

CREATING GLOBAL BUSINESS MODEL FOR KNOWLEDGE-INTENSIVE SMES: THE SMALL TRANSITION COUNTRY CASES¹

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Abstract

During the past fifteen years several studies have explored the phenomenon of the “born global” of the hi-tech small and medium sized enterprises (HSME). Up to today too little attention has been paid on knowledge related processes and mechanisms, and business models of HSMEs in their market globalization process. The paper aims partly to fulfill the gap exploring “knowledge-market” development trajectories of becoming global of technology- and knowledge-intensive SMEs from small open economy country origin. To open theoretical background of the topic the paper is mapping main processes of global breakthrough as well as “knowledge-market” framework of globalization of HSMEs. Empirical study is based on three cases representing ICT and biotech companies completely or partly of Estonian origin: Regio, Skype and Asper Biotech. The results demonstrate three different globalization trajectories named S-, Γ- and rotated L-curve. All cases are characterized by different knowledge accumulation and learning period preceding their globalization and selection of the following business model: B2B, P2P and B2C. The results of the study provide for “new economy” companies better understanding of strategic options to be followed in internationalization process.

Keywords: Globalization, hi-tech small and medium sized enterprise (HSME), knowledge-market trajectory, business model.

Introduction

Internationalization of its activities cannot be assumed as a habitual process in small company's growth. Very many businesses, for example of big countries, do not need to internationalize themselves at all because of huge home market. Therefore the internationalization of a company is usually not simple and fast, but for hi-tech small and medium sized enterprises (HSME) this can be a different matter. The traditional model is a slow, incremental and resource-intensive process known as the Uppsala model (U-model) of internationalization (Johanson & Vahlne, 1977; Andersen, 1993). The innovation related I-model links the gradual internationalization of an HSME to internal and external actors, and to factors carrying “push” and “pull” mechanisms (Andersen, 1993). During the last fifteen years the concept of “born global” company (BG) for a rapidly globalizing HSME has become quite popular. However, the phenomenon is not fully explained by the more gradual U- and I-models, also known as the process models (McNaughton, 2003).

BGs do not need to start in or focus for a long time success in home market; they may start globally, i.e. on other continents, from the very beginning. This approach is important for knowledge- and technology-intensive companies of very small, open economy countries where the market is too small to feed R&D (push factor), while the demand of large global markets works as a real pull-factor. (Luostarinen & Gabrielsson, 2004).

Some companies operate for a long time in domestic market, but then after some event (a critical incident) globalize themselves; these companies are called “born-again global” (BAG) firms (Bell, McNaughton & Young, 2001) and their behavior is defined as reactive (Bell et al, 2003). Into this category of firms belong partly also “globalizing international” firms, which have started their business within home continent after the domestic market period (Gabrielsson & Gabrielsson, 2004). Then they start to globalize their activities outside home continent (ibid).

But the concept of born global or its modifications do not explain why and how some hi-tech small and medium sized enterprises (HSME) become global, while others do not. The shortcoming of the BG and BAG approach can be seen, as they do not expose the entrepreneurial process which takes place during internationalization/globalization. The entrepreneurial process includes (experiential) learning at both levels: individual (entrepreneur) and organizational (Corbett, 2005). Based on a concrete case study of knowledge-based small company leveraging its technological knowledge and reaching global market, a “learned global” concept is suggested (Mets, 2008). That involves the need to derive knowledge about the markets as well as creation of technological knowledge and development of product(s) responding to higher market value, but

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also right positioning in the value chain of the concrete product or business (Vadi & Türk, 2009). This cannot happen accidentally, these processes need learning and accumulation of knowledge, and experience before becoming global.

Leverage of resources, incl. intangible resources was first seen as competitive advantage of multinational companies (MNC) (Hamel & Prahalad, 1993; later supported by Blomstermo & Sharma, 2003), which could be very effectively implemented by replicating knowledge and competences based on the business models presented (Winter & Szulanski, 2001). This phenomenon sometimes known also as “McDonalds approach” (ibid) creates advantage potential for global corporation before local company, if implemented, disproportionately strongly exceeding their size ratio especially in knowledge-intensive spheres regarded as “new economy” (Mets, 2003). That points out that HSMEs of small and open economies (SMOPEC) (abbreviation from Luostarinen & Gabriellson, 2006) are competing with global competitors not only in international markets, but also in home market. Of course, it is easier to enter psychically and culturally closer neighboring target markets (see for example: Roolah, 2002) than to become global from inception. Therefore expanding the market in competition with MNCs is special learning and educational challenge for entrepreneurs and managers from small transition countries (Aaltio, 2008).

As can be concluded from the short overview above, in the core of business internationalization lies knowledge (push factor) as resource enabling HSMEs to respond to global market needs (pull factor) and real globalization process happens under the certain circumstances depending on knowledge-related processes and business model chosen for reaching to global market.

