

Exploiting External Knowledge in Continuous Innovation Processes:

The impact of information technology

Due to increased competition, faster technological development, increased complexity of products and better access to information, the lifetime of products has decreased substantially and the importance of fast response to continuous changes in customer requirements has increased. Innovating quickly, reliably and effectively is therefore an important advantage for achieving profitability and growth. Yet, all too often, organizations are unable to generate sufficiently creative ideas and effectively move them to market. One of the reasons is that given the growing complexity of technologies, even big firms seldom possess sufficient range of in-house capabilities and knowledge needed for new product development. The increased need for specialization and use of multiple technologies in products furthermore indicates that the utilization of external knowledge contributes to the innovativeness of firms. In order to sustain their competitiveness firms need to develop a capability to innovate efficiently in this dynamic environment that utilizes both internal and external knowledge simultaneously in their innovation processes. This capability can be enhanced by utilizing IT resources that support information and knowledge transfer, integration and co-operation (Pavlou and El Sawy 2006).

The need for the development of this new capability is supported by the theory of continuous innovation which emphasizes the need for a new way of thinking of innovation processes (ESPIRIT-project-26056 2002). Instead of viewing innovation as an output of independent and isolated activities within specific product development projects, the theory of continuous innovation emphasizes that in today's hypercompetitive environment, companies need to develop a capability that utilizes all potential effects of people, stakeholders and society on the speed and effectiveness in product development. Continuous innovation is a process of knowledge transfer within and between a broad range of activities, covering all phases of the product life cycle, such as concept generation, product and process design, product launch, sales, customization in sales and installation, enhancement and upgrading during use and services, not only in the life cycle of independent products, but of a whole family of products.

The theory of continuous innovation emphasizes the importance of a synergistic balance between the exploitation of existing capabilities and exploration of new capabilities, and to complement and enhance existing capabilities through collaboration between firms within an industry and between industry and academia. Companies therefore need to extend their innovation efforts and organize for effective knowledge transfer and learning both within the company and with other partner organizations. It has furthermore been argued that mastering, sharing and transfer of knowledge within this process requires new managerial skills that can become a powerful competitive weapon. Although the theory is reasonably well supported in a number of projects, the theory of continuous innovation is still under

development, and has only been implemented and tested to a limited extent, particularly with respect to the utilization of external information.

The emphasis in the research in information technology (IT) has changed from focusing mainly on identifying how IT can support and improve operational issues towards identifying how IT can support the firms' strategy and applied to enhance the sustainable competitive advantage of firms. The literature on information systems research furthermore suggests that the utilization of external knowledge can be supported by information technology and that the capability of managers to utilize information technology is an important contributor to the sustainable competitive advantage of firms. Furthermore, a number of scholars have suggested that the resource based view (RBV) provides a useful approach for a research in information technology (Santhanam and Hartono 2003; Wade and Hulland 2004; Newbert 2007).

The main objective of this research is to investigate the relationship between the utilization of information technology for the exploitation of external information and knowledge on performance in innovation processes. The research evolves around the resource based view on the relationship between the utilization of information technology for the exploitation of external knowledge and performance in continuous innovation processes. It is assumed that firms will be able to support communication processes and collaboration with information technology and that the ability of managers to leverage IT (IT leveraging competence) will have an impact on the extent to which firms are able to utilize information technology for this purpose.

A survey approach has been chosen for the research among production managers, R&D managers, sales and marketing managers as well as managers of foreign subsidiaries of Icelandic production firms. In order to capture the impact of external information from a global perspective, the main focus is on firms that have operations in international markets. The limited number of respondents that fall within this definition provides an opportunity to include the complete population in the research.

An extensive literature review covered three main areas that have an impact on the design and support the contribution of this research, the Resource Based View (RBV), networking and information technology (IT). The RBV provides a useful framework for the identification of the impact of activities, routines and business processes on the exploitation of external knowledge in innovation processes. Further analysis of the theory of the resource based view, networking and information systems revealed the main type of IT resources that have an impact on cooperation and information sharing between individuals within the firm, its subsidiaries and alliances and performance in continuous innovation processes. Based on the literature review the research model depicted in figure 1 was developed. The impact of the utilization of IT is captured by three constructs that have been tested in previous research and measure the extent to which firms actually use information technology in their innovation processes (Pavlou and El Sawy 2006). Since effective utilization of IT is not fully utilized without good relationship with suppliers and subsidiaries, two additional independent variables were included in the model, information sharing and communication quality (Han, Lee et al. 2008).

