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Strategic forecast tool for SMEs: how the opportunity landscape interacts with business strategy to anticipate technological trends

P. Savioz^{*}, M. Blum

ETH Center for Enterprise Science, Technology and Innovation Management, Zürichbergstrasse 18, 8028 Zürich, Switzerland

Abstract

Due to the increasing pace of technological change and in order to remain competitive, planning gains more importance in all companies, including small and medium-sized enterprises (SMEs). However, existing planning tools do not correspond to SME-specific needs; restricted resources often render their implementation difficult.

This paper proposes a novel concept: the Opportunity Landscape. Its main purpose is to make relevant technological information available to decision-makers in order to anticipate future developments and to act accordingly. The concept is developed and described in detail and then illustrated by means of a case study conducted in a Swiss mid-sized company. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Strategic technology forecasting; SMEs; Opportunity landscape

1. Preface and approach

Today, emerging small and medium-sized enterprises (SMEs) find themselves in an environment of constant technological change (Tschirky, 1998: p. 67). These changes may become a significant threat when ignored by the company, but they may as well become valuable opportunities in case of anticipation. The growing awareness and the will to take advantage of this has led to a broader interest in the field of Technology Intelligence (TI). Technological preparedness is desired, but since many of the existing tools and methods are intended for large R&D departments, they are not well suited for small and medium-sized companies because of their restricted resources (i.e. knowledge, human and financial resources). Moreover, both general and SME-specific TI approaches are not always sufficiently strategy-related. On the other hand, there exists a great variety of well-documented and field-tested strategic tools and methods designed to aid strategic planning and decision-making. These approaches in turn are sometimes not sufficiently technology-related and not enough adapted to SME's needs. So far however, not much

effort has been put into linking SME-relevant TI and strategic planning together. In Switzerland, 99.9% of the enterprises are counted among SMEs. This paper presents a strategic concept designed to provide the missing link to such enterprises.

TI and some important strategic approaches are first defined individually. Then, the strengths and weaknesses significant to SMEs are discussed. Awareness is consolidated and brought in relation to the Opportunity Landscape, which itself is then introduced and elucidated in the second part of this paper. The final part consists of a case study which has been conducted in a medium-sized Swiss company to show the implementation of the concept, and to present the results and teachings.

2. Framework

According to Kohler (1998: p. 557), Technology Management as an integrated task of general management leads to more innovative SMEs. For such companies, technological expertise in administrative management, due to controlling interest in production or development, leads to optimal employment of technology. Corporations additionally have the opportunity for acquiring external knowledge to support their decision-making by getting specialists to join the Board of Directors. Even

^{*} Corresponding author. Tel.: +41-1-6320589; fax: +41-1-6321048.
E-mail address: pascal.savioz@ethz.ch (P. Savioz).

though basic approaches in the field of TI exist, and the above-mentioned opportunities are being turned to account, technology goals and appropriate planning are still not common on the strategic level.

2.1. *Technology intelligence*

The speed of technological change and the increased complexity through the merge of present disciplines demand both effective technology decisions and efficient provision of internal and external technology. TI provides analyzed information, that enables decisions of technical concern and covers three main tasks: early identification, analysis, and communication of new technologies, products, and processes, as well as their potential impact on the enterprise (Lichtenthaler, 2000: p. 19). The process of TI consists of four main steps: clarification of knowledge needs, collection of data, analysis, and validation of information, and distribution of information (Ashton and Klavans, 1997: p. 13). When the needs are known, the collection of data can be accomplished through general scanning of the environment, or specific monitoring in the case of already identified technology fields (Lang, 1998a: p. 73). It is important to make use of both formal and informal sources of information. Analysis is the stage of the process where a forecast is being made, expert judgements are solicited, or scenarios are specified. Only relevant information should then be passed to the decision-maker, while the rest (of the predominantly unstructured information) is stored and ready to be retrieved (Lang, 1998b: p. 406). TI is not restricted to large R&D departments, a small group of researchers is sufficient to gather and provide the company with the needed information. In addition, the distribution of information or even knowledge may be facilitated by shorter physical distances and flat hierarchical structures commonly found in SMEs. But the information remains useless until it comes into operation for strategic decision-making.

An important method in TI to achieve this goal is forecasting: a technological forecast is a prediction of the future characteristics of useful machines, procedures, and techniques, and consists of the four elements: technology, time, characteristics, and probability (Martino, 1993: p. 1). Characteristics mean functional capabilities of a technology, that should be used for decision-making, as opposed to its technical parameters; they are merely being modified to achieve the functional capability. There are four basic forecasting methods, which are normally used in combination: extrapolation, leading indicators, casual models, and probabilistic methods (Martino, 1993: p. 11). The first method is to identify trends or cycles of some kind in order to find patterns in historical data. The second method is to seek correlation between past and future series of events. Casual models examine cause and effect, these forecasts are based on

formulas and equations. Probabilistic methods deliver probability distributions rather than a single value. Since these methods depend on historical data and continuity, it is essential to identify precursors of possible breakthroughs (Martino, 1993: p. 192). This environmental monitoring process involves collection of information in all environmental sectors, screening to sort out relevant information, evaluation to specify its significance, and establishment of hypotheses, and finally setting of a threshold level when to actually make the forecast. This process requires a steady search for both confirming and disconfirming signals, but holds the advantage of identifying new technical approaches from outside the own industry. In doing so it is also important to consider the stage of innovation that a particular technology is in.

Monitoring and acquisition of information, forecast-making and the resulting decisions on how to proceed should not be accomplished by the same person. If building of such teams exceeds (human) resources, especially in smaller companies, the scale of forecasting operations has to be reduced accordingly. Nevertheless, technological forecasting remains a vital scope of TI and has to be an integral part of it in a reduced design, too.

2.2. *Underlying concepts*

2.2.1. *Issue management*

According to Ansoff (1980), Issue Management tries to identify future trends in time to prevent crisis. Ansoff defines strategic Issue Management as an independent real-time system running parallel to strategic planning: "A strategic Issue Management system (SIM) is a systematic procedure for *early* identification and *fast* response to important trends and events both inside and outside an enterprise" (Ansoff, 1980: p. 134). It is a *real-time process* because strategy has to be improved, not revised; a key strategic issue list has to be maintained. A revision would take years of implementation. It is running parallel because a separation of the two would be too expensive. Time and primarily money both are resources that are normally restricted in SMEs. According to Miller (1999: p. 6), Public Relations play an important role in Issue Management in the sense that the public perception of issues is more important than the company view. Thus, communication between the PR department and management is vital. Small enterprises usually do not have such a department, but there should always be at least one person responsible for external relations and communication. The objective is to prevent crisis, or to manage it when breakout has already occurred. Since the first alternative is much more appreciated, the main instrument to do so is a trend analysis in one way or another. The gathered information can then be used to support strategic decision-making for building up a readjusted communication strategy. This implies constant monitoring of and adapting to changes

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