

# Applied customer knowledge in a manufacturing environment: Flexibility for industrial firms

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Received 9 January 2004; received in revised form 6 October 2004; accepted 30 October 2004

Available online 10 May 2005

## Abstract

Dynamic business markets are forcing B2B marketers to create flexibility in their firms. The present study investigates: (1) made-to-stock (MTS) versus made-to-order (MTO, which is considered more flexible); (2) production technology routineness (with nonroutine considered more flexible); and (3) a marketing-based enabler of flexibility, i.e., applied customer knowledge. SEM analysis shows that applied customer knowledge completely mediates the relationships of both MTO and routineness with financial performance. This delineates two routes to financial performance, beginning with manufacturing-based flexibility constructs and operating through marketing-based applied knowledge. In addition, exploratory analysis of a subsample confirmed empirically that the financial success of mass customization depends on extensive customer knowledge application and low finished goods inventory levels. Managerial implications are discussed, along with ideas for future research.

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*Keywords:* Business-to-business; Knowledge; Performance; Manufacturing strategy; Flexibility

## 1. Introduction

Business-to-business markets (B2B) have become turbulent, even volatile in today's environment. Shortened product life cycles, increased product variety and customization, and escalating customer requirements mean that managers are forced to be alert, learn quickly, and transform ideas promptly into action (Gerwin, 1987; van Hoek, 2001). Windows of opportunity are narrower and more mutable. To deal with dynamic marketing environments, firms must adopt methods of creating strategic and operational flexibility (Gerwin, 1987, 1993). Flexibility pursued as a competitive priority can create a sustainable competitive

advantage (DeToni & Tonchia, 1998; Narain, Yadav, Sarkis, & Cordeiro, 2000). Flexibility in response to demand fluctuations can be key to fending off competition (Yusuf, Adelye, & Sivayoganathan, 2003).

Marketing-based flexibility is designed to cope with dynamic market change (Narain et al., 2000). One approach to marketing-based flexibility is to utilize customer knowledge. Knowledge is the understanding of some phenomenon, created and organized by the flow of information (Nonaka, 1994). "Applied customer knowledge" refers to creating new knowledge based on information from customers, disseminating it, and embodying knowledge in new technologies or products (Nonaka, 1991). Applied customer knowledge is different from marketing orientation. A marketing orientation is an organizational culture and structure that creates the necessary behaviors to attain creation of superior value for buyers: it includes generation and dissemination, as well as responsiveness to marketing intelligence (Kohli & Jaworski, 1990; Narver & Slater, 1990). Applied customer knowledge is concerned with

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creating intangible, knowledge-based assets that are indispensable sources of competitive advantage (Grant, 1996; Teece, 1998). Our focus is on applied customer knowledge about product quality levels, design of products, production plans, and production costs.

Flexibility research is driven by market dynamism, but occurs within a context of a supply chain and in relation to manufacturing strategies (van Hoek, 2001). Manufacturing strategies can range from completely make-to-stock (MTS) to completely make-to-order (MTO). MTS products are based on forecasts of overall customer demand while MTO waits until customer orders are received. Generally, MTO strategies are considered more flexible. We also consider routineness of production technology (e.g., batch versus mass production): more routine production is often viewed as less flexible. We argue that MTO and routineness are independent constructs that do not necessarily follow one from the other.

We hypothesize that MTO and routineness have independent effects on applied customer knowledge as well as on finished goods inventory levels. In turn, applied customer knowledge (an enabler of marketing-based flexibility) and finished goods inventory levels influence financial performance. The resource-based view of the firm argues that differences in performance are attributable to differences in the organizational resources that firms possess, such as knowledge-based assets (Grant, 1991). Performance differences exist between firms because of asymmetries in knowledge (Kogut & Zander, 1992). The theory suggests that rather than direct effects, manufacturing strategy and production technology indirectly influence performance through applied customer knowledge—a knowledge-based asset that firms may possess. The general research question we address is whether applied customer knowledge mediates the relationship between manufacturing strategy and financial performance. Fig. 1 displays our conceptual model.

We also introduce an exploratory component to the research. In today's dynamic markets there is often a need for the simultaneous manufacture of small and large volumes, as well as an ability to shift between producing for mass and niche markets. To remain competitive, a firm should be able to simultaneously manufacture both low and high batch using either MTO or MTS strategies without significant changes in the unit cost of manufacture (Yusuf et al., 2003). The study of various combinations of MTO/MTS strategies and production routineness may provide informa-

tion on different “routes” to performance. In particular, we focus on the mass customization case (characterized by MTO and routine production) and examine the effects of applied customer knowledge and finished goods inventory levels on financial performance in this important subgroup. From a marketing perspective, it is important to understand how marketing-based flexibility (e.g., applied customer knowledge) can positively influence performance in this context.

The paper begins with definitions of the main constructs, followed by the arguments supporting the model hypotheses. After presentation of the main results, selected subgroups are scrutinized. Managerial implications and directions for further research conclude the paper.

## 2. Conceptual foundation: definition of constructs

We begin by defining each of the three major constructs in Fig. 1, i.e., MTS versus MTO manufacturing strategy, production technology routineness, and applied customer knowledge. We show how each of these constructs relates to flexibility.

### 2.1. Manufacturing strategy: MTS versus MTO

Manufacturing strategy is the allocation and coordination of manufacturing resources and activities to support a selected product-process focus aimed at gaining a sustainable advantage (Chase & Aquilano, 1992; Walker, Boyd, & Larréché, 1999). Manufacturing strategies range on a continuum from pure MTS to pure MTO, the basic distinction being the timing of customer orders relative to final assembly. In MTS, final goods are assembled in anticipation of customer orders (Maruchek & McClelland, 1986), and hence demand forecasts are critical in avoiding excessive finished goods inventory. In MTO, manufacturing or assembly is undertaken after the order is received as the product is customized to meet customer preferences (Vickery, Dröge, & Germain, 1999). MTO enables agile responsiveness to customers' demands and thus is a key aspect of manufacturing flexibility (van Hoek, 2001).

Firms use an MTO strategy for a number of reasons (Spring & Dalrymple, 2000). First, MTO creates a competitive entry barrier. Second, MTO is used as a vehicle for learning about new organizational or technological capabilities. Third, an MTO strategy sends symbolic

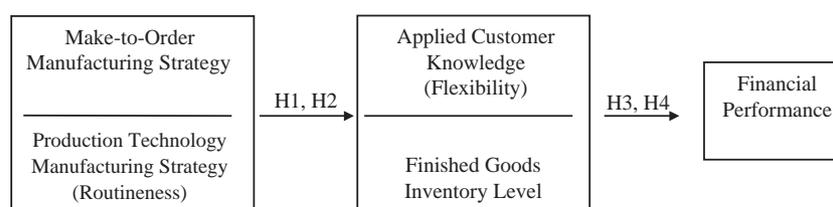


Fig. 1. Research framework and hypotheses.

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