Project resource management systems (PRMS) which provide IT functionalities designed for the project and process management of NPD project help NPD work units to

obtain real-time information on project status, integrate dispersed information and monitor performance. PRMS furthermore support NPD work units to manage their shared resource dependencies by breaking down the project into smaller tasks and identifying matching resources.

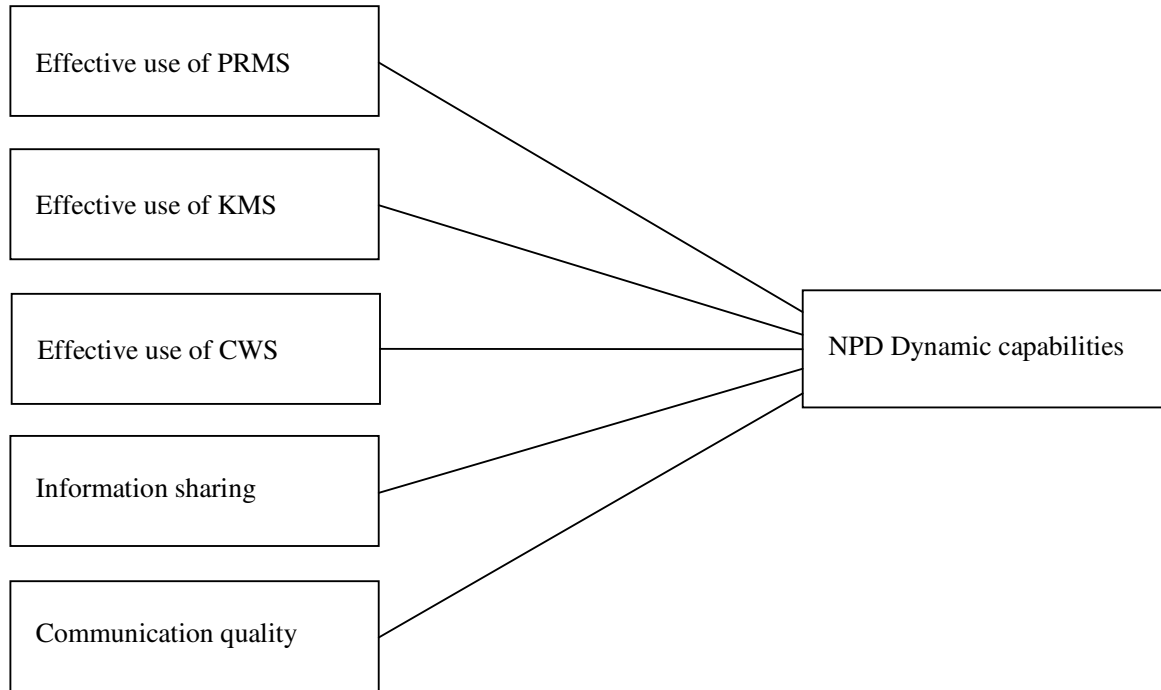


Figure 1: Preliminary research model

Knowledge management systems (KMS) have three key functionalities that support knowledge management activities in NPD, knowledge coding and sharing functionality that support NPD units to capture, codify, assimilate and share knowledge, such as product designs and engineering data (Nambisan 2003; Pavlou and El Sawy 2006). KMS furthermore provides NPD work units with the possibility to permanently store their project histories, including discussions and work data in content repositories' to make them accessible for reuse. A networking facility in KMS enable communication forums and knowledge communities that help NPD work units to discuss ideas on enhancements and new products as well as on testing new product and review.

Cooperative Work Systems (CWS) or groupware technologies provide facilities for collaborative work by enabling group communication across time and space. CWS may provide conveyance functionality that enables data-based collaboration, content management and sharing of ideas, presentation functionality, for filtering, structuring and modeling that enable NPD work units to transfer their tacit ideas into graphic images. Such presentation systems allow NPD work units to manipulate the format of their individual contributions and give new meaning to existing information and contributions by sorting, structuring and analyzing individual contributions into a collective design.

The RBV sets out a clear link between resources and strategic competitive advantage through a well defined dependent variable. A recently developed and tested construct, NPD dynamic capability (Pavlou and El Sawy 2006) which captures reconfigurability and has an impact on the effectiveness of responding to changes in the environment, is a suitable dependent variable for this research. This construct supports the identification of the impact of the utilization of IT on the exploitation of external information and knowledge in innovation processes and the impact of IT on the extent to which external orientation of innovation capability contributes to performance in innovation processes.

This research will contribute to the theory of continuous innovation by identifying how firms can utilize information technology for enhancing interaction, collaboration and integration of external information in innovation processes in dynamic environments. The research is one of the first to provide an empirical test on a number of relationships that have been proposed in the literature.

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