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# Barriers towards integrated product development — Challenges from a holistic project management perspective

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**Abstract**

The basis for product development in many large industrial companies is a traditional project management method positing non-overlapping phases, independent activities, and a dedicated project team. Research findings indicate that the use of integrated product development methods increases performance compared to traditional methods in contexts of complex problem solving, which are disruptive and non-linear. Even though integrated product development has been the focus of a large number of research studies, these studies mostly focus on identifying success criteria and improving performance, while the requirements for implementing integrated product development remain under-researched. This study takes a more holistic project management perspective and identifies both the challenges and the requirements of successful implementation through an in-depth case study. It was found in a chosen case company that successful implementation requires awareness and skills of integrated product development in senior management, as well as a set of cross-organizational project governance structures.


*Keywords:* Integrated product development; Project management; Project governance; Case study method

## 1. Introduction

Product Development (PD) can be a crucial competitive lever in the global marketplace (Browning and Ramasesh, 2007). In most of today's industrial manufacturing companies, PD is still conducted using traditional project management methods following linear process models (Haque, 2003), even though this is identified as a main cause of low PD performance and market failure (Browning and Ramasesh, 2007). The alternative to traditional PD is found in the well-established research area of Integrated Product Development (IPD), which represents the most dominating paradigm in PD research today (Gerwin and Barrowman, 2002). Integrated Product Development (IPD) is a managerial approach for improving product development performance through managing the overlapping, parallel execution and concurrent workflow of activities (Gerwin and Barrowman, 2002; Naveh, 2005). In contrast to traditional sequential PD, IPD regards overlap and interaction of certain activities as highly important (Duhovnik et al., 2009; Gerwin and Barrowman, 2002; Takeuchi and Nonaka, 1986). Furthermore, IPD research has taken up a more holistic view on managing PD by including several other performance-affecting elements than the PD process itself. These elements include project management (Danilovic and Browning, 2007), project governance (Winch, 2001), organizational structure (Menguc and Auh, 2010), and human resource related aspects (Knudsen, 2007; Lee et al., 2008; Martins and Terblanche, 2003; Ojanen and Hallikas, 2009) among others. IPD environments are characterized by a high degree of uncertainty, whereas traditional PD is based on the assumption of a low uncertainty environment (Buijs, 2003; De Meyer et al., 2002). Uncertainty in PD stems from assumptions about activity dependencies, the need for information exchange within and between domains, and the people needed to solve problems in product development. Managing all of these aspects requires approaches to aid the understanding of multiple domains working simultaneously and in an integrated way (Danilovic and

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Browning, 2007). Therefore, it is argued that a holistic IPD approach is necessary to increase PD performance, since it acknowledges the complexity involved (Takeuchi and Nonaka, 1986; Tracey, 2004) and includes more aspects than the PD process itself (Tan and Tracey, 2007).

Despite prescriptive research on IPD improvement and IPD success, implementation of IPD in companies is still not adequate, and old problems such as poor communication and integration of functions are still rampant (Griffin, 1997; Haque, 2003; Tracey, 2004). There is a need to investigate the current challenges in PD from a holistic viewpoint and to examine why suggestions for performance-enhancing solutions in IPD research are not implemented in practice (Gerwin and Barrowman, 2002; Haque, 2003). Hence, the aim of this research is to investigate the current challenges in integrated product development and which requirements are necessary for the successful implementation of IPD from a holistic viewpoint.

The paper is structured as follows. Firstly, a literature review on PD project management and holistic IPD elements is presented and summarized through a holistic IPD framework in the Theoretical background section. Secondly, the method is described, including an overview of the elements of the in-depth case study. Thirdly, the results are presented, analyzed, and discussed. Finally, suggestions for further research and the concluding remarks of the paper are presented in the Conclusion section.

## 2. Theoretical background

First, it is important to distinguish between the notion of a process model, a process, and a project. In this paper, a process model is regarded as a generic view of the main activities of a project divided into phases, while the process itself is the unique series of interconnected activities involving several stakeholders across functions and organizations. The project is the temporary organization working to accomplish a certain, inter-subjectively determined task (Packendorff, 1995).

In this section follows a literature review on relevant research, including PD project management, PD process models, project governance, the IPD framework, improvement of PD performance, and challenges in PD.

### 2.1. Product development project management

A project is generally understood as a series of tasks with clear goals, limited time and resources, and inherent uncertainties (Nicholas and Steyn, 2012). Projects are viewed as different from permanent business processes, since projects are characterized by discontinuous personal constellations, lack of organizational routines, short-term orientation, and trans-disciplinary integration of internal and external experts (Muller et al., 2005). The traditional understanding of projects being a means to an end is changing towards projects being viewed as temporary organizations (Bakker, 2010; Packendorff, 1995) which is also the underlying understanding of a project in this paper. This change in perception has altered the focus in project management research from evaluation of project tools towards a more holistic approach, including project governance, employee/team interaction, organizational constructs, and human resource management (Packendorff, 1995).

A holistic approach is broadly characterized by the belief that the parts of something are intimately interconnected and explicable only by reference to the whole (Oxford Dictionaries, 2013). A holistic approach to PD including a project management perspective was first proposed in 1986, when Takeuchi and Nonaka called for a change from the linear approach to an integrated approach called the 'rugby approach' (Takeuchi and Nonaka, 1986). They argue that executives must realize that the sequential traditional product development method is insufficient to stay competitive. They derive a list of six characteristics for successful cross-organizational project management in large industrial organizations. These include built-in instability, self-organizing project teams, overlapping development phases, multi-learning, subtle control, and organizational transfer of learning. Takeuchi and Nonaka (1986) argue that the goal is to combine these characteristics to improve internal collaboration on product development, and to increase not only efficiency but also innovativeness and product performance. The holistic approach has since been supported by numerous IPD research studies (Balachandra, 2000; Jayaram and Malhotra, 2010; Knudsen, 2007; Koufteros et al., 2010; Naveh, 2005; Rauniar et al., 2008; Tracey, 2004; Un et al., 2010). Through these studies, researchers have found that successful implementation of IPD is determined by how organizations are able to manage the interplay of a set of IPD characteristics (Danilovic and Browning, 2007; Duhovnik et al., 2009; Gerwin and Barrowman, 2002). For instance, Duhovnik et al. (2009) find three characteristics to be cornerstones in IPD: parallelness of activities, standardization of IPD process, and integration of processes.

#### 2.1.1. Process models

Process models are used as project management tools to frame project tasks (Nicholas and Steyn, 2012). Many different process models exist. However, most are activity-based process models, visualizing the flow of activities during the project period. The two dominant models are the sequential and iterative process models (Browning and Ramasesh, 2007). The sequential model is the most broadly used model within PD project management (Griffin, 1997; Grönlund et al., 2010; Ovesen, 2012). It is often referred to as a stage-gate model, inspired by the stage-gate® model introduced by Cooper in 1979 (Cooper, 1979; Griffin, 1997). Here, project tasks are divided into a number of sequentially dependent stages with well-defined gates in between (Nicholas and Steyn, 2012). The main challenge of the sequential model lies in the rigidity of its nature (Browning and Ramasesh, 2007). Due to the sequential interdependency of the stages, the sequential model does not allow for any tasks to bypass the gates nor to repeat former tasks. Hence, in more uncertain projects, this model is not the most appropriate choice (Cunha and Gomes, 2003; Minderhoud and Fraser, 2005).

In complex problem solving, defining requirements and analyzing the setting are often necessary more than once (Stabell and Fjeldstad, 1998; Zhang, 2013). In these cases, an iterative model is more applicable than a sequential model, conceiving