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# Is more always better? An exploration of the differential effects of functional integration on performance in new product development

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## Abstract

The objective of this paper is to explore the relationship between performance in new product development (hereinafter NPD) and functional integration under different conditions of project uncertainty. Functional integration is conceived as a two-dimensional concept, encompassing a behavioural — collaboration — and a structural — interaction — dimension.

This study is based on 92 questionnaires looking at NPD activities in more than 40 British and Dutch companies from various industrial sectors. The results suggest that the nature of the relationship between integration and performance is contingent upon the project stage and the degree of novelty in the new product. Integration in the initial stages of the project assumes a prominent role in the quality of the end product, whereas in later stages it is more associated with time to market than with costs and end product quality. Results further show that the dimension collaboration of integration may be more relevant under circumstances of high new product innovativeness than when minor variations are introduced in a new product. The paper ends with a discussion of the use of universal approaches to NPD management.

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## 1. Introduction

Numerous studies have shown that functional integration is a critical aspect of today's new product development (NPD) activities (Gupta et al. 1985, 1986; Souder and Moenaert, 1992; Song et al., 1997). As far back as 1970, Allen observes that the frequency, the structure of communication networks, and the nature of communicational mechanisms differ sharply between low and high performers in R&D organisations (Allen, 1970). More recently, Calantone et al. (1995) reviewed 500 articles and books on NPD, innovation, and general management, and suggest that the quality of the market-

ing-R&D interface is one of the current concerns in NPD research. Also in Europe the interface management is regarded as a very important issue for current research (Brockoff and Pearson, 2000). Similarly, Griffin and Hauser (1996) elucidate that communication between marketing and R&D is related to success, regardless of the focus on services or products, and on consumer or industrial markets. This relationship is especially critical when the degree of uncertainty in the environment is high.

The central question raised by research on integration is that NPD is a process that requires the capability to obtain, process and interpret large amounts of market, technical, financial and other information, in order to develop product ideas and evaluate their technical soundness, manufacturability and economic feasibility. This requires organisations and individuals to be able to overcome internal differences and barriers built during the process of differentiation (Lawrence and Lorsch, 1967; Dougherty, 1992; Griffin and Hauser, 1996), and implement an NPD process based on collaboration of structurally separated, yet interdependent, functional units.

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Conceiving of the innovation process this way means that along with diversity of information and tasks to be performed, there is also diversity of behaviours and attitudes, as projects usually require the contribution of many people with different roles in the process. The problem of integrating tasks and activities becomes as well one of integrating attitudes and behaviours.

The objective of the present paper is to explore the relationship between performance in NPD and integration of tasks and activities, on one hand, and of behaviours, on the other. Furthermore, it aims to explore the nature of this relationship under different conditions of project uncertainty.

Previous research has examined the bi-dimensional nature of functional integration (e.g. Kahn, 1996), but this has been done at a departmental level. This paper complements existing literature by focusing on the marketing–R&D integration at the project level of analysis. It starts by reviewing definitions of integration and the effect of integration practices on performance. It then presents the method and results of the empirical study and it concludes with discussion and implications for managers and researchers involved in NPD activities.

## 2. Literature review

The concept of integration has been coloured with different and various meanings. Authors have tried to organise this diversity by describing types or levels of integration. For instance, Mintzberg et al. (1996) distinguish between inter-organisational and intra-organisational collaboration. The first one is concerned with collaboration among people and across units, whereas the second includes upstream (e.g. suppliers), downstream (e.g. franchises), Governmental, and lateral (e.g. shared research projects) collaboration. The current work recognises the recent trend in the study of external collaboration, but focuses only on internal integration of functional units or departments in the context of NPD.

Functional integration has also been labelled: interface (e.g. Gupta et al., 1986), cooperation (e.g. Pinto and Pinto, 1990), co-ordination (e.g. Scott, 1998), collaboration (e.g. Jassawalla and Sashittal, 1998), communication (Pearson and Ball, 1993), and cross- or multifunctional teams (e.g. Denison et al., 1996). In the project management literature it is common to find terms such as concurrent or simultaneous engineering, integrated design and engineering, or design for manufacturing (e.g. Hauptman and Hirji, 1999). One common aspect between these terms is that they all stress the crucial interplay between human and organisational systems in NPD activities.

However, they also emphasise distinct aspects of integration. Kahn (1996) suggests that definitions of integration have focused on two attributes: interaction and

collaboration. The first term emphasises the use and exchange of communication between functional units; it represents the structural nature of cross-departmental activities. Collaboration focuses on the collective work between departments; it represents the unstructured, affective nature of interdepartmental relationships. Based on questionnaires to 514 marketing, R&D, and manufacturing managers, Kahn (1996) found that collaboration has a stronger effect on product development and process development performance than interaction.

Hauptman and Hirji (1999) argue that collaboration is needed to overcome the negative attitudes and behaviours that result from differentiation and specialisation and to support cooperation and productive conflict resolution. Co-ordination is also needed to ensure timely sequencing, scheduling and synchronisation of interdependent activities. The operational definitions used by these authors are different from those used by Kahn (1996): integration mechanisms are a measure of status parity, job rotation, and group based rewards; co-ordination mechanisms are a measure of project leader's power and use of communication technologies and tools. Based on questionnaires to 50 cross-national project teams, the authors found that both types of mechanisms support an effective team process and help to overcome the negative effects due to geographic distance and time differences.

Developing grounded theory from a study of 10 high-tech firms, Jassawalla and Sashittal (1998) built on Kahn's work to propose that cross-functional collaboration goes beyond integration. While cross-functional teams and concurrent engineering teams are some of the key structural mechanisms to achieve integration, collaboration reflects specific attributes of team members and their organisational context. Collaborative firms score high in attributes such as transparency (a condition of high awareness achieved as a result of intense communication and exchange of hard-data) and mindfulness (a condition where new product decisions and participants' actions reflect an integrated understanding of the motivations, agendas, and constraints of all participants). Collaboration is attained only after integration has been achieved. The authors did not include performance measures in their study.

Finally, in a case study of implementation of a structured NPD process at Texas Instruments, Bernasco et al. (1999) observed that meetings, committees and telephone calls improve interaction, but not necessarily collaboration. Collaboration is improved by sharing goals, mutual understanding and informal activity. The authors further suggest that managers use interaction for establishing contact and familiarity between departments; collaboration will slowly emerge from this process.

Not all these studies address the relationship between performance and integration; some (e.g. Jassawalla and Sashittal, 1998) explore the integration mechanisms only

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