Chapter 8
Technology Engineering for NPD Acceleration: Evidences from the Product Design

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ABSTRACT

In complex environments, firms adopt continuously new IT-based systems and tools for knowledge management, otherwise knowledge can be dispersed or lost. And as a part of the new product development process, the product design is one of the most crucial phases for the relevance of its data and information and for the importance of the new knowledge creation of its designers and engineers. This chapter argues, through a conceptual model, the strategic role of the integration of knowledge management systems and special communities for the acceleration of the new product development process and presents an ontology-based knowledge management system and its application in the context of a community of automotive designers. More precisely, the issue management, based on this engineered IT-system, will accelerate and optimize the product design phase and knowledge sharing among the designers and engineers.

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INFORMATION ENGINEERING FOR NPD ACCELERATION

INTRODUCTION

In the actual environment, new product development has emerged as the main objective of many businesses and organizations. It is a process characterized by complex steps that need to be organized, managed and supported by knowledge management. Knowledge is the key success factor for the achievement of high economic performance for organizations and knowledge management leads to an efficient knowledge creation, reuse and sharing. Managing knowledge for new product development is a complex process that incite organizations to find new methods to optimize it. The organizations’ objectives is to coordinate the management of knowledge through optimal solutions as the creation of special groups, entities, units and teams, and to support them through the use of information systems based on technologies.

Merging organizational structures, knowledge management and technological systems is the biggest challenge of most organizations. And the reason for that is the complexity of the new product development process and the willingness to accelerate it. Our goal is to bring together the three areas of research, to connect them with NPD and to end up with a proposed solution. In what follows, we will talk about the communities of practice (CoP) as strategic entities for knowledge creation and sharing and the knowledge management systems (KMS) as their enablers of knowledge storage and reuse. We then propose a framework for the connection of the CoP and KMS and the extent to which it contributes to the acceleration of the NPD process. Next, we focus on an adequate IT-based method to achieve NPD acceleration that is based on semantic web and present a case of the management of knowledge related to new complex products design where the method is contextualized and customized.

ORGANIZATIONAL STRUCTURE

The organizational structure plays a strategic role in the context of new product development where the rules and procedures are coordinated among the people involved in the development of a product. Wheelwright and Clark (1992) state that the functional organizational structure is needed for the development of complex products that require specialized knowledge. The functional structure gathers people holding similar positions in an organization, performing the same type of activities, and exploiting the same kind of expertise. Thus, this type of structure facilitates communication and knowledge sharing, allows fast decision making since the involved people share the same interests, and leads to skills development.

In the functional organizational structure, centralization, formalization and integration are important factors influencing it (Germain (1996) and Sciulli (1998)). Nonaka and Takeuchi (1995) indicate that a combination of formal, non-hierarchical and self-organizing structure would improve knowledge creation and sharing capabilities. Besides, integration allows individuals to work interactively and share knowledge. Therefore, decreased centralization (Nonaka and Takeuchi (1995); Hopper (1990)), low formalization (Sivadas & Dwyer, 2000) and integration lead to knowledge sharing and creation for the new product development. The communities of practice (CoP), as organizational structures, are characterized by these factors and enhance knowledge sharing and creation since CoPs are decentralized, mostly informal and used to share knowledge among different individuals sharing the same interests. More precisely, the strategic communities are created for the purpose of the acceleration of new product development (Corallo et al., 2008; Taifi et al., 2008).