ELSEVIER

Journal of Operations Management 20 (2002) 33–52

JOURNAL OF OPERATIONS MANAGEMENT

www.elsevier.com/locate/dsw

An exploratory study of the effects of supplier relationships on new product development outcomes

Marcos A.M. Primo [a,*], Susan D. Amundson [b,1]

[a] *Department of Supply Chain Management, Arizona State University, P.O. Box 4706, Tempe, AZ 85287-4706, USA*
[b] *Operations and Management Science Department, University of Minnesota, Management and Information Systems/Dec. Sciences Department, Metropolitan State University, 2911 Rankin Road, St. Anthony, MN 55418, USA*

Received 13 November 2000; accepted 19 July 2001

Abstract

The literature about the influence of suppliers on new product development (NPD) project outcomes shows mixed results. Focusing on supplier relationships, especially the concept of supplier involvement, we present a two-stage model explaining supplier relationships and their impacts on product quality, project development time and project cost. The level of supplier involvement on the NPD project is seen as contingent on the level of technical difficulty of the project. This model is tested using secondary survey data.

JEL classification: 17 (Industry studies: manufacturing); O3 (Technological change)

Keywords: New product development; Supplier involvement

1. Introduction

The importance of new product development (NPD) for a company's growth and prosperity is emphasized in the literature (Schoonhoven et al., 1990; Gupta and Wilemon, 1990; Smith and Reinertsen, 1998). Companies have involved suppliers in their NPD processes, achieving fast project times (Clark, 1989; Clark and Fujimoto, 1991), better product quality and lower project costs (McGinnis and Vallopra, 1998; Ragatz et al., 1997). However, other researchers have found that suppliers have little practical influence on the overall project technical success (Hartley et al., 1997a), and even a negative impact on project development time if they delay their activities (King and Penleskey, 1992). Also, in a literature review of product development, Brown and Eisenhardt (1995) show that it is not clear exactly how or when it is appropriate to involve suppliers in the development process.

In this paper, we have three main objectives. First, we analyze findings from previous research about supplier involvement effects on NPD project outcomes. Focusing on the impact of different supplier relationships, we discuss possible reasons for contradictory results found in previous research. Our second objective is to derive a model explaining how supplier relationship variables are related to each other and how they can affect NPD project outcomes. This two-stage model builds on prior research and extends our understanding of the effects of suppliers on NPD. We emphasize that the involvement in NPD projects by suppliers is contingent on the level of technical

* Corresponding author. Tel.: +1-480-965-6044; fax: +1-480-965-8629.
E-mail addresses: marcos.primo@asu.edu (M.A.M. Primo), susanmisterek@mediaone.net (S.D. Amundson).
[1] Tel.: +1-612-787-04432; fax: +1-612-787-04432.

0272-6963/02/$ – see front matter
PII: S0272-6963(01)00080-8

difficulty of the NPD project. Finally, our third objective is to test this model. Using secondary survey data from an NSF-sponsored research project (Flynn et al., 1999, 2000) for the US electronics industry, we empirically observe how supplier relationship variables are interrelated and under what conditions suppliers help or hinder product development projects.

2. Theoretical background

In this section, we will analyze the impact of supplier factors, especially supplier involvement, on NPD project outcomes, and attempt to explain the different results from previous studies. First, we review various studies and their results, determining that both benefits and problems can result from supplier participation in NPD. Then the meaning of the supplier involvement construct is examined in terms of the extent and nature of involvement, as well as the presence of quality control activities. Finally, a contingency approach distinguishing between incremental and breakthrough projects is proposed.

2.1. Effect of suppliers on NPD outcomes

There are many different results in the literature concerning the benefits of suppliers in NPD projects. The general view is that project development times and project costs are reduced due to the supplier participation. Gupta and Souder (1998), conducting a study with a large database of NPD projects, found that companies with short NPD cycle times involve suppliers to a significantly greater extent in their NPD processes than companies with long cycle times. Kessler (2000), in a multi-industry study of NPD projects, found that development costs are lower when there is greater use of external versus internal ideas and technologies, including use of information from suppliers. Clark (1989), analyzing NPD projects in the automotive industry, found that involving suppliers in the development phase has a positive effect on project lead-time and cost.

Some researchers have looked at NPD quality- and performance-related outcomes as a result of supplier involvement. McGinnis and Vallopra (1999) found that purchasing managers believe supplier involvement resulted in better perceived quality of new products, in addition to improvements in time and reduction in costs. Ragatz et al. (1997), analyzing 60 member companies from a benchmarking network, also found positive effects of supplier integration on quality of purchased materials, access to and application of technology, project costs and lead-time.

There are indications of better manufacturability of new products due to suppliers. Wasti and Liker (1997) found that the tendency of designers to consider manufacturability increases with supplier involvement. Swink (1999) found a clearly positive effect of supplier influence on new product manufacturability (NPM). Swink believes that better product manufacturability will lead to better outcomes such as faster development time, lower production unit costs, and better reliability and overall product quality. Based on the aforementioned studies, we found strong evidence that active supplier participation and input in the NPD project are generally believed to be beneficial for NPD project development time, costs, and quality-related outcomes.

There are also indications from previous research that the effects of suppliers on NPD outcomes may be negative or neutral. Hartley et al. (1997a) found that, despite positive buyers' perceptions about supplier contributions to product development, supplier involvement had little practical influence on overall project technical success. They suggest that more research is needed to understand how to use suppliers effectively to improve product development outcomes. King and Penleskey (1992) suggest that vendor monitoring; along with manager selection, attention to physical engineering design, and bureaucratic checkpoints; contribute more to project delays than do most other internal problems such as resource bottlenecks and miscommunications. Hartley et al. (1997b) found, in a multiple industry study, that overall timeliness of the NPD project is dependent on the percentage of supplier's activities completed on time. For these reasons, we infer that poor supplier performance can have a negative effect on project development times.

Another possible negative effect of supplier involvement is the effort required to integrate suppliers into the NPD process. The greater the differentiation among NPD participants, the greater the challenge of integrating those different functions toward achievement of common goals (Susman and Ray, 1999). We can expect that involving suppliers increases that