The paper aims to explore “knowledge-market” development trajectories of becoming global of technology- and knowledge-intensive SMEs from small open economy country origin. The results of the study provide better understanding of strategic options that “new economy” companies may follow in their internationalization process. To open theoretical background of the topic the next section is mapping the main processes of global breakthrough of HSME. The following section creates “knowledge-market” framework of HSME’s globalization process. After that, methodology and short description of a case study sample are given. Empirical findings and discussion of results end the paper.

Global breakthrough process of HSME

Generalizing globalization process of HSMEs one can find three main ways differing from each other in terms of speed and extent of internationalization: gradual, born global (BG) and born-again global (BAG) trajectories (Johanson & Vahlne, 1977; Andersen, 1993; Bell, McNaughton & Young, 2001) as presented in Figure 1.

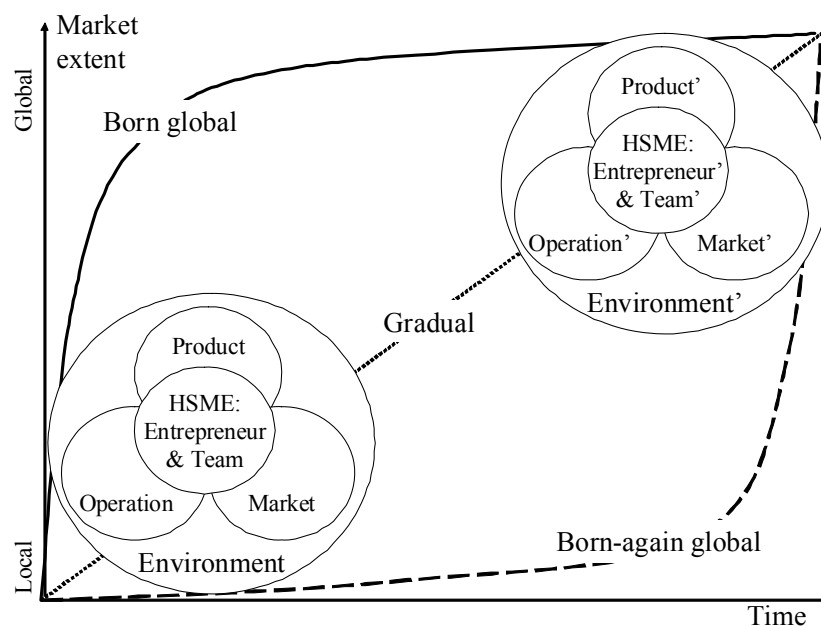


Figure 1. Trajectories of HSME internationalization (the author’s drawing)

Luostarinen (1979) first introduced globalization strategy including three sub-strategies (or fields): the product (P), the operation mode (O) and the market (M), and altogether – POM-strategy. POM-strategy itself leads to global marketing strategy, which consists of pricing, distribution and customer strategy (Luostarinen & Gabrielsson, 2004).

The POM-strategy as a model covers and partly overlaps the components of business model – the way how a firm is creating value to all its stakeholders. From the company's position – the business model is mediating technical inputs into economic output (Chesbrough & Rosenbloom, 2002). Researchers of Helsinki School Luostarinen and Gabrielsson (2004, 2006) have demonstrated that the BG may exist in any field of product categories of SME: (1) high-tech, (2) high-design, (3) high-services, (4) high-know-how, and (5) high-system businesses. The authors argue also that one product category compliments another, for example: high tech companies offer services for their innovative goods, or, high-service companies package their product and manuals into diskettes, which presents physical goods (ibid). Characteristic to BGs is that they differ from product and operation mainstream patterns of internationalization of conventional (non-born-global) companies; the same is valid for their POM-strategy (ibid). Becoming global depends very strongly on HSME's capability to attract venture capital (VC) companies to invest into BG. VC investors affect the management of HSME, even employing professional managers into company, which accelerates globalization process. Some founders of HSMEs are more experienced and better skilled in global business, which speeds up the process (Luostarinen & Gabrielsson, 2006). This points out the importance of market learning in realization of own opportunities.

Effective recognition of opportunities is considered one the most important outcomes of entrepreneurial learning as an experiential process (see Politis, 2005; Corbett, 2005). The learning can be organizational; the "learning organization" is the concept used to describe an organization's ability to manage change (see for example Senge, 1990). From the perspective of entrepreneurial learning described by Politis (2005), it is more or less an individual process. This viewpoint is only partly supported by research among Italian technology entrepreneurs, where networking capability and the creation of technological competence with limited resources play a key role (Ravasi & Turati, 2005). Organizational learning of SME's in terms of an entrepreneur's capacity to learn and to integrate the working team remains the leading factor; and entrepreneurial learning is mostly an action-learning process (Deakins et al, 2000).

The internationalization process trajectories of three different routes (shown in Figure 1) contain learning, which is more or less intensive in some period. The main result of learning is reaching a global business model. The main difference between BG and BAG is the moment of globalization.

