Chapter 5.11
Problem-Solving Style, Problem Complexity and Knowledge Generation:
How Product Development Teams Learn When They Carry on Innovation

Corrado lo Storto
University of Naples Federico II, Italy

ABSTRACT

This chapter presents the findings of a study aimed at investigating how the fit between the problem-solving style of a product development team and the cognitive environment induced by the perceived problem of complexity affects the amount and type of knowledge generated.

It is assumed that organizational knowledge is created as a by-product of collective creative technical problem-solving, when people work together to deal with unfamiliar and unexpected situations. Two major outcomes emerge from the analysis of experimental data: (1) different cognitive environment patterns are more conducive than others to organizational learning; (2) there exists some fit between the cognitive environment pattern and the team technical problem-solving style, as some cognitive practices and social behaviours adopted during technical problem-solving are more effective than others in certain cognitive environments. Particularly, practices and behaviours that are more associated to creativity have a not negligible weigh in the generation of knowledge. Ninety-one cases of technical problem-solving occurred during product innovation within 35 small firms studied.

DOI: 10.4018/978-1-60960-783-8.ch5.11

INTRODUCTION

A large body of literature clearly distinguishes between creativity, innovation, and learning and knowledge generation at the organizational

level. While creativity is more associated to the generation of new concepts and the exploration of new ideas, innovation is associated to the conversion and implementation of the ideas into tangible products and processes, and learning to the adoption of new knowledge and behaviors within the organization (Cook, 1998; Craft, 2005; Oldham and Cummings, 1996). However, these processes are strongly interconnected and it is usually difficult to separate them (Brennan and Dooley, 2005; McAdam and McClelland, 2002a). Creativity is often considered the front end of the innovation process, while learning is the output of innovation (Amabile, 1983; Majaro, 1988; McAdam and McClelland, 2002b). When people carry on innovation, they manifest their creativity when they are able to find new solutions to old problems or identify new problems to solve (Treffinger and Isaksen, 1992). In the same time, knowledge and learning are critical inputs of the creative process, and vice versa, creativity is a form of knowledge creation. Urabe (1988, p. 3) describes innovation as a "never one-time phenomenon, but a long and cumulative process of a great number of organizational decision-making process, ranging from the phase of generation of a new idea to its implementation phase", and recent models of the innovation process emphasize how it is often a chaotic, iterative and interactive and not easily planned process in which several people, teams, organizations and institutions work together to search, refine, recycle, nurture information and knowledge to solve problems, generate new ideas and develop products and processes (Kline and Rosenberg, 1986; Chesbrough, 2004; Cheng and Van de Ven, 1996; Van de Ven, Polley, Garud and Venkataraman, 1999). According to Argyris and Schon (1978, p. 3) organizational learning is:"[...] a process in which members of an organization detect an error or anomaly and correct it by restructuring organizational theory of action, embedding the results of their inquiry in organizational maps and images". Thus learning is affected by the organization capabilities, practices and behaviors adopted to search, process, interpret and transfer information during technical problem-solving. An important source of learning – particularly in small organizations – is creative technical problem-solving that teams and individuals carry on during the innovative activity. This technical problem-solving usually proceeds randomly, without any planned or deliberated choice, but individuals conceptualize problems only when drawbacks occur and do not make any attempt to anticipate and prevent problems carrying on institutional R&D. Moreover, it is not rare that solving complex technical problems requires that people have to deal with problems of management.

Technical problem-solving is thus of crucial importance for all these processes, both as it is a common piece of the intrinsic nature of them and as it can shape and influence their dynamics. Creative technical problem-solving that individuals and teams implement during innovation affects how learning occurs and its output, e.g. knowledge created in its different shapes and amount. People working together in product development teams adopt different problem-solving styles, combining together a number of social behaviours and cognitive practices, depending on the amount of the perceived problem complexity (i.e. activating relationships to exchange information with the customer, developing either internal or external communication networks, approaching to problem solving by problem framing or problem widening, implementing experimentation and planning when dealing with problems, or divergent thinking) (Amabile, 1983; Andrews, 1975; Bell, 1982; Clark and Fujimoto, 1991; McKee, 1992; Raaheim, 1974; West and Farr, 1989). Problem-solvers perceive problem complexity as a consequence of the perceived state of ambiguity and uncertainty that characterizes the problem-solving cognitive environment (Daft and Lengel, 1986). Both the amount of perceived problem complexity and how technical problem-solving is managed by people (e.g., the problem-solving style) are particularly