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ScienceDirect

International Journal of Project Management 34 (2016) 983 – 996

International Journal of Project Management

www.elsevier.com/locate/ijproman

Balancing contradictory temporality during the unfold of innovation streams

Fanny Simon, Albéric Tellier *

NIMEC, University of Caen Normandy, France

Received 26 August 2015; received in revised form 29 February 2016; accepted 9 May 2016
Available online 24 May 2016

Abstract

This article focuses on individuals working on innovation developments during the unfolding of innovation streams. Innovation streams include both exploitation- and exploration-oriented projects. Those projects imply different temporalities and can be conducted at different paces. This research examines how different temporalities within a single innovation stream are managed first at the level of projects and then among projects. We collected data on an innovation stream in the semiconductor industry. We explain how teams and organization develop processes and tools to address different temporalities. The results show that the process of learning occurs first within projects and then among projects. Our research offers new understandings of the transition of organizations towards a project-based structure by demonstrating that changes in practices can occur first as a reaction to external events, then as the results of new arrangements triggered by management and finally as the consequences of the team's proactive actions.

Keywords: Innovation; Temporality; Project; Exploration; Exploitation

1. Introduction

Continuous development of innovation is a substantial source of competitive advantage and a crucial factor in organizations' longevity (Eisenhardt and Brown, 1998; Tushman et al., 1997). Most innovations are based upon other innovations and may become foundations for additional technological development (Podolny and Stuart, 1995). In this article, we focus on streams of innovation, which are defined as '*patterns of innovation that are required for sustained competitive advantage*' (Tushman et al. 1997, p.5). Specifically, we understand innovation streams as including both activities to prepare for future activities and activities to expand a company's existing knowledge base (March, 1991) through the development of new products.

Simultaneously creating new competences for future expansion and while continuously developing existing knowledge is particularly challenging. In fact, exploring new pathways and exploiting the existing knowledge base are based on different temporalities (March, 1991). As exploring involves experimentation, search and discovery (Ibid), its returns are based on long-term engagement (Arthur et al., 2001). Furthermore, reinforcing deadlines may not be conductive to exploratory activities (Amabile, 1985, 1998). On the contrary, exploiting a company's existing knowledge base is associated with short-term returns, and meeting deadlines and maximizing the use of existing resources are key objectives (Arthur et al., 2001).

However, innovations are increasingly developed by project teams. Projects can bring competitive advantages for companies in terms of the reuse of existing knowledge or the development of new knowledge (Brady and Davies, 2004; DeFillippi, 2001). Thus, individuals can be involved consecutively in simultaneous projects with different temporalities that can be conducted at different paces within a company. However, few studies have linked the two processes of the exploration of new activities and the exploitation of the existing knowledge base and time perceptions in project-based organizations (Swan et al., 2010;

* Corresponding author at: Université de Caen Normandie, IAE, NIMEC, 3, rue Claude Bloch, CS 25160, 14075 Caen, Cedex 5, France.
E-mail addresses: Fanny.simon@unicaen.fr (F. Simon), Alberic.tellier@unicaen.fr (A. Tellier).

http://dx.doi.org/10.1016/j.ijproman.2016.05.004
0263-7863/00/

Bakker et al., 2013). Our research explores how different temporalities within a single innovation stream are managed. It is grounded in a stream of research demonstrating that projects are the locus for the development of new capabilities at the organizational level (Söderlund and Tell, 2009). It provides new insights by focusing on projects within their context and in their interrelation (Engwall, 2003). Our research focuses on temporalities both within and between projects.

We collected data on an innovation stream in the semiconductor industry and performed a qualitative analysis using the 'event structure analysis' (ESA) method. The innovation stream was composed of 10 hybrid projects (Schwab and Miner, 2008). We explain how teams and organizations develop processes and tools to address different temporalities.

This article is structured as follows. Section 2 presents the theoretical background and objectives of this research. The research settings and methods are described in Section 3. Section 4 presents the results. The last section includes a discussion and the conclusion of the paper. The results show that the process of learning occurs first within projects and then among projects. During the first stage, the project structure gains legitimacy in the organization. Then, team members deploy the new practices, particularly concerning time pacing, and finally, synchronization within projects and the external environment is enhanced.

