



# Linking operations strategy and product innovation: an empirical study of Spanish ceramic tile producers

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Received 25 January 2002; received in revised form 3 April 2003; accepted 15 January 2004

Available online 12 March 2004

## Abstract

This paper deals with the fit between operations strategy and product innovation. The literature review suggests that product-innovating firms should have specific, competitive priorities with regard to operations. In order to test this proposition, we carried out a survey of the competitive priorities in the Spanish ceramic tile industry. We classified respondents according to the number of new products launched between 1997 and 1999. New products were identified according to the literature-based innovation output indicator. Our results revealed that the more-innovative firms follow a different operations strategy than the less-innovative firms because of the emphasis placed on flexibility and quality capabilities.

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*Keywords:* Operations capability; Product innovation; Fit; LBIO

## 1. Introduction

In today's competitive environment, product innovation is becoming more and more relevant, mainly due to three major trends: intense international competition, fragmented and demanding markets, and diverse and rapidly changing technologies. Firms that market faster and more efficiently by offering products that are adapted to the needs and wants of target customers are in a better position to create a sustainable competitive advantage (Wheelwright and Clark, 1992; Amit and Schoemaker, 1993; Nonaka and Takeuchi, 1995).

Developing and launching of a new product involves many innovation activities (OCDE-EUROSTAT, 1997) and requires coordination between com-

pany functions such as R&D, engineering, operations, and marketing (Takeuchi and Nonaka, 1986; Montoya-Weiss and Calantone, 1994; Nonaka and Takeuchi, 1995). Substantial evidence exists on the important consequences that developing new products has on the production process and on operations management (e.g., Utterback and Abernathy, 1975; Hayes and Wheelwright, 1979a,b; Baldwin and Johnson, 1996). One feature of product innovating companies is the relationship between operations strategy and new product development. Operations strategy must be designed to contribute to corporate strategy (Skinner, 1969). Hence, product innovators' operations strategies should be different from those of non-product innovators.

In this paper, we improve our understanding of the effect of product innovation on operations strategy. Our research objective is to discover whether more-innovative firms formulate different operations strategies from less-innovative firms.

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The paper is structured as follows. Section 2 sets out a theoretical review of studies that deals with the link between new products development and operations strategy. In Section 3, the research and the hypothesis to be tested are detailed. Section 4 outlines the methodological issues affecting the design of the empirical study, which is based on a postal survey of Spanish ceramic tile producers' operations strategy. Subsequently, we implement the literature-based innovation output (LBIO) indicator in order to distinguish two groups: more and less-innovative firms, according to the number of product innovations launched between 1997 and 1999. Finally, results and conclusions are presented in Sections 5 and 6, respectively.

## 2. Theoretical background and hypotheses

Adam and Swamidass (1989) divided research in operations strategy into two broad areas: content and process. Content deals with alternatives, plans, and actions that shape strategic directions. Process deals with the strategy formulation and implementation system. Competitive priorities have been integrated in most operations strategy content models and they have proven to be a useful way of assessing operations strategy regardless the strategy formulation process (Ward et al., 1995). Several terms have been used to designate them: competitive priorities (Hayes and Wheelwright, 1984), manufacturing tasks (Skinner, 1969), objectives (Schroeder et al., 1986), production competences (Cleveland et al., 1989; Vickery, 1991), or manufacturing capabilities (Ferdows and De Meyer, 1990). There is a broad agreement on their composition. Hayes and Wheelwright (1984) summarized these as cost efficiency, quality, delivery and flexibility.

Operations management must vary the stress of each of these objectives in a different way according to the global strategy chosen by the firm (Garvin, 1993). Which of these operations objectives are going to be more important to more-innovative firms?

Utterback and Abernathy (1975) studied the relationship between product innovation, process innovation and the product life cycle. In the light of many historical examples of product innovations, these authors proposed that product innovation is both more frequent and more intense at the beginning of product life cycle. As the new product reaches its dominant

design or normal configuration (McEvily and Chakrabarty, 2002), the product becomes more and more standardised. According to this model, product innovating firms offer new products whose advantage is chiefly based on their performance, and thus on their quality, but not necessarily on their cost. Moreover, at the beginning of the product's life cycle, operations must deal with frequent changes in product design and in production volumes. Therefore, flexibility is required in production processes. To sum up, according to this model, more-innovative firms' operations capability should involve quality and flexibility.

Hayes and Wheelwright (1979a,b) used a biological focus when they developed the product–process matrix. These authors suggested that a manufacturing process has also a life cycle that is closely related to that of the product. At the beginning of the product life cycle, production volume is low, products may require design changes, and therefore, the process needs to be flexible. As the product becomes increasingly accepted by the market, competition grows, production volumes increase, the product is standardised, and the process needs more cost efficiency. The latter is achieved through operations standardisation, mechanisation and automation. Hayes and Wheelwright's product–process matrix suggests that when a product innovation is launched, operations should give priority to flexibility to the detriment of cost efficiency.

According to Stobaugh and Telesio (1983), a change in product strategy alters the production task, and therefore, the operations priorities. These authors outlined three product strategies: (1) technology-driven strategy, (2) marketing-intensive strategy and (3) low cost strategy. They carried out an international survey in order to determine which manufacturing policies are appropriate for each product strategy. Their results revealed that a technology-driven strategy gives priority to flexibility, a marketing-intensive strategy gives priority to quality and delivery, and a low-cost strategy emphasizes cost minimisation.

As Freeman (1982) reports, Schmookler compared innovation activity to two scissor blades, each relating to a separate innovation source: technology push and market pull. Stobaugh and Telesio's technology-based and marketing-intensive strategies correspond to these two sources of innovation. Therefore, we infer from their results that more-innovative firms' capabilities should stress flexibility, quality and delivery.

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