



# An empirical study on the drivers of management control systems' design in new product development

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## Abstract

New product development has changed significantly over the last decade and management control systems have played an important role in this transformation. This study draws on Galbraith's concept of uncertainty and investigates the relationship between project uncertainty, product strategy and management control systems. It also explores whether these systems help or, as argued in the innovation literature, hinder product development performance. Results support the relevance of the project uncertainty and product strategy to explain the design of management control systems. They also show that better cost and design information has a positive association with performance, but that time information has a negative effect. © 2000 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

New product development has become a central dimension in the strategies of many companies (Brown & Eisenhardt, 1995; Clark & Fujimoto, 1991, p. 6; Grant, 1996; Gupta & Wilemon, 1990; Schilling & Hill, 1998). Current emphasis on first mover advantages, fast product introductions, more demanding product functionality, and shortening life cycles has put greater pressure on new product development (Cooper, 1998). While manufacturing has traditionally been a key repository of core competencies (Hayes & Abernathy, 1980), outperforming competitors in product development has emerged as a relevant source of competitive advantage.

As the process has gained importance, academics as well as practitioners have voiced the importance that management control systems play in coordinating and controlling this process (Cooper & Kleinschmidt, 1987; Zirger & Maidique, 1990). For example, Clark and Fujimoto (1991), in their study of the product development process in the auto industry, argue that:

Today's effective product development organization is characterized not only by creativity and freedom, but also by discipline and control in scheduling, resource use, and product quality (...) The challenge in product development is not so much unilateral pursuit of organic structure and permissive management style as a subtle balance of control and freedom, precision and flexibility, individualism and teamwork (Clark & Fujimoto, p. 169).

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However, this emphasis on a structured product development process contrasts with the traditional view supporting a hands-off approach (Lothian, 1984; McNair & Leibfried, 1992). According to this latter view, successful new products result from devoting adequate resources to the process and avoiding control procedures that could restrict the freedom of engineers. The impact of management control systems in product development performance is, therefore, unclear.

So far, management accounting literature has devoted scant attention to new product development. Most studies have looked at the relevance of management control systems to the broader process of R&D (Abernethy & Brownell, 1997; Birnberg, 1988; Brownell, 1985; Hayes, 1977; Kamm, 1980; Rockness & Shields, 1984, 1988). These studies mainly characterize management control systems as hindering or, at most, being irrelevant in R&D settings. In contrast, Nixon (1998) offers a rich case description of a product development process where financial control plays a significant role.

The importance of new product development requires the allocation of accounting research resources in order to understand the phenomenon. This study seeks to extend this line of inquiry. Using a contingency approach, the study investigates the design of management control systems<sup>1</sup> to understand how companies adapt their systems to the particular characteristics of each product development effort. Moreover, the study brings new evidence to the unsettled issue of the relevance or, alternatively, the lack of relevance of management control systems in product development.

Several characteristics distinguish this study. In contrast to previous research, the unit of analysis is the product development project rather than the R&D project. Because R&D projects are very

heterogeneous (National Science Foundation, 1976), focusing on one type of project increases the power of the research design. The study also goes beyond the narrow definition of management control systems around financial information to add formal but non-financial information (Kaplan, 1983; Banker, Potter & Schroeder, 1993). Moreover, the theoretical foundation of the study leads to an interpretation of management control systems different from previous studies and to a different set of independent variables.

The study focuses on the medical devices industry to keep the external factors as constant as possible and avoid confounding effects that may come from differences across industries. This industry has several attractive characteristics. First, product development is an important process: R&D over sales averages more than 5% for the industry and new products are constantly introduced. Therefore, companies have well thought-out product development processes. Second, the industry is characterized by a lot of technological diversity. Some products — syringes, for example — use well-established technology, while others — CT systems, for example — compete by bringing to the market the latest technology developed. Finally, product strategies are also diverse; even products belonging to the same company and serving the same product-market have to adapt their value proposition to different market segments ranging from price sensitive to performance oriented customers. X-ray products include machines designed to take static images of parts of the body, where price is the key purchasing criteria, as well as sophisticated machines that scan the whole body from different angles, where performance and customer interfaces are the key competitive dimensions.<sup>2</sup> Both diversity in technology and product strategies suggest that companies manage product development differently.

The remainder of this paper is structured as follows. The next section reviews previous research

<sup>1</sup> The term management control systems is used to name the design as well as the use of measurement systems in an organization. Therefore, leaving out other formal procedures that the organization may use to alter behaviour (Flamholtz, 1983; p. 154). An alternative term is management accounting systems. However, management accounting systems are sometimes interpreted as conveying financial information only, while this paper also investigates non-financial measures.

<sup>2</sup> The companies in the study include a wide range of medical products: body-imaging machines, heart devices, orthopedics, surgical instruments, drug delivery products, diagnostic equipment, blood collection, and therapy products.

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