BG means going global from inception. That means that not only the business idea, but also all other factors (Product, Operation, Market & Management) must be appropriate for the strategy of rapid globalization. Lack of just one of the factors can lead HSME to failure. BAG keeps the local business model for a long period, and may even involve some exports and other internationalization activities. Favorable events, or the accumulation of a success factor or resource, possibly gradually, can trigger the globalization process.

Although several authors have tried to define BG company via share of sales on international/global markets or period of becoming international/global, there is no agreement about the concrete value of criteria (Luostarinen & Gabrielsson, 2006; Svensson, 2006; Rialp, Rialp, Urbano & Vaillant, 2005). It seems that strategy (POM-model) and management behavioral patterns and ambition to achieve competitive advantage match better to general understanding of rapid globalization process than formal criteria. This position is supported also by the authors mentioned above (Luostarinen & Gabrielsson, 2006). Hereby arises also another crucial aspect: not only global market breakthrough, but also protecting and deepening competitive advantage in global position has high strategic importance for HSME. That means the need to better understand the content of core competence(s) in creating long-run competitive advantage hard to copy by competitors on the market.

Knowledge-Market grid - global HSME's options of leverage

The POM-strategy model is less explicit about the organizational mechanisms which besides entrepreneurial learning may release the potential for such behavior, or about what makes this mode of operation possible. The competence and knowledge of organization acquire more power in organizational structures which use the mechanism of leverage. Leverage is defined as "the extent to which profits can be

increased when revenues and capacity utilization rise” (Crainer, 1999). Often the concept of leverage is linked to the idea of stretching financial as well as non-financial resources (Hamel & Prahalad, 1993).

Leveraging intangible resources at the human level is achieved as a result of the multiple duplication of the working process, creating higher skills and performance along a learning curve, but it also means the initial creation and development of such skills and related competences. At company level, this means extending knowledge, skills, competence and performance over all parts of the organization, reaching every person engaged in the process. In knowledge business, leverage means invention, permanent improvement, and the acquisition of new “soft” and “hard” processes, and spreading of new technology in conjunction with what already exists. The leverage mechanism is a part of the mode of operation as explained in the matrix in Figure 2.

Market extent	High	Single/initial domain technology Diversification across the markets globally	Multiple domain of integrated technologies Diversification across the markets globally	Expansive multiplication of high system knowledge & business model globally
	Medium	Single/initial domain technology Duplication across famier markets	Multiple domain of integrated technologies & knowledge Duplication across famier markets	Multiplication of high system knowledge & business model Duplication across famier markets
	Low	Single/initial domain knowledge and inventions Single market	Multiple domain of integrated technologies and knowledge = combination of high-tech & service	Multi domain technologies and knowledge = high system product (& business model)
		Low	Medium	High
		Complexity of knowledge		

Figure 2. Knowledge-market leverage grid for technology business internationalization (the author’s drawing)

The matrix describes the strategic options of an HSME in terms of the leverage of technology and knowledge, and of markets. Leverage means combining several single domains of knowledge or technology with each other in order to gain more complex results. Hereby it should be mentioned that the complexity can be related to “product” as well to “operation” aspect of POM-model. That can mean growing complexity of technology knowledge in production process and can but must not necessarily reflect in product itself. Meaning complexity contains here first of all multiplicity of (interdisciplinary) knowledge domains. Of course, complexity can vary in the framework of the same domain, therefore complexity has relative meaning if implementing for comparison of concrete objects. Labeling quadrants with two axes (Market extent, Complexity of knowledge) in three-scale measure (L-low; M-medium; H-high) we can describe different ways of leverage of knowledge according to the globalization concept of HSME. The BG company is ready to move into the quadrants LH-MH-HH or even to start from there leveraging its business model at the inception. BAG company can follow more mazy trajectory, for example: LL-ML-LM-LH-MH-HH. This process could be understood as experiential learning, creating new knowledge in the company about product as well as about market (see similar approach: Casillas et al., 2008). As a result, unique high level products and services are created on the basis of the multiplication of new and existing knowledge and competences (for example, in quadrant LM). As the creation of high level competences is a path-dependent, usually the result of interdisciplinary (learning) process, it is a competitive advantage that is hard for competitors to replicate. The market can be expanded gradually by selling to neighboring and culturally close countries, or related markets, whereas if expansion into different markets in different continents is made in a very limited timeframe it is a global player. The more reachable and relevant to customer needs and use the company is the more chances it has of becoming a global player. Customer reach becomes critical for an HSME. Typically the Business to Business (B2B) model is prevailing before Business to Consumer (B2C) sales model among BGs (Luostarinen & Gabrielsson, 2006). Very often it can be difficult for a global business and networking model to reach every individual, for example peer-to-peer (P2P), like that of Skype

(Yovanof & Hazapis, 2008). In that case, globalization is simply a global replication of the business model globally, or the business model itself is global. The uniqueness defends the company's position as global.

