

# Managing beyond the factory walls: Effects of four types of strategic integration on manufacturing plant performance

Morgan Swink<sup>\*</sup>, Ram Narasimhan, Cynthia Wang

*Department of Marketing and Supply Chain Management, Eli Broad College of Business,  
Michigan State University, East Lansing, MI 48824, United States*

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## Abstract

In this paper we focus on the integration of strategic objectives and process knowledge that a manufacturing factory collects from its external interfaces. Using data from a variety of manufacturing industries, this study examines four different types of strategic integration at the manufacturing plant level. We use a path analytic approach to simultaneously assess the contributions of the various types of integration to manufacturing-based competitive capabilities and business level performance. In addition, we examine the intervening roles that manufacturing-based competitive capabilities play in mediating the relationships between strategic integration and business performance. We find that each type of integration activity has unique benefits and detriments. These findings extend prior studies of manufacturing and supply chain integration by broadening the theory relating to strategic integration. The results also provide implications for manufacturing managers who seek to design integration policies and associated resource deployments.

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## 1. Introduction

Various integration concepts have received attention from operations management researchers in recent years. In this paper we focus on manufacturing strategic integration, the integration of strategic and technical knowledge that a manufacturing factory collects from external interfacing sources. We view strategic integration as a *process*, rather than an outcome. An integration process includes activities that acquire, share, and consolidate strategic knowledge and

information with parties outside the immediate organization. We argue that factories which engage in such activities will outperform their less-integrated peers, because they achieve better alignment of objectives and business processes, coordination, and fit.

Our research takes the perspective that manufacturing is part of an overall value chain of activities, which include product supply and distribution, as well as corporate strategy and technology development activities. Research studies of integration have tended to focus on vertical supply chain activities, technology related activities, or strategy formulation activities (Hayes and Wheelwright, 1984; Hill, 1994; Frohlich and Westbrook, 2001; Rosenzweig et al., 2003; Vickery et al., 2003; Swink and Calantone, 2004). Our study is one of the first to simultaneously examine the relative influences of strategic integration in each of these

<sup>\*</sup> Corresponding author. Tel.: +1 517 353 6381.

*E-mail addresses:* [Swinkm@msu.edu](mailto:Swinkm@msu.edu) (M. Swink),  
[Narasimh@msu.edu](mailto:Narasimh@msu.edu) (R. Narasimhan), [wangcynt@gmail.com](mailto:wangcynt@gmail.com)  
(C. Wang).

areas on manufacturing-based competitive capabilities. Evaluating and comparing a more complete set of integration aspects than has been done in prior studies is important given that manufacturing managers have limited resources and must choose the most effective deployment of these resources. Further, where other researchers have focused on tactical or operational integration of supply chain activities (Frohlich, 2002; Frohlich and Westbrook, 2001; Sahin and Robinson, 2002), we investigate integration of strategic information and knowledge. This focus places our research in the realm of manufacturing strategy.

Like most foregoing manufacturing strategy research, our unit of analysis is the manufacturing plant. Plant level studies are important since optimal deployment of resources must eventually be made at the plant. The findings thus provide extensions to prior manufacturing strategy studies in this stream. The results also provide implications for manufacturing managers who seek to design strategic integration policies and associated resource deployments. For researchers, the study extends existing supply chain integration theories to develop a more comprehensive strategic value chain integration theory.

We use a path analytic approach to simultaneously assess the relative contributions of various types of strategic integration to manufacturing competitive capabilities and business performance. In addition, we examine the intervening roles that manufacturing competitive capabilities play in mediating the relationships between integration and business performance. Prior studies indicate that mediation effects are important, but they have not been tested comprehensively or holistically (Rosenzweig et al., 2003; Vickery et al., 2003). A multivariate approach is important given the typically high correlations among integration activities and among manufacturing competitive capabilities. The multivariate analysis clarifies the unique influences of each integration type on various dimensions of capability and performance, controlling for spurious associations. Furthermore, path analysis affords the ability to test mediation hypotheses directly, rather than inferring them from associations in methods such as regression.

In addition, our study employs measures of practice implementations as reflective indicators of types of strategic integration, rather than simply asking informants “are you integrated?” This approach reduces the threat of common method variance. More importantly, the results suggest how strategic integration might be achieved, as well as what the relative importance of various integration types might be. The sample data for the study are drawn from multiple

manufacturing industries, providing an extension to other studies that have focused on consumer, automotive, or other industries.

The objectives of the study can be summarized in the following research questions:

1. What are the specific effects on performance of various types of strategic integration activities in which manufacturing plants engage?
2. Do strategic integration activities foster manufacturing-based competitive capabilities, or are they mainly direct drivers of business performance?

These questions have been unaddressed in prior research. However, there are substantial related studies that provide a theoretical grounding and basis for comparing our research findings. In the next section, we review these studies and develop the theoretical grounding for our hypotheses.

## 2. Literature review and theoretical model

In this paper we study the influences that integration of strategic information and knowledge from outside the walls of a manufacturing plant has on the development of the plant’s competitive capabilities and business performance. We first describe the theoretical constructs central to our study. This discussion is followed by the development of our theoretical model and related hypotheses.

### 2.1. Types of value chain integration

Porter’s (1985) value chain framework provides a useful theoretical foundation for integration concepts. His discussion of linkages among value-adding activities includes two primary dimensions. First, Porter advocated making *vertical* linkages across supply chain activities including those executed by suppliers and customers. A second dimension of integration involves *horizontal* linkages within a firm, that is, linkages of direct value chain activities (e.g., production) with supporting activities such as corporate strategy and new product development. In the framework illustrated in Fig. 1, we identify four types of strategic integration which exist along these vertical and horizontal dimensions: supplier integration, customer integration, product–process technology integration, and corporate strategy integration. Fig. 1 illustrates how strategic integration activities create information and knowledge flows related to the manufacturing plant. According to this framework, a manufacturing plant’s

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