

## Chapter 30

# Mapping the Knowledge Supply Chain to Foster Innovation

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### ABSTRACT

*Knowledge Supply Chains (KSCs) are the networks that provide knowledge supplies so nourishing one or more business processes carried out by a firm. KSCs are particularly crucial for innovation development processes. The need to recur to open KSCs during the accomplishment of such processes is indeed emphasized by the recent literature on open innovation (Kirschbaum, 2005; Chesbrough, 2006; Gassman, 2006; Van de Vrande et al., 2009). However, as scholars adopt different definitions of openness and stress different practices, it is not clear what open really means (Dahlander and Gann, 2010). Research is called for to further classify the different practices and, above all, to measure the impact of open vs. closed innovation so as to support companies in the identification of the right balance (Enkel et al., 2009). In the paper a methodology to map and analyze KSCs arising during an innovation development process is proposed. The methodology is described with specific reference to New Product Development (NPD) which is widely common as well as strategic in many firms. The methodology supports the characterization of the knowledge supplies (also in terms of the adopted collaboration approach) and the assessment of their criticality within the NPD process. Hence, it (1) contributes to make the concept of openness clearer and (2) provide companies with a clear picture of the process and its criticalities.*

### INTRODUCTION

Labour mobility, abundant venture capital, development of information and communication technologies, and the existence of widely dispersed

knowledge across public and private organizations make both wise and necessary for enterprises to develop innovations by engaging in collaboration networks (Pisano & Verganti, 2008; van de Vrande et al., 2009). The need to recur to partners

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to develop innovations is not new: communication, information, and knowledge-intensiveness have always been crucial aspects associated to innovation development, so often requiring companies be supported by suppliers, customers and/or other partners (Tushman, 1979; Kats & Allen, 1982; Morelli et al., 1995; Eppinger, 2001). The recent literature on open innovation emphasizes the beneficial for those firms that, in particular, recur to open practices, such as venturing, outward/inward intellectual property licensing, or R&D outsourcing (Kirschbaum, 2005; Chesbrough, 2006; Gassman, 2006; Van de Vrande et al., 2009). However, scholars adopt different definitions of openness and stress different practices, so creating conceptual ambiguity (Dahlander & Gann, 2010). Although some typologies of open collaboration have been developed/described (Pisano & Verganti, 2008; Dahlander & Gann, 2010), more research is needed to describe and analyze the different practices and, above all, to measure the impact of open vs. closed innovation so as to support companies in the identification of the right balance (Enkel et al., 2009). Such a need is not addressed neither by the literature on open innovation nor by the older and wider literature on the information and communication networks developed in the fields of innovation development, technology management, and supply chain management (Allen, 1977; Tushman, 1979; Allen et al., 1980; Clark & Fujimoto, 1991; Morelli et al., 1995; Eppinger, 2001).

The paper discusses a methodology to map and analyze the knowledge networks that nourish, by providing knowledge supplies, the innovation development process carried out by a company. We define such networks as Knowledge Supply Chains (KSCs). Although the methodology can be used for any innovation development process, for the sake of clarity, in the paper we decided to discuss it with specific reference to New Product Development (NPD). The methodology, based on the rooting ideas of Business and Supply Chain

Mapping Techniques (Scott & Westbrook, 1991; Kettinger et al., 1997) and the Analytical Hierarchy Process (AHP) (Saaty, 1980; 2008), supports the identification of actors involved and the role they carry out in the NPD process, as well as the types and criticality of the transferred knowledge and the adopted collaboration approach.

The methodology is intended as a support for companies interested to map and analyse the knowledge networks in which they are involved. In particular, by providing a clear picture of the NPD process, ex-post it allows firms to: (i) preserve the architectural knowledge, i.e. the knowledge related to the different parts of the final product, and (ii) support ex-post learning (lesson learnt) as to the knowledge acquired and used during NPD. The methodology can also support companies ex ante. Based on forecasts and experience, companies can (i) design a map of the NPD process to be developed and (ii) identify the most critical knowledge supplies, which is useful to assess priorities in allocating resources.

Finally, as it requires a description of the knowledge supplies also in terms of the collaboration approach, the methodology contributes to make the concept of openness clearer. In particular, it represents a first step to develop a tool by which a company can measure the openness degree with respect to a specific NPD process.

The paper is organized as follows. In the next section we discuss the concept of knowledge supplies. In the following section we describe the steps to implement the methodology. An example of application of the methodology is reported in the section after. Finally, in the last section we draw some conclusions and discuss further research.

## **NPD AND KNOWLEDGE SUPPLIES**

“Open innovation is both a set of practices for profiting from innovation and also a cognitive mode, for creating, interpreting and researching

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