Nummela, Saarenketo and Puumalainen (2004) have found that companies with narrowly defined core competence started their international operations on average two years earlier than companies with broad competence. As could be understood from the grid (Figure 2) this means capability of HSME to go global with single domain knowledge. Does this contradict to learning and knowledge leverage processes in B(A)Gs? Probably not, first, the company has its history which starts not just the moment of legal registration of its founding, but starts far before with the learning, experience and knowledge accumulation by founders and managers (Casillas et al., 2008). Second, (new) opportunity recognition by company leaders can happen in any period of company's existence, which can trigger absolutely new developments in/by the company like it happened with NOKIA moving into new technology and business field, which changed also the business model and behavior categorized as "globalizing international" (Gabrielsson & Gabrielsson, 2004). That means "pre-history" period of B(A)G is important, may-be crucial point of the globalization concept.

Empirical research and methodology

Empirical research is based on the process theory and general knowledge-market framework of globalization of HSMEs as discussed in the first sections of the paper. The approach is especially, focusing on the role of knowledge, which is the basis for product as well as operations development in reaching global market. Mapping the trajectory of knowledge-market development in internationalization of HSMEs can give basic understanding for further strategy creation by businesses as well as for actors of public sector in forming entrepreneurship policy. That means also the need to analyze changes of complexity of knowledge in that process – is movement from "high product" towards high-system business/product the rule for BGs and what is happening with complexity of (product) knowledge in globalization? What is the timing of accumulation of necessary competences for globalization and how it is related to internationalization process - is there so called "pre-history"? Can we identify entrepreneurial learning in globalization process? How has entrepreneurship environment influenced financing of HSMEs? And what are the consequences of competitive advantage, business model and strategy?

Case studies were used for mapping the main factors affecting internationalization of technology intensive SMEs in the "knowledge-market" framework. Main criteria for selection of a company for case study were the following:

- Estonian origin of the company or/and tight relations to Estonia;
- The company should be relevant to a success story, i.e. it should be already global;
- The main development track of the company could be observed;
- Main part of knowledge and technology is created in Estonia;
- The companies represent technologies of different fields.

It was not possible to find many Estonian companies that met the described characteristics, therefore more well-known of them were selected for the study. Current case studies are based on secondary data and personal interviews. First of all, search for research publications was carried out using Google Scholar®. That gave possibility to learn the aspects researchers already covered about the case companies. Then historical facts and general overviews were collected from previous researches (Mets, 2008; Kodres, 2006) and press (for example Kurm, 2005). After that web-pages and annual reports of the companies were studied. The facts collected during the previous studies as well as current research were evaluated in the context of research questions. The aspects not covered before and newer trends were mapped, also some interpretations were checked in interviews.

Globalization cases of three technology companies

Cases in the current paper are presented in the Tables 1, 2 and 3 structured according to the raised research questions, aspects for mapping globalization process of the HSME and important factors in that process.

Table 1. Regio – mobile positioning software company

Company name, founding data, product	Regio Firm, 1988 (state-owned); Regio AS, 1990 (private LLC), founders – Jüri Jagomägi, Rivo Noorkõiv and Madis Michelson, geographers, started with R&D services (regional studies) and postcard production; 1989, road map of Estonia
Pre-history period, important events	1992, mediation of Intergraph software; 1993, Teet Jagomägi (23) appointed the CEO after training in programming in USA; implementation of the geo-information system (GIS); the first Estonian sea-map after Soviet occupation in 1940; 1994, complete digital map technology using GPS; 1998, CD-Atlas
Opportunity recognition	1999, the tender from Ericsson AB for mobile positioning software (MPS), new product which became the breakthrough for globalization
Domestic period	1988, from inception operated in the Estonian market; 1992-1993, first export sales; amount of exports was not remarkable until 2001
Internationalization period (under the trademark Reach-U)	2000, merge with the Finnish listed corporation Digital Open Network Environment OY (DONE); 2001, drastic growth of exports to one fourth of sales; 2002, bankruptcy of parent company; management buy-out of the company
Globalization period	2004, global reselling agreement with Ericsson; 2005, delivery of location based services (LBS) middleware to Saudi Arabia; 2006, North Africa; 2008, entering the market in Mexico
Marketing	Practically no (direct) costs for marketing on global market, partnering with global player
Product development	Widening the product range from post-cards and maps to GIS, digital maps and LBS; ISO 9001: 2000 quality certificate since 2006.
Finance	First, founders mortgaged their homes for bank loan on very unfavorable conditions in 1993-1994. Later, in 1998 the Baltic Small Equity Fund (BSEF) became risk capital partner for Regio; 2000, merger with DONE (funding product development)
Lessons learned before globalization	Learning modern technology in USA, business development from venture capital and merging quoted company DONE
Competitive edge	Latecomer effect starting digital cartography and GIS from scratch. Learning and integrating knowledge from different technology domains: design, cartography, programming, GIS and LBS
Global business model and strategy	B2B; partnering with global player Ericsson (piggybacking) being/creating part of telecom's value chain, leverage of new technology with traditional one, widening product complexity enabling customer tailored solutions

