



Cross-functional integration as a knowledge transformation mechanism: Implications for new product development

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ABSTRACT

The importance of cross-functional integration (CFI) teams involving workers with multiple forms of functional expertise to work on new product development cannot be overemphasized. CFI is an organic structure and it allows the team members' tacit knowledge embedded in individuals to be realized in the new product development team's collective knowledge – a holistic appreciation and understanding about how to achieve new product development goals. Specifically, despite the pivotal role of CFI and knowledge appreciation in new product development teams, scholars appear to have overlooked the integration of individual level factors, team level factors, individual tacit knowledge, and group collective knowledge within the context of achieving the new product development objectives. Adopting knowledge, CFI, and socialization theories, we propose a conceptual framework that stipulates that the factors at the team level (*goal congruence, task cohesion, interpersonal cohesion, and transformational leadership*) and the qualification of team members (*common knowledge, functional expertise, and their positions in the network*) influence the effectiveness of tacit-to-collective knowledge transformation.

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1. Introduction

The integration of diverse disciplines or cross-functional integration (“CFI”) to develop new products has attracted much interest from scholars and has become popular among many organizations (Adler, 1995; Brown & Eisenhardt, 1995). CFI is defined as “the magnitude of interaction and communication, the level of information sharing, the degree of coordination, and the extent of joint involvement across functions in specific new product development tasks” (Song & Montoya-Weiss, 2001, p. 65; see also Clark & Fujimoto, 1990, 1991; Wheelwright & Clark, 1992; Song et al., 2000).³ CFI facilitates communications, interaction, information sharing, coordination, and collaboration between functions in new product development (Song & Montoya-

Weiss, 2001). This organic structure provides a collaborative and interactive forum for different functions within a firm (Kahn, 1996).

Review of the literature shows that the success of many new product development tasks depends upon the interaction among a firm's different functional areas (Cooper, 2001). The latter's practical effect in the context of capabilities of CFI has been reported at several new product development best-practice companies (see Di Benedetto, 1999; Griffin, 1997). A recent quantitative literature review of the CFI- new product development success relationship during the past two decades appears to corroborate CFI's benefits over its costs (Troy, Hirunyawipada, & Paswan, 2008). Moreover, the impact of CFI on new product development success has been emphasized in several studies (see Table 1) leading to at least three CFI research streams emerging. These include (1) CFI impacts on new product development (e.g., Di Benedetto, 1999; Im & Workman, 2004; Li & Calantone, 1998, etc.), (2) influences of some relevant factors on CFI effectiveness (e.g., Leenders & Wierenga, 2002; Song, Montoya-Weiss, & Schmidt, 1997, etc.), and (3) impacts of functional types and development phases on CFI effectiveness (e.g., Gomes, Weerd-Nederhof, Pearson & Cunha, 2003; Song et al., 1998).

In broad terms, while CFI is considered a practical arrangement of task integration and communication among functions assigned to new product development, the success of new products is not only enhanced by employing CFI but also by how much knowledge is actually integrated and transformed to usable knowledge in this setting (De Luca & Atuahene-Gima, 2007; Madhavan & Grover, 1998). CFI can enhance the integration of diverse functional knowledge (e.g., technology, marketing), and this

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³ Song & Montoya-Weiss (2001) view a CFI team as the extent to which diverse functions become integrated under a specific new product development task. CFI in a project team is determined based on its magnitude rather than a static form of integration (e.g., Clark & Wheelwright's (1992, p.11-14) lightweight and heavyweight teams). They consider CFI team as a dynamic form which provides a greater chance of construct operationalization and theory testing. This paper is positioned to serve as theory testing platform.

Table 1
Empirical Studies of Cross-Functional Integration – New Product Performance Relationship.

