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Team learning in IT implementation projects: Antecedents and consequences

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ABSTRACT

This study investigates the antecedents and consequences of team learning, which is composed of information acquisition, dissemination, and implementation, in information technology (IT) implementation projects. By investigating 129 IT implementation project teams, we found that (1) information acquisition and information dissemination have a positive impact on project outcomes, such as speed-to-users, lower implementation cost, and operational effectiveness, and (2) team behavior and enabler variables, such as teamwork, team communication, interpersonal trust between team members, team commitment, and senior manager support, positively influence team learning. We also found that team anxiety moderates the relationship between team learning and project outcomes.

1. Introduction

Team learning is a critical process in developing new products and services quickly and effectively (Edmondson & Nembhard, 2009; Lynn, Skov, & Abel, 1999). Thus, researchers have paid significant attention to the concept of team learning, as reflected in the new product development (NPD) project literature. In addition to its influence on NPD projects, team learning is also important for process innovation/implementation projects in general (Adamides & Karacapilidis, 2006), and information technology (IT) implementation projects in particular (Kim, Pan, & Pan, 2007; Scott & Vessey, 2000). IT implementation projects, such as computer and software applications, are complex and relatively more systemic in the sense that they are more interrelated with other systems within the organization and require relatively more tacit and hands-on experience (Gopalakrishnan, Bierly, & Kessler, 1999). Accordingly, this complex nature of projects requires effective team learning to ensure that project team members acquire information, employ diverse information/knowledge, and incorporate new information into the collective understanding for solving technical, user, and process-related problems during projects (Plaza & Turetken, 2009; Steel, Dubelaar, & Ewing, 2013).

Nevertheless, most research on learning in IT implementation projects has focused on experience-based learning, or the "lessons learned"' approach (Bondarouk, 2006). Thus, they have studied how learning curve theory can inform better management of IT implementation projects (Plaza, Ngwenyama, & Rohlf, 2010), rather than learning processes themselves. Also, the research has emphasized organization-level learning, rather than within cross-functional team-level learning (Bondarouk, 2006; Harrington & Guimaraes, 2005; Ke & Wei, 2008).

Furthermore, few empirical studies on the antecedents and consequences of team learning in the IT implementation project context exist (Beck, Jiang, & Klein, 2006; Edmondson, Bohmer, & Pisano, 2001). Specifically, while past studies have investigated the consequences or outcomes of IT implementation projects, such as payback, reliability, enhanced competitive advantage, user satisfaction, and ease of use (Bondarouk & Ruel, 2008; Dhillon, 2005; Harrington & Guimaraes, 2005), we know less about the impact of the variables of most interest to project managers, such as implementation cost, speed (i.e., speed-to-users), and operational effectiveness on team learning, as Aloini, Dulmin, and Mininno (2007) suggested. Indeed, most IT implementation projects come in over time and over budget, resulting in significant financial and strategic consequences (Plaza et al., 2010). Plaza and Turetken (2009) also argued that focusing on cost, speed, and effectiveness is critical for IT implementation projects, where 18% of projects are prematurely canceled and 53% exceed their cost, schedule, and scope constraints.

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In addition to the consequences of team learning, the literature presents little about the antecedents of team learning. Here, by using McDonough's (2000) study,[1] we selected the factors related to team behaviors and enablers, such as teamwork, team communication and commitment, management support, and trust among team members, as the antecedents of team learning. Although previous studies have investigated the role of these variables, including management support (Ravichandran & Rai, 2000), within-team communication and commitment (Reich & Benbasat, 2000), teamwork (Shin & Edington, 2007), and trust among people (Bondarouk & Ruel, 2008), on IT implementation success, they specifically have not linked them to the team learning process.

Finally, because IT implementation project teams work in uncertain conditions (e.g., there is uncertainty about how the new system will work and how the information contained in it will be used) (Beck et al., 2006), team members generally experience stress in general and *anxiety* in particular (Sauer & Reich, 2009), which manifests itself as the fear of social situations where team members perceive themselves to be vulnerable to negative evaluations of others (Akgün, Byrne, Lynn, & Keskin, 2007). The NPD literature also indicates that anxiety is embedded in most projects and can be expected to influence the effectiveness of decision-making and learning on team performance outcomes (Dayan & Di Benedetto, 2011). For example, Clarke (2010) suggested that anxiety frames the context for learning and performance. Neverthless, we know less about how team anxiety influences the relationships between the team learning process and project outcome in the IT implementation project context, which warants an empirical investigation.