Source: Author's compilation based on Mets (2008), Reach-U (2009)

Table 2. Skype Technologies S.A. – global VoIP company

Company name, founding data	Skype Technologies S.A., 2002, its Estonian branch in 2004, founders – Niklas Zennström (Swede) and Janus Friis (Dane) involving four Estonian programmers Ahti Heinla, Priit Kasesalu, Jaan Tallinn and Toivo Annus, promising high quality P2P phone, initial service Skype phone – free of charge
Pre-history period, important events	The founders and the primary code writers Ahti Heinla, Priit Kasesalu and Jaan Tallinn had created P2P file-sharing internet environment KaZaA, which was introduced by Dutch registered company Consumer Empowerment in March 2001 (sold to Sharman Networks; provoked scandalous court claims by copyright organizations and music publishers)
Opportunity recognition	...took place before company was founded, technological idea and business model were initiated from the former project KaZaA, sold in 2002
Domestic period	Did not exist, the product was launched in Aug. 2003
Internationalization period	Concurred with globalization
Globalization period	Aug. 2003 - Jan. 2004: 2.4 million users from 200 countries; Aug. 2004: 9 million users; Aug. 2005: 51 million users; April 2006: 100 million users; June 2007: 196 million users; Apr. 2008: 308 million users; Feb. 2009: 405 million users
Marketing	The global final customers found practically without any marketing costs
Product development	Aug. 2003: First public beta version released; 2004: conference calling, SkypeOut Global (calls into landlines and mobile networks); Apr. 2005: SkypeIn and Skype Voicemail; Dec. 2005: video calling; Jan. 2006: wireless mobile telephone; Feb. 2009: full-screen video calling; Wide range of compatible equipment and software designed and produced by partners worldwide

Finance	Sept. 2002: investment from Draper Investment Company (USA) of Steve Jürvetson, investor with Estonian roots; Sept.-Nov. 2005: acquisition by the American Internet auction site eBay for approx. \$2.6 billion
Lessons learned	Reaching the market, the team has intensively expanded complexity of the product: Skype
Competitive edge	No limits worldwide using Internet environment, global connection without extra charge
Business model, strategy	P2P, collaborating and competing with (big) telecoms

Source: Author's compilation based on Kurm (2005), Thomann (2006), Leibowitz, Ripeanu and Wirzbicki (2003), Yovanof and Hazapis (2008), Skype (2009).

Table 3. Asper Biotech – small global biotech company

Company name, founding data, initial product	Asper Biotech AS, 1999, founders – prof. Andres Metspalu and Jaanus Pikani, former CEO of University Clinics, genotyping service and package (instrumentation, software and bioinformatics solution) for identifying genetic components of human disease, mostly customers of R&D field
Pre-history period, important events	1996-1999, prof. Metspalu worked in the universities in France and USA working out a particular genotyping technology
Opportunity recognition	...took place before company was founded, technological idea and the initial business model were generated from the founder's experience
Domestic period	Practically did not exist
Internationalization period (under the trademark Reach-U)	2001, the first international revenues were generated; results of the first project were published in top journals <i>Nature</i> and <i>PNAS</i> for reference
Globalization period	2001-2002, local representative agreements were signed with partners in Japan, USA, Norway and Italy; 2003-2004, focus turned on direct contacts and shifted from products to services; 2009: clients in more than 40 countries
Marketing	Quite intensive advertising in special journals complimented with research publications in the beginning. Direct marketing (1000 - 10000 institutions/companies worldwide) partly based on personal contacts of the professor
Product development	Started from wider (complex) product range (technology platform, methodology, equipment, analysis) offer, focus turned to concrete DNA tests' and diagnostics' services; ISO 9001: 2000 quality certificate, since 2000
Finance	Involving risk capital investment for product and technology development from the very beginning: US origin SEAF fund in 2000, later BSEF; EU FP6 funding of several projects
Lessons learned	Low efficiency of partnering with local players in global niche market; selling complicated product needs expensive support system; most effective was replacing analysis' product sale with the analysis' services; splitting the business by moving instrumentation, software and technology platform development into the HSME Genorama with the same owners
Competitive edge	Competence-based world-wide recognized analysis' methodology; founder's personal worldwide scientific contacts; (comparatively) low cost knowledge intensive service
Business model, strategy	From B2B to B2C; creating new markets by focusing on (high competence) different specialized services for different segments: genotyping for special global niches

Source: Author's compilation based on Kask (2009), Kodres (2006), AS Asper Biotech (2001-2007), Asper Biotech (2009), Genorama (2009)

