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Designing teams for speedy product development: The moderating effect of technological complexity

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Abstract

Findings from this study suggest that there is no one best team for speedy product development, especially not for projects of varying levels of technological complexity. Based on findings from 183 new product projects, this study indicates that managers tailor development teams to the degree of technological complexity of the project. Results show that technologically complex projects are sped up by development teams with individuals assigned full-time to the project, and working in close proximity. Alternatively, for technologically simple projects, findings suggest that managers assign part-time experienced members to projects, and maintain the same leader and members on the team throughout the development. Functional diversity has an inverted U-shaped relationship with innovation speed for both technologically complex and simple projects. Still, for the first part of the curve, functional diversity has a greater positive impact on the speed of technologically complex products.

Keywords: New product development teams; Team design factors; Technological complexity; Innovation speed

1. Introduction

Rapid development of new products is critical to the competitive advantage of most corporations. One factor to be associated with faster innovation speed is the use of cross-functional teams. Increasingly, organizations are using cross-functional teams to improve the speed of their new product development efforts (Griffin, 2002). Yet, despite their growing use, results of new product development teams' endeavors have been mixed (McDonough, 2000). One of the key reasons is that managing product development teams is not easy. In implementing development teams, managers face many challenges and questions.

A few researchers have begun to suggest that a universal approach to the design of new product development teams is not always effective (Clift and Vandenbosch, 1999; Kessler and Chakrabarti, 1999). As observed by McDonough (1993), the type of technological work that is being undertaken on a project affects what team members' characteristics are important in order to speed up the development process. Because only very few studies have been conducted, there is still much to be learned about how to build teams so as to have a positive impact on the speed of projects of varying levels of technological complexity (McDonough, 2000). The study presented here attempts to fill this research gap. Specifically, the study investigates the moderating influence of the technological complexity on the effect of several team design factors on innovation speed. The relevance of this study comes from the fact that it focuses on understanding factors that affect an important underlying explanation for new product success and profitability (i.e. speed to market). Moreover, because the study considers variables that can be influenced by managers, its findings provide useful recommendations for enhancing innovation speed and, in turn, improving success and profitability.

2. Theoretical model and propositions

The conceptual model presented in Fig. 1 outlines the moderating effect of technological complexity on the effect of various team design factors on innovation speed. Specifically, the current study focuses on two types of design factors: characteristics of the people assigned to the development team (staff-related factors), and decisions with regard to the way the

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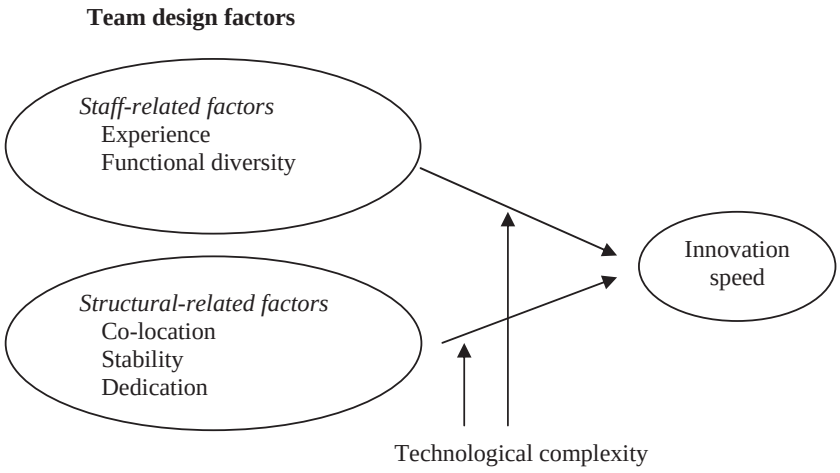

Fig. 1. Conceptual model.

team is put together or how it works together (structural-related factors). Staff-related factors comprise the degree of representativeness of internal and external interest groups on project teams, and the relative experience of members assigned to work on projects. Structural-related factors include team's co-location, team's dedication, and team's stability through the development process. We defined innovation speed as the pace of activities between idea conception and commercialization (Kessler and Bierly, 2002).

According to Wang and Tunzelmann (2000), complexity in organizations can be assessed in terms of the dimensions of 'depth' and 'breadth'. Complexity in 'depth' refers to the novelty and sophistication of a subject, whereas complexity in 'breadth' refers to the range of areas that has to be investigated to develop a particular subject. In the present article, technological complexity is defined in terms of depth, and relates to the technological newness and difficulty of the development project. We suggest that projects can be rather technologically simple or quite technologically complex. Technologically simple projects are those that apply mature technologies, and for which the understanding of the technology is high. Technologically complex projects are those that involve emerging or new technologies and for which the understanding of the technology is low. Because of the lower technological knowledge, technologically complex projects are likely to face more design challenges, and greater difficulties in production of the final design than technologically simple projects. Our term *technological complexity* is similar to what some authors have termed *type of work undertaken on a project* (McDonough, 1993), *technical content* (LaBahn et al., 1996), and *product complexity* (Sarin and McDermott, 2003).

2.1. Staff-related factors

2.1.1. Functional diversity

Team functional diversity refers to the number of functional areas as well as external stakeholders represented on the team. The literature suggests highly diverse teams decrease development time by increasing goal congruence among the functional groups, bringing more creative potential to problem solving, and ensuring the availability of crucial input (Karagozoglu and Brown, 1993; Sethi et al., 2001). Zirger and Hartley (1996) found that each additional function included on a product development team subtracted 0.4 months from development time. Functional diversity, however, may also increase cycle time. It has been suggested that highly diverse groups find it difficult to develop a shared purpose and an effective group process and hence, fall down on implementation. Ancona and Caldwell (1992) report a negative relationship between functional diversity and adherence to schedules. Other studies have found a lack of association between functional diversity and innovation speed (Kessler and Chakrabarti, 1999; Sarin and McDermott, 2003). To address and reconcile these perspectives, this study suggests an inverted U-shaped curvilinear relationship between functional diversity and innovation speed. As functional diversity increases from a low to a moderate level, it enhances speed. However, when functional diversity goes beyond a moderate level, it has a negative effect on innovation speed.

It is argued that increased technological complexity increases the need for functional diversity. When dealing with technological complex projects, because team members have fewer relevant experiences to draw upon, they perceive their tasks to be more challenging and depend more heavily on other functional specialists for the expertise, information and resources needed to arrive at a successful solution (Olson et al., 1995). Findings from Clift and Vandenbosch (1999) showed that the number of stakeholders contributing directly to the project was higher among short-cycle complex projects than among short-cycle simple projects. Short-cycle simple project teams were leaner, representing key functional areas only. The preceding discussion suggests that the positive effect of functional diversity on innovation speed will be stronger for technologically complex projects. Taken together, we propose:

H1a. The relationship between innovation speed and functional diversity is an inverted curvilinear U-shaped function.