2. Theoretical background

2.1. Innovation projects and temporality

Most works on technology innovation focus on the development of a single innovation, although in certain highly dynamic domains, the innovation paths are formed by several innovation trajectories, which sometimes overlap or go in different directions (Boland et al., 2007). Innovation streams are characterized by both the exploitation of current knowledge and the exploration of new futures (Tushman et al., 2010). Companies need to enhance the development of these streams to both shape technological change in their market and sustain competitive advantages (Tushman et al., 1997). Thus, they need to develop an ability to address the strategic challenges of managing different innovation types both consecutively and successively (Gupta et al., 2006; Bodwell and Chermack, 2010).

Those activities can be performed in projects. As projects are temporary structures that are oriented towards a specific objective, they are particularly helpful in exploring or exploiting knowledge to be applied in a particular context (Sydow and Staber, 2002; Grabher, 2004). Projects assemble people with a diversity of profiles and past experiences. Thus, projects provide diversity and enhance the development of new activities (Hargadon and Sutton, 1997; Fleming et al., 2007). Moreover, project members move from one project to another and cross-pollinate a company's knowledge base (Takeuchi and Nonaka, 1986; DeFillippi and Arthur, 1998) and exploit previously generated knowledge. Thus, during innovation streams, projects are performed simultaneously and are interrelated with continuous flows of new innovations (Eisenhardt and Brown, 1998), which is called synchronization (Halbesleben et al., 2003).

The temporality of projects affects how people interact in a team and organize their work (McGrath, 1991; Hernes et al., 2013). In this research, we particularly focus on the capacity of the organization and individuals to pace innovations, focus simultaneously on different timeframes and build ties between those timeframes (Brown and Eisenhardt, 1997). Time frames relate to the project teams' 'anticipation of the termination of their project that is more or less imminent' (Janowicz-Panjaitan et al., 2009). Orlikowski and Yates (2002) note that in most research, time is either conceived as an objective measure, which exists independent of human actions, or as socially constructed by human action. Time has a subjective capacity (Ancona et al., 2001, Bakker et al., 2013). Thus, timeframes relate to the fact that time is experienced by individuals and play a major role in how people become involved in projects and learn from them. Teams that perceive a project as a short-term engagement, after which their relationships with other team members will be dismantled, focus more on the immediate present (Bakker et al., 2013), which may impede the further diffusion of newly created knowledge (Grabher, 2004) and the unfolding of innovation streams.

Time frames relate to projects in isolation. However, innovation projects are embedded in larger social aggregates (McGrath, 1991), and moreover, certain organizations schedule product innovations at regular time intervals (Gersick, 1994; Brown and Eisenhardt, 1997). When individuals are involved in a continuous flow of projects, as in innovation streams, they perceive that their collaboration with other team members is likely to recur in the future, and they develop long-term relationships and a long-term orientation (Cattani et al., 2011). Repeated collaborations with similar others favours knowledge dissemination but would constrain the innovation stream regeneration process (Granovetter, 1973). The transition between long-term and short-term orientations needs to be managed at both the individual and team levels. Thus, we also focus on the synchronization of transitions within projects to provide a tempo for change. Synchronization also occurs between the project group and "external events" (McGrath, 1991). Those synchronizations are keys to time-pacing innovations. Time pacing allows for the coordination of innovation activities (Dougherty et al., 2013). Brown and Eisenhardt (1997) demonstrate that the ability of managers to link current product development to future development and to synchronize transition between projects determines the ability of the organization to generate a continuous flow of innovations.

Several studies, which link temporality to projects, have been performed that consider stand-alone projects in which people do not expect to collaborate on other projects in the future (McGrath, 1991). However, projects should also be understood in the context of the more permanent organizational structures in which they are embedded (Grabher, 2004; Schwab and Miner, 2008; Cattani et al., 2011; Manning and Sydow, 2011). Innovation streams provide a particular context, as groups have shared pasts and can expect to have shared futures. Individuals can also interact on several projects at the same