Main findings, discussion and conclusions

Following general understanding from former researches, Estonia corresponds to the environments of small open economies' (SMOPEC) context of BG HSMEs being even remarkably smaller than Finland or Sweden covered by several authors earlier (Luostarinen & Gabrielsson, 2006). Since 1992 the Estonian government has practiced a liberal economic policy, and has opened the Estonian market to foreign goods and capital. That policy has helped to attract foreign investments which fostered to overcome backwardness inherited from Soviet occupation. As liberal but also comparatively poor economy Estonia has not supported neither technology-based nor any start-ups as strongly as neighboring Western countries could do. Therefore

the main survival condition for companies has been the balance between costs and revenues which did not give the chance to invest enough into new technology development. This is a part of explanation of “long journey” of Regio, founded in 1988, to global market as presented in Figure 3. Before internationalization Regio had already quite a wide range of products of different technology domains (design, cartography, GIS and software). Because the lack of resources product development was hindered for several years in the mid of the 1990s. Later, in 1998 the Baltic Small Equity Fund (BSEF) became risk capital partner for Regio, but even that was not enough. More possibilities were created through the merger with DONE. Global breakthrough succeeded first with one product only – location based services (LBS) provided as a part of value chain of global player Ericsson since 2004.

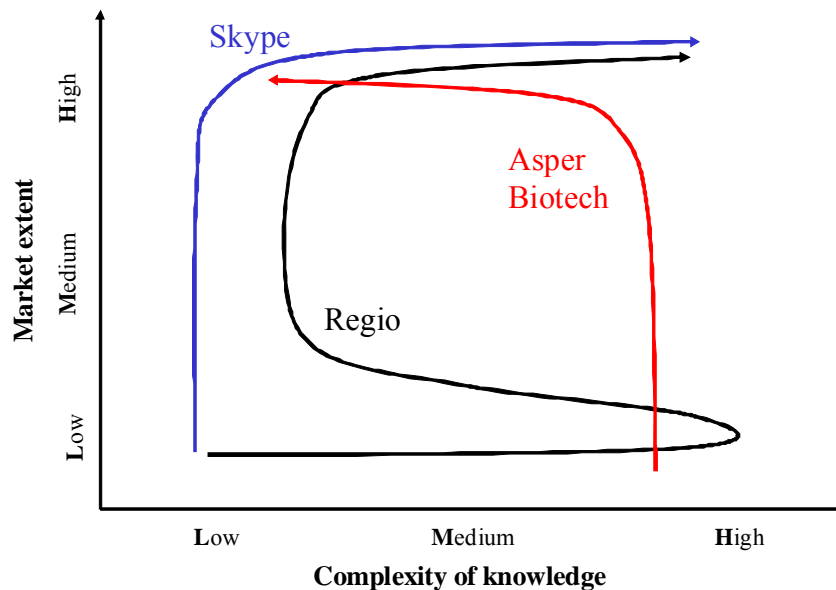


Figure 3. Product knowledge-market trajectories of globalizing HSMs (the author’s drawing)

Spreading worldwide LBS service afterward has enabled to compliment global product with the elements of its traditional and new products leveraging complex knowledge across global markets. The process in “knowledge-market” framework is described with S-shape curve.

Skype represents another development trajectory, where globalization starts from one concrete product and after global breakthrough it is leveraged with wide range of improvements and additional functions growing knowledge complexity of the product. The trajectory (see Figure 3) seems to be very relevant to classical process of moving from “high product” to “high system” business, which could be described with the Γ -curve. The knowledge accumulation for VoIP-company was strongly supported by “pre-history” of technology and business competences developed in KaZaA project. The same important was also an international team, its visionary ideas, technological skills and capability to attract VC at the very early stage. Although some experts guess that in technological meaning Skype did not change too much in ICT world (Landler, 2005), main was clever way for “putting together bits and pieces”. The “peer-to-peer” (P2P) technology concept and business model of the Skype has found being disruptive innovation (Yovanof & Hazapis, 2008) completely changing global market of telecommunication. The case confirms again that the most effective innovations do not need hard basic research any more, just new ideas how basic knowledge could be used (Mets, 2006).

The case of Asper Biotech is an example of contrary development of product on the market. The beginning was also quite classical stage of knowledge accumulation. Professor initiating the HSME was very active also in business development and finding the funding. Using already improved entrepreneurship environment in Estonia in the beginning of 21st century the founders succeeded to involve remarkable resources for product development from different risk funds and European Union framework program (FP). Complexity of the product range at the beginning was quite high. Asper Biotech started global offering from inception. It was supported by advertising, research publications and personal contacts of prof. Metspalu. Learning in the process of market development it became clearer that in the specific business with very small shipments and mediation of genotyping services “business-to-business” (B2B) model with local partners

could not be efficient. As a result direct sales (“business-to-client” – B2C model) to final customers were implemented. The most complicated part of product range – technology platform with complementary methodology and software needed another commercialization approach, therefore it was moved into another business Genorama with its specific strategy. As a result, a complex system-offer was replaced with less complex product for the client in the global niche market. In the “knowledge-market” axis the process could be described with the rotated L-curve. Besides that the company has found that they still may be at the very beginning of customary market creation for gene test and diagnostics which market need should be facilitated.

