



## Dynamic knowledge-related learning processes in internationalizing high-tech SMEs

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### Abstract

This paper studies the internationalization of high-tech small- and medium-sized firms (SMEs). The traditional internationalization theories suggest that the firm's international involvement increases in stages as a result of incremental learning. However, the small information and communications technology (ICT) companies are often characterized as *born globals*, showing very rapid and intensive international growth enabled by the use of external resources, such as partnerships and networks. Adopting a *knowledge-based view of the firm* has proved to be a useful way to theoretically explain the internationalization process of these ICT SMEs. However, in our view, the crucial dynamic aspects of knowledge development have not received enough attention in previous empirical studies, which have typically been more like static snapshots.

In this paper, we will first launch an evolutionary knowledge management model, derive then its basic theoretical propositions and finally test them empirically in terms of a longitudinal survey of small- and medium-sized software and content providers in the Finnish ICT-sector (from the year 1999 to 2001). Most of the results are straightforward and show that at least some of the proposed knowledge-related determinants really have significant effects on the dynamics of internationalization.

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### 1. Introduction

The internationalization process of small and specialized high-technology firms is often different from that of more mature industries. The established internationalization theories propose that the firm's international involvement increases in stages as a result of incremental learning. However, the

small information and communications technology (ICT) companies are often characterized as *born globals*, showing very rapid and intensive international growth enabled by the use of external resources such as partners and networks. Adopting a *knowledge-based view of the firm* is a practical way to explain the internationalization process of these companies. Nevertheless, the dynamic aspects of knowledge development have not received enough attention in previous empirical studies.

The main objective of this paper is to identify how development of knowledge and capabilities

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may contribute to the rapidity and extensiveness of internationalization. We have applied a general evolutionary knowledge management model that makes it possible to derive the basic determinants of the company's ability to leverage their knowledge in technology, marketing, resources and process management. We attempt to utilize these determinants when explaining the internationalization process and compare our results with the more traditional views about internationalization. From the model we have derived propositions on the dynamic knowledge-related learning processes and their effect on the scale and rapidity of internationalization.

The propositions are tested empirically with a longitudinal survey of small- and medium-sized software and content providers in Finnish ICT-sector. Most of the results are straightforward and show that at least some of the main proposed knowledge-related determinants have significant effects on the dynamics of internationalization.

The paper consists of five parts. In the first part internationalization theories and particularly the learning aspects and challenges faced by the small high-tech firms are examined. In the subsequent section, the knowledge-based view of the firm is introduced generally. Then, our particular evolutionary knowledge management model for internationalization and propositions will be launched. The empirical part reports the results from our longitudinal data set and the last section concludes the paper with some implications and suggestions for further research as well.

## 2. ICT-industry—what is it all about?

The ICT-industry has been one of the fastest growing industry sectors for several years. For example, European Information Technology Observatory (EITO) has recorded double digit growth numbers in 1999 for Europe and they expected similar trend to continue (EITO, 1999). Although not all the news from ICT firms was positive in 2001, the ICT-sector continues to grow, at least in the European market. In October 2001 EITO estimated that the Western European market would grow by 6.8% to €575 billion.

Research organization IDC's forecast is parallel, 6–7% in Western Europe and 4–6% in the United States (IDC, 2002). The size of the world market is estimated to be €2151 billion in 2001 (EITO, 2001).

Although the international growth of services and especially information technology based services continues, certain segments of the ICT-sector have been in a downturn. For many firms, the year 2001 meant disappointing sales, layoffs and deflated new technology expectations (e.g. last year was the worst ever for telecommunication manufacturers Motorola and Lucent) (Briody, 2002). The most problematic segments were related to telecommunications, especially to end user devices (EITO, 2001). Network carriers are also burdened with the high price of the license investments and this may hinder the service development.

The diverse nature of the industry makes the analysis of the developments complicated. There are many different types of services and products, e.g. software business can be divided into packaged software, enterprise solutions and professional services related to software (Hoch et al., 2000). Convergence of the IT, communications and service industries, the increasing use of Internet and wireless technologies by traditional "brick and mortar" firms make the situation even more blurred. There will be many actors involved in the production of new types of offerings and many services accompany even highly tangible high-technology products (e.g. embedded software products). However, the complexity of the industry was not the only reason behind the crash of the dot-com boom. It is clear that the high expectations associated with the use of new technologies gave distorted signals to markets (i.e. to consumers, other firms and investors). Like in many cases when launching new disruptive technologies, many dot-com roll-outs were done without clear estimations of sales and costs (Porter, 2001). It appears that for many firms, Internet only was a substitute for a strategy and this is one of the reasons for the fall of "brave" new economy (Porter, 2001).

High-tech small- and medium-sized firms (SMEs) in the ICT-sector are currently coping

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