CFI Research	Author(s)	Findings	Samples/Industries	Countries
CFI impacts on new product performance	Di Benedetto (1999)	Getting CFI teams involved in new product development activities and making key decisions leads to the success of new product launches.	PDMA members ^a	US
	Im and Workman (2004)	CFI enhances the meaningfulness of marketing program and new products.	High tech	US
	Kandemir, Calantone, and Garcia (2006)	CFI team significantly influence the success of new product development.	Biochemistry	Canada, Belgium, Germany, UK, & US,
	Li and Calantone (1998)	Marketing and R&D integration has a significant impact on new product advantages.	Software	US
	Nakata, Im, Park, and Ha (2006)	CFI is antecedent to new product advantages.	Manufacturing	Korea ^b
	Parthasarthy and Hammond (2002)	R&D spending (relation to sales) does not directly lead to the number of new products developed and marketed. This relationship is moderated by CFI.	Medical devices	na
	Sherman, Souder, and Jossen (2000)	Marketing-R&D integration leads to the reduction of new product development cycle time.	High tech	US
	Sherman et al. (2005)	Marketing-R&D integration together with effective recording and efficient retrieval of information from past projects help improve new product development process and outcome.	High tech	na
	Song and Parry (1997)	CFI leads to proficiency in several stages in new product development (ideation, development, market testing, and commercialization stages)	Various	Japan
	Souder, Sherman, and Davies-Cooper (1998)	R&D and marketing integration shows positive effect on new product development effectiveness.	High tech	UK & US
Influences of relevant factors (e.g., context, organization, team, and individuals) on CFI effectiveness	Leenders and Wierenga (2002)	Information and communication technology increase the effectiveness of CFI.	Pharmaceutical	na
	Song et al. (1997)	Firms' facilitating factors exert strong moderating impact on CFI- new product development performance relationship.	High tech	Mexico
	Song and Montoya-Weiss (2001)	CFI differentially impacts on new product development performance under different conditions of perceived technology uncertainty.	Various	Japan
	Song and Xie (2000)	National culture exerts important effect on the relationship between CFI and new product development performance.	Various	Japan & US
Impacts of functional types and development phases on CFI effectiveness	Gomes et al. (2003)	CFI in the initial phases of new product development significantly influences end product quality. CFI in the later phases significantly affects the time to market.	Various	Netherlands & UK
	Song et al. (1998)	Not all functions should be integrated in all new product development phases. Some specific functions should be integrated during specific phases of new product development.	Various	US

^a PDMA: Product Development and Management Association.

^b Study was conducted in Korean and Japan but the significant CFI-new product advantages relationship was found only among Korean samples.

integration tends to incorporate essential product attributes (Marsh & Stock, 2006; see also Clark & Fujimoto, 1991; Cooper & Kleinschmidt, 1986; Souder, 1987). Incidentally, what seems to be apparent is that most previous studies tend to focus on the sharing of information rather than attempt to articulate CFI as a knowledge transformation tool.

Knowledge differs from information. Information is a flow of messages while knowledge is the information embedded with commitment and belief of its holder who can process, make sense of, and use information (Machlup, 1983; Nonaka, 1994). In addition, in view of the fact that new product development involves creation, acquisition, dissemination, and utilization of new knowledge (Calantone, Cavusgil, & Zhao, 2002; Damanpour, 1991; Johnson, Meyer, Berkowitz, Ethington, & Miller, 1997; Verona, 1999), treating CFI as information sharing is tantamount to providing limited insight. Rather, the implementation of CFI should aim at the transformation of knowledge (e.g., Madhavan & Grover, 1998) for the benefit of new product development.

The paucity of studies geared toward knowledge transformation in CFI (see Table 1) leaves important research questions unanswered. These include (1) how individual team members' knowledge is disseminated and transformed to CFI team knowledge, (2) how knowledge from different disciplines is fully harnessed using CFI team, (3) which type of knowledge is more effective for the success of product development, and finally, (4) which factors can enhance the knowledge transformation in a

CFI team. The existence of these questions has given impetus for this paper. Our primary aim is to develop a conceptual framework of knowledge transformation in CFI and then suggest how this knowledge could be effectively exploited.

In this article, we review the literature on knowledge sharing and socialization as the important facets of cross-functional integration in new product development. We particularly focus on CFI at the team level in which most new product development activities occur (e.g., Brown & Eisenhardt, 1995). We look at CFI as a dynamic configuration facilitating the transformation of knowledge necessary for new product development (e.g., Adams, Day, & Dougherty, 1998). Thus, by focusing on knowledge transformation, this paper contributes to the marketing literature by providing insights concerning the factors that influence the effectiveness of knowledge management in a new product development team. Additionally, we explicate the criteria for CFI team building and the CFI team management approach to achieve the successful knowledge transformation. We assert that our proposed conceptual framework could serve as theoretical platform for future empirical research.

2. Knowledge in Cross-Functional Integration Team

Knowledge embedded in an individual is multidimensional and includes *explicit knowledge* – knowledge that can be laid out in

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