers	1.0000	0.00000	-	

Notes: all indicators are explained in the methods section (please refer to the item numbers)

Table 1 – measurement model

Discriminant validity. Discriminant validity holds as long as Average Variance Explained (AVE) is higher than all variances (squared correlations) between constructs which was the case in this study (see table 1).

Structural model

The structural model is evaluated using three criteria, 1) the effect size of the path between two constructs; 2) the variance explained of the main endogenous variable (R^2) and 3) significance tests (t values). According to Lohmoeller (1984), effect sizes of paths should be higher than 0.1 in order to be valid. Regarding variance explained, the picture is mixed;

Chin (1998), for instance, considers R^2 above 0.67 as strong, above 0.33 as average and above 0.19 as small. Others consider R^2 higher than 0.3 as acceptable (Herrmann, Huber & Kressmann, 2004) while many studies do not even report R^2 (for example, Croteau & Bergeron, 2001).

This study uses three dependent constructs (propensity to export, international entrepreneurship, foreign market knowledge barriers) with R^2 coefficients between 0.24 and 0.32 (see table 1) which is not ideal but consistent with mentioned minimum criteria.

As non-parametric modeling does not provide significance tests, we used bootstrapping in order to obtain t-values. Acceptable paths should have t-values above 1.98, which is the case for all hypothesized paths except for hypothesis H5b (see table 2).

We may therefore conclude that the proposed model holds against standard criteria established in methodological literature.

Hypothesized relationship	Standardized coefficient	t-value (bootstrapping)	Assessment of hypotheses
H1 Foreign market knowledge barriers are negatively related to international entrepreneurship.	-0.315	2.4634	Supported
H2 Foreign market knowledge barriers are negatively related to export propensity	-0.218	2.2417	Supported
H3 International entrepreneurship is positively related to export propensity	0.259	2.1987	Supported
H4a Executive board members with international experience are less likely to perceive foreign market knowledge barriers.	-0.222	2.0358	Supported
H4b Executive board members with international experience are more likely to have an international entrepreneurship orientation.	0.230	2.0828	Supported
H5a Executive board members who perceive language skills as a barrier to internationalization are more likely to perceive foreign market knowledge barriers.	0.330	2.6242	Supported
H5b Executive board members who perceive language skills as a barrier to internationalization are less likely to have an international entrepreneurship orientation.	0.209	1.8286	Not supported
H6 The higher the sales to local MNCs located in the domestic market, the higher the export involvement.	0.341	2.3084	Supported
H7 Partnerships in research, are positively related to international entrepreneurship.	0.372	3.7380	Supported
H8 On-site software sales and implementation are positively related to foreign market knowledge barriers.	0.250	2.2071	Supported

Notes: $p < 0.05$ for t-values above 1.98; $p < 0.01$ t-values above 2.57

Table 2 – tests of hypotheses

DISCUSSION

Implications for Theory

Using a sample of software SMEs, this study provides evidence for the argument that international experience, obtained by working abroad, and foreign language skills, increases international entrepreneurship orientation and foreign market knowledge which, in turn, enhance the propensity to export. Thus our study links mentioned antecedents of exporting to constructs derived from the international entrepreneurship and internationalization literature.

Still, domestic client-supplier relationships with large firms and multinationals are likely to enhance a firm's exporting activities. This finding seems to suggest that relationships with multinationals (foreign or locally owned) present in the domestic market are a vehicle for transmitting general knowledge, for instance, on how to make deals with large customers, on which technical and managerial standards are essential for expanding internationally and on how to get access to their international networks, among other things. Hence, in addition to experiential market specific knowledge, general knowledge (Johanson & Vahlne, 1977) is probably an important predictor of the propensity to export as well. Moreover, the substantial association between international entrepreneurship orientation and university-industry relationships may indicate that international entrepreneurs tend to be more open-minded regarding cooperative R&D activities and university-industry relationships.

