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The role of tacit knowledge in innovation processes of small technology companies

Kaj U. Koskinen*, Hannu Vanharanta

Industrial Management and Engineering, Pori School of Technology and Economics, Tampere University of Technology, Pohjoisranta 11, P.O. Box 300, 28101 Pori, Finland

Abstract

This paper reports on a conceptual analysis of the role of tacit knowledge in innovation processes. The presentation will focus on foundations of tacit knowledge, how tacit knowledge is acquired and transferred, and how it is utilised in the innovation functions of small technology companies. The study hints that tacit knowledge can play an important role in the initial stages of the innovation processes of small technology enterprises. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

Until the 1960s innovation was treated as an unexplained variance in the performance of a technology company. Today tacit knowledge, as an element within technological innovation, has been seen similarly.

Interest in tacit knowledge has, however, grown as awareness has increased that the contribution of technological innovation to growth and economic performance is not simply associated with embodied technologies, but is also dependent on disembodied, intangible assets and working practices. (cf. Charles and Howells, 1992).

With regard to innovation function, it is argued that small technology companies have some advantages over larger technology companies. It is said that small technology enterprises can many times develop more products than larger technology companies with same amount of money. If this is true, is it then possible to explain these benefits partly in terms of the concept 'tacit knowledge'?

The goal of this paper is to illustrate the role of tacit knowledge in innovation processes. Therefore, at the beginning of the following discussion we will describe the views of various researchers on tacit knowledge and its dissemination in technology companies. After that we will analyse a typical innovation process while trying to determine what role tacit knowledge plays in the different phases of the innovation process. At the end of the paper we draw a conclusion as to what the role of tacit knowledge utilisation in innovation processes of small technology companies is.

2. Experience, the basis of tacit knowledge

Tacit knowledge represents knowledge based on the experience of individuals. It expresses itself in

*Corresponding author. Tel.: +35826272839; fax: +35826272727.

E-mail address: kajuk@pori.tut.fi (K.U. Koskinen).

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human actions in the form of evaluations, attitudes, points of view, commitments, motivation, etc. Usually it is difficult to express tacit knowledge directly in words, and often the only ways of presenting it are through metaphors, drawings and various methods of expression not requiring a formal use of language. On a practical level many experts are often unable to clearly express all they know and can do, and how they make their decisions and come to conclusions.

Polanyi (1966) encompasses the essence of tacit knowledge in the phrase "We know more than we can tell", and provides further clarification of the concept in such commonplace examples as the ability to recognise faces, ride a bicycle or swim without even the slightest idea of how these things are done. Rosenberg's (1982, p. 143) description of traditional technological knowledge, accumulated in crude empirical ways with no reliance upon science, provides a good definition of tacit knowledge in technology companies: "The knowledge of techniques, methods and designs that work in certain ways and with certain consequences, even when one cannot explain exactly why". Thus, tacit knowledge equals practical know-how.

Human experience is the foundation of tacit knowledge (cf. Polanyi, 1966; Nonaka and Takeuchi, 1995). Badaracco (1991) claims that a human being cannot take advantage of new information unless s/he has earlier "social software" connected to that information. Also Cohen and Levinthal (1990), who have introduced the "absorptive capacity" concept, claim that man's capability for utilising new information in the solution of a problem depends largely on his earlier knowledge. For example, the chances that a technology firm will succeed in an engineering project can be dependent on a staff's experience in similar projects (Koskinen, 2000).

When people attempt to solve their problems, they are guided by the knowledge they have gained from similar problems earlier (Schultz, 1970). The fact that knowledge and know-how based on experience can be utilised in the engineering of technology products is also supported by findings of cognitive psychology research (cf. Ross, 1989). The results of these studies provide evidence for the important role of specific, previously experienced situations in the engineering of such products. Also, Anderson (1983) indicates how people use a model from some earlier situation when they are solving a problem.

The multi-faceted experience of an individual increases his/her possibilities of solving the problems that might arise in a task. This is so because multi-facetedness adds to the individual's ability to see subject entities and dependencies between matters. This capability of solving a problem is dependent on the richness of the existing knowledge structure (Lyles and Schwenk, 1992). These observations, drawing on studies at an individual level in the cognitive and behavioural sciences, are also supported by Bower and Hilgard (1981, p. 424), who claim that "…the more objects, patterns and concepts that are stored in memory, the more readily is new information about these constructs acquired".

The depth of knowledge and know-how may also have a positive effect on problem solving. In-depth know-how is especially important when the problem is a difficult technological issue. In other words, both variety and depth of know-how are of help in solving problems. Of these branches of experience multi-facetedness (which means, for example, the capacity to understand cause–effect relations) consists largely of hard-to-express tacit knowledge.

von Krogh and Roos (1996) argue that, when continuity in the performance of tasks is interrupted by the appearance of a problem, people seek to interpret the task through their 'current frame of reference'. When the performance of the task is perceived as being problematic, the individual is not able to make sense of it directly with his/her current stock of knowledge. However, even if the problem is something outside his/her experience, it may well be still within the range of problems that their knowledge can address. For example, an individual might not have earlier experienced the tasks he faces at the moment, but through interaction with others he/she can acquire new knowledge that helps him/her understand the task in order to make the needed 'adjustments' in behaviour in accordance with his/her interpretations.