On the example of three different knowledge-market trajectories case studies of completely or partly Estonian-origin HSMEs in the field of ICT and biotechnology some generalizations and conclusions can be made.

Appearance of the “born global” phenomenon in company’s behavior presumes knowledge and experience accumulation – i.e. entrepreneurial learning period, which is leading to (global) business (breakthrough) opportunity recognition. This competence accumulation period can take place before formal company founding as well as in the framework of already functioning businesses.

Usually BG HSMEs focus on global niche market, but they can also challenge the whole industry. It seems that partly the aspect depends on the maturity of the industry. Skype is a good example of going wide market from inception. But Asper Biotech could refer to the potential/chance to turn new technology niche product/service into wide customer market need as a result of growing awareness of potential clients.

BGs have usually relatively low resources for marketing, but not only, there is lack of resources for anything. But this could be not disturbing to global breakthrough as seen on the example of Skype. Clever business model and free of charge basic service can create absolutely new approach in the industry. Technology innovation that means also innovation in the market and human behavior, can finally lead to social innovation. Moving from single product/knowledge domain to “high system” products is not the absolute rule. Market can cause the contrary processes, i.e. simplifying complexity of the product. That happens in the learning process the company can experience on the market.

The experience with the three Estonian-related case study companies demonstrate that the HSMEs can be very successful, but even success stories have their “critical” points, learning from which creates better basis for knowledge economy of the country. From lessons experienced by case companies can learn entrepreneurs and managers of technology and knowledge-intensive businesses as well as relevant public sector. These are lessons for educators of future engineers and scientists-technologists – how to integrate technology competences with entrepreneurial skills. The schools the engineers and researchers of case companies graduated from are still giving too little knowledge and attitude how to use technology skills in creating higher value for society. That is the challenge not only for higher education institutions of Estonia but also for the whole national innovation system.

References

1. Aaltio, I. (2008). “Management education as an identity construction: the case of Estonia and its transition background”, *Int. J. Entrepreneurship and Small Business*, Vol. 4(1), pp. 83-99.
2. Andersen, O. (1993). “On the Internationalization Process of Firms: A Critical Analysis”, *Journal of International Business Studies*, Vol. 24(2), pp. 209-231.
3. AS Asper Biotech (2001-2007). Annual reports (in Estonian).
4. Asper Biotech (2009). “Company profile”, <http://www.asperbio.com/company.htm>, accessed 24 February 2009.
5. Bell, J., McNaughton, R., Young, S. and Crick, D. (2003). „Towards an Integrative Model of Small Firm Internationalization“, *Journal of International Entrepreneurship*, 1, 339-362.
6. Bell, J., McNaughton, R. and Young, S. (2001). ”’Born-again Global’ Firms. An Extension to the ‘Born Global’ phenomenon”, *Journal of International Management*, 7, 173-189.
7. Blomstermo, A. and Sharma, D. (2003). „Three Decades of Research on the Internationalisation Process of Firms“. In: *Learning in the Internationalisation Process of Firms*. (Eds.) Blomstermo, A. and Sharma, D., Cheltenham: Edward Elgar, pp.16-35.
8. Casillas, J.C. et al. (2008). „An integrative model of the role of knowledge in the internationalization process“, *J World Business*, doi:10.1016/j.jwb.2008.08.001.
9. Chesbrough, H. and Rosenbloom, R.S. (2002). “The role of the business model in capturing value from innovation: evidence from Xerox Corporation’s technology spin-off companies”, *Industrial and Corporate Change*, Vol. 11(3), pp. 529-555.
10. Corbett, A.C. (2005). “Experiential learning within the process of opportunity identification and exploitation”, *Entrepreneurship Theory and Practice*, July, pp. 473-491.