Furthermore, we found that experiential knowledge on foreign markets, a valuable resource for foreign market expansion, seems to work as a driver for international entrepreneurship. In other words, foreign market knowledge is likely to foster international entrepreneurship, while a lack of foreign market knowledge may reduce international entrepreneurship, at least in firms with limited resources like SMEs. This finding gives empirical support to the more restrictive Penrosian theory of firm growth in contrast to the more enabling Schumpeterian view of entrepreneurship (Autio, 2005). Accordingly, our empirical results and their theoretical explanation refine international entrepreneurship literature demonstrating that the validity of the Penrosian or Schumpeterian view depends on the size of the existing resource base (see reasoning behind H1). The fact that SMEs from developing countries dispose over less abundant resources compared to their fellows in Europe, the USA or Australia possibly explains why this result became perceptible precisely in a sample from a less developed region.

In summary, this study contributes to existing literature on SME export propensity with a theory-based and empirically supported model which draws on complementary streams of international management literature and the theory of the firm (behavioral approach / stages model, international entrepreneurship, and resource based view of the firm). Adding new predictor variables and investigating a known phenomenon, SME export propensity, under dissimilar circumstances (high technology (software) SMEs from an emerging market), our model represents a refinement of existing literature. Above-mentioned results are particularly relevant, because they are not only in conformity with theory, but they hold in an emerging market, and within this country in a less developed region.

Managerial Implications

Several studies have lamented the few efforts done to develop normative orientations for practitioners working in or advising international entrepreneurs (Autio, 2005). With this in mind and taking Vermeulen's (2007) suggestions as a reference for identifying managerial recommendations, we intend to focus on new concepts with relevance for the study of international entrepreneurship and variables that can be influenced by managers.

First, this exploratory work helped to identify some new variables which may either directly (sales to MNCs located in the domestic market) or indirectly (research partnership with universities, on-site software sales and implementation) influence the propensity to export.

Second, most of the variables of this study can easily be influenced by management; for instance, if management boosts domestic sales to MNCs or large companies, increases knowledge on foreign markets and cultivates international entrepreneurship orientation, a raise in current or future exports becomes more likely. In turn, management can stimulate international entrepreneurship orientation when more managers with international working experience and foreign language skills are integrated in top management. Once there,

international entrepreneurship can be strengthened maintaining research partnerships with universities or research institutes. Foreign market knowledge barriers may be reduced when firms increase the language skills of their staff and when they develop business models which allow software sales and distribution without direct client contact, for instance, using Internet distribution.

Third, we discovered a relationship between lack of foreign market knowledge and international entrepreneurship: the higher the former, the lower international entrepreneurship will be. This means that management should definitely not focus international entrepreneurship in an isolated manner; rather, an increase in current or future export requires that both variables be focused simultaneously, otherwise high foreign market knowledge barriers may work as an obstacle to the development of a strong international entrepreneurship orientation.

A case example might help to illustrate our model. IVIA, a rapidly growing and exporting software development and service firm has already contracted five senior managers and directors with international work experience in Portugal, the USA and Canada. According to our in-depth interviews, this international experience has made them conscious regarding their international clients' expectations and the need to deepen innovation, technological development, managerial improvements and international exposure of their staff. For instance, in 2006, a subsidiary in Portugal was set up and in 2005, an internal R&D department was established; university-industry links exist since 2004 when the Ministry of Science and Technology conceded a research grant which requires cooperative R&D with the informatics faculty of the University of Fortaleza. In addition, lots of managerial improvements have been implemented since the 2001 initiated organizational change process. Cultural change is under way since several staff "gained a passport" in recent years, a way the director paraphrases the formerly not very common fact that several of his staff had to travel abroad in order to work on software projects. With respect to implementation, the firm sells mainly by direct visits and implementation, however, the costs and limits of this business model has motivated carrying out a study on Internet-based distribution models. In sum, this example reflects several key relationships and can therefore help to understand our model.

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ⁱ “Sample size can be smaller, with a strong rule of thumb suggesting that it be equal to the larger of the following: (1) ten times the scale with the largest number of formative (i.e., causal) indicators (note that scales for constructs designated with reflective indicators can be ignored), or (2) ten times the largest number of structural paths directed at a particular construct in the structural model. A weak rule of thumb, similar to the heuristic for multiple regression (Tabachnik and Fidell, 1989, p. 129), would be to use a multiplier of five instead of ten for the preceding formulae. An extreme example is given by Wold (1989) who analyzed 27 variables using two latent constructs with a data set consisting of ten cases.” (available at <<http://disc-nt.cba.uh.edu/chin/PLSINTRO.HTM>> ; accessed October 24, 2007)