Therefore, the aim of this study, as shown in Fig. 1, is to investigate (1) the impact of the team learning process on project outcomes, such as implementation cost, speed-to-users, and operational effectiveness, (2) which team behavior characteristics and enablers can be leveraged to improve team learning, and (3) the moderating role of team anxiety between team learning and project outcome.

2. Process innovation and team learning

In general, process innovation is defined as "new elements introduced into an organization's production or service operations to produce a product or render a service" (Damanpour & Gopalakrishnan, 2001, p. 48). In this study, we viewed process innovation as a method that uses/implements IT to overhaul business processes and thereby attain major business goals (Al-Mashari & Zairi, 2000). IT implementations encompass computers and software applications to automate organizational processes and improve organizational efficiency and effectiveness (Newell, Huang, Galliers, & Pan, 2003; Teng, Grover, & Fiedler, 1994). For example, hardware technologies such as local area networks (LANs) and groupware improve collaboration among personnel of different functional units in their efforts to accomplish a common business process. In addition, software applications, such as expert systems, ERP, and databases, can provide information on current and future capabilities of technology, human resources, and organizational change (Attaran, 2004). Here, process innovation through IT applications (Teng et al., 1994) requires project teams that are composed of members with different functional backgrounds (Puck, Rygl, & Kittler, 2006). In fact, the size and complexity of business processes and the requirement for multiple skills drive most firms to use IT implementation teams, as it is not possible for an individual to understand the whole process or control all the resources that are necessary to deal with the problem at hand (Teng et al., 1994). While using teams for IT implementation projects is useful, the learning within those teams becomes critical for the success of the projects.

The concept of team learning has been defined differently across studies. Learning, for example, has been described as a change in behavior resulting from experience or an outcome (Horton & Dewar, 2005). Ellis et al. (2003) defined team learning as a relatively permanent change in the team's collective level of knowledge and skill produced by the shared experience of the team members. On the other hand, learning does not always lead to a change in a team's overall performance and behavior. Team learning is also viewed as a process (Tansley & Newell, 2007), such that learning activities are carried out by team members through which the team obtains and processes information (Woerkom & Croon, 2009). It is through this manageable process that the shared means for interpreting complex project activities are formed, transformed, and transmitted (Tansley & Newell, 2007). In this respect, consistent with Tansley and Newell (2007) and Woerkom and Croon (2009), we have focused on the information processing view of team learning in this study, which involves information acquisition, dissemination, and implementation practices.

Information acquisition refers to the gathering of project-related internal and external data and information (Akgün, Lynn, & Reilly, 2002). During this acquisition process, team members have the chance to learn the basic tenets of each others' disciplines (Edmondson & Nembhard, 2009) as team members will share their recognition of specification-related parts of the process that are not so explicit to the others. Also, as IT applications cannot be implemented independent of their environment, team members collect information from their external environment specifically about successful IT implementation samples from the related industry and try to make sense and benchmark these samples to stimulate collective learning (Heine, Grover, & Malhotra, 2003).

Information dissemination is the transfer and sharing of information throughout the teams by formal and informal means (Akgün et al., 2002). Through information dissemination, people combine information, insights, and ideas and capture a clear understanding of the underpinning assumptions of the system as well as the environment of the firm. For instance, IT experts need to know more about the business processes and business process experts need to leverage their knowledge of the IT systems (Vandaie, 2008). This way, teams can determine the extent to which organizational processes must be re-designed to fit the new IT application or hardware.

Information implementation refers to the use of information to solve problems during the IT implementation process (Akgün et al., 2002). Detecting and correcting errors through experience exchange between team members, as well as coordination of skills and knowledge among team members, will facilitate the team learning process. For instance, after an IT application is prototyped and implemented through a pilot test, team members will identify problems that are potential opportunities for betterment and suggest improvements. Also, all members of a team can benefit when solving a problem that requires a key insight or perspective to advance once the solution is discovered (Dew & Hearn, 2009).

Having established the characteristics of the team learning process, we will now develop arguments regarding the antecedents

[1] By analyzing the responses of 112 new product development professionals regarding how to achieve successful teams, McDonough (2000) identifed a number of frequently mentioned success factors and divided them into three categories: stage setters (e.g., project goals, empowerment, human resources, creating a productive climate), team behaviors (e.g., commitment, trust/respect, teamwork, communication), and enablers (e.g., management support) to avoid random use of those factors. We use the team behavior and enabler variables in this study. The rationale is that unlike stage setting elements, which are put in place at the outset of a project, team behavior and enabler-related factors show the assignment and management of personnel within the implementation process and the extent to which they match with project objectives, as well as the coordination of people involved in the learning process.