11. Crainer, S. (1999). *Handbook of Management*, London: Financial Times.
12. Deakins, D., O'Neill, E. and Mileham, P. (2000). "Executive learning in entrepreneurial firms and the role of external directors", *Education + Training*, Vol. 42(4/5), pp. 317-325.
13. Gabrielsson, P. and Gabrielsson, M. (2004). „Globalizing internationals: business portfolio and marketing strategies in the ICT field”, *International Business Review*, 13, pp. 661–684.
14. Genorama (2009). "About Genorama", <http://www.genorama.com/>, accessed 26 February 2009.
15. Hamel, G., Prahalad, C.K. (1993). 'Strategy as Stretch and Leverage', *Harvard Business Review*, March-April, 75-84.
16. Johanson, J. and Vahlne, J.-E. (1977). "The Internationalization Process of the Firm – A Model of Knowledge Development and Increasing Foreign Market Commitments", *Journal of International Business Studies*, Vol. 8(1), 23-32.
17. Kask, I. (2009). Interview, 26 February, by T.Mets.
18. Kodres, G. (2006) *Internationalization of Estonian technology-intensive sector: the case of three companies*, Master's thesis in Entrepreneurship and Technology Management, Tartu.
19. Kurm, K. (2005). "Skype shakes up the way", *The Baltic Times*, Nov. 09, <http://www.baltictimes.com/news/articles/13963/>, accessed 24 February 2009.
20. Landler, M. (2005). "Hot technology for chilly streets in Estonia", *The New York Times*, Dec. 13, <http://www.nytimes.com/2005/12/13/technology/13skype.html>, accessed 24 February 2009.
21. Leibowitz, N., Ripeanu, M. and Wirzbicki, A. (2003). "Deconstructing the Kazaa network", *Proceedings of the The Third IEEE Workshop on Internet Applications (WIAPP'03)*, 9 p.
22. Luostarinen, R. (1979). *Internationalisation of the Firm*, Helsinki School of Economics, doctoral dissertation – Reference via (Luostarinen and Gabrielsson 2004).
23. Luostarinen, R., Gabrielsson, M. (2006). "Globalization and marketing strategies of Born Globals in SMOPECs", *Thunderbird International Business Review*, Vol. 48(6), 773-801.
24. Luostarinen, R. and Gabrielsson, M. (2004). "Finnish perspectives of international entrepreneurship", in: *Handbook of Research on International Entrepreneurship*. (Ed.), Dana, L.-P., Cheltenham: Edward Elgar, pp.383-403.
25. McNauthon, R.B. (2003). "The Number of Export Markets that a Firm Serves: Process Models versus the Born-Global Phenomenon", *Journal of International Entrepreneurship*, 1, 297-311.
26. Mets, T. (2008). „Regio – a learned global knowledge company: Case from Estonia“. In: *The Cutting Edge: Innovation and Entrepreneurship in New Europe*. (Ed-s)Ruta Aidis and Friederike Welter, Cheltenham: Edward Elgar, pp. 54-73.
27. Mets, T. (2006). "Developing the sectorial innovation system of Estonian biotechnology", *Inzinerine Ekonomika-Engineering Economics*, 50(5), pp. 73-79.
28. Mets, T. (2003). "Leverage of knowledge and competence – success factor of global corporation: Mathematical model and some empirical findings in Estonia", *Management of Organizations: Systematic Research*, 28, pp. 111-124.
29. Nummela, N., Saarenketo, S. and Puumalainen, K. (2004). „Rapidly with the rifle or more slowly with a shotgun? Stretching the company boundaries of internationalising ICT firms“, *Journal of International Entrepreneurship*, 2, pp. 275-288.
30. Politis, D. (2005). "The process of entrepreneurial learning: A conceptual framework", *Entrepreneurship Theory and Practice*, July, pp. 399-424.
31. Ravasi, D. and Turati, C. (2005) "Exploring entrepreneurial learning: a comparative study of technology development projects", *Journal of Business Venturing*, 20, pp. 137-164.
32. Reach-U. (2009). "News", <http://www.reach-u.com/?op=body&id=4>, accessed 24 February 2009.
33. Rialp, A., Rialp, J., Urbano, D. and Vaillant, Y. (2005). "The born-global phenomenon: a comparative case study research", *Journal of International Entrepreneurship*, 3, pp. 133-171.
34. Roolaht, T. (2002). "Internationalisation of Firms from Small Open Transition Economies: The Intra-Firm Factors and Inward-Outward Connections", *Journal of East-West Business*, Vol. 8(3/4), 123-144.
35. Senge, P. (1990). *The Fifth Discipline. The Art and Practice of the Learning Organization*, Random House, Sydney.
36. Skype (2009). „News“, <http://about.skype.com/news.html>, accessed 24 February 2009.
37. Svensson, G. (2006). "A quest for a common terminology: the concept of born glocals", *Management Decision*, Vol. 44(9), pp. 1311-1317.
38. Thomann, A. (2006). "Skype – A Baltic success story", *Credit Suisse*. Online Publication, 06.09.06.
39. Vadi, M. and Türk, K. (2009). "Behaviour patterns in Estonian enterprises from the perspective of the value", *Baltic Journal of Management*, Vol. 4(1), pp. 34-50.
40. Winter, S. and Szulanski, G. (2001). "Replication as Strategy", *Organization Science*, Vol. 12(6), pp. 730-743.
41. Yovanof, G. and Hazapis, G. (2008). "Disruptive technologies, services, or business models", *Wireless Personal Communications*, 45, pp. 569-583.