

The production performance benefits from JIT implementation

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Abstract

The intense competition in the current marketplace has forced firms to reexamine their methods of doing business. The US manufacturers have struggled with growing trade deficits and outsourced operations, while strong market competitors have emerged, using superior manufacturing practices in the form of just-in-time (JIT) and continuous process improvement. Although proponents cite the many benefits of JIT adoption, its implementation rate in the US has been relatively conservative. This study uses survey responses from executives at 95 JIT-practicing firms to better understand the benefits that firms have experienced through JIT adoption, and whether a more comprehensive implementation is worthwhile. The research results demonstrate that implementing the quality, continuous improvement, and waste reduction practices embodied in the JIT philosophy can enhance firm competitiveness. JIT implementation improves performance through lower inventory levels, reduced quality costs, and greater customer responsiveness. This study indicates that JIT is a vital manufacturing strategy to build and sustain competitive advantage. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The globalization and intense competitiveness of the current marketplace has forced firms to reexamine their methods of doing business. Despite an abundance of both natural and economic resources, the US manufacturers have struggled with growing trade deficits and outsourced operations. With fewer available natural resources, strong market competitors have emerged, specifically in the Pacific Rim, using superior manufacturing practices in the form of just-in-time (JIT) and continuous process improvement (CPI) (Cammarano, 1996). JIT is a manufacturing philosophy that emphasizes achieving excellence through the

principles of continuous improvement and waste reduction. Some of its purported benefits include higher quality production, lower inventory levels, improved throughput times, and shortened customer response times. In the US, JIT has been both praised and criticized for its effectiveness, accounting, in part, for its relatively conservative adoption rate (Bowman, 1998; Clode, 1993; Milligan, 1999; White et al., 1999). This study has two principal objectives: first, it investigates the benefits received from the implementation of JIT; second, it examines the dependence of these benefits upon the level of commitment in adopting specific JIT practices.

This paper contributes to the JIT literature by providing a better understanding of why firms consider JIT adoption to be beneficial. Improvements resulting from reduced inventory levels are documented in several JIT studies. However, limited empirical evidence

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exists concerning other benefits received from investing in JIT. Most evidence consists of case studies of individual firms or descriptive statistics of small samples (Ellis and Conlon, 1992; Kalagnanam and Lindsay, 1998; Orth et al., 1990; Pandya and Boyd, 1995; Patell, 1987). This study focuses on the survey responses from executives at 95 manufacturing firms that have formally adopted JIT. The level of JIT implementation is measured by responses to Likert-scaled questions and partitioned into low and high levels. One-way analysis of variance (ANOVA) tests are performed to ascertain if there are differences in the perceived benefits of JIT between the low and high adopters.

2. JIT review

JIT is a Japanese-developed manufacturing philosophy that represents “an aesthetic ideal, a natural state of simplicity” in production efficiency (Zipkin, 1991, p. 42). Although precisely defining JIT continues to be perplexing (Mia, 2000; White and Ruch, 1990), JIT production is generally referred to as a manufacturing system for achieving excellence through continuous improvements in productivity and elimination of waste (Crawford and Cox, 1990; Lummus and Duclos-Wilson, 1992; Orth et al., 1990; Suzaki, 1987). A more specific definition is provided by Calvasina et al. (1989, p. 41):

“JIT is a system of production control that seeks to minimize raw materials and WIP inventories; control (eliminate) defects; stabilize production; continuously simplify the production process; and create a flexible, multi-skilled work force.”

According to Schonberger (1987, p. 5), JIT is the “most important productivity enhancing management innovation since the turn of the century.” Gleckman et al. (1994) stated that “JIT has come of age,” and is recognized as a legitimate management philosophy. “The concept of JIT has completed its evolution from a manufacturing technique to a much broader philosophy of improvement” (Vokurka and Davis, 1996, p. 58) that can help the US manufacturers regain and maintain a competitive advantage in the global market (Yasin et al., 1997).

2.1. JIT objectives

JIT looks beyond the short run to the long-term optimization of the entire production/distribution network (Jones, 1991). Successful JIT implementation should accomplish two major objectives: improve quality and control the timeliness of the production and delivery of products (Davy et al., 1992; Monden, 1981; Walleigh, 1986). By concentrating on quality, companies should experience less scrap and rework and more effective communication among departments and employees. In addition, long-term commitments with fewer suppliers should result in fewer inspections. The achievement of these results requires an even production flow of small lot size, schedule stability, product quality, short setup times, preventive maintenance, and efficient process layout (Chapman and Carter, 1990; Foster and Horngren, 1987; Hall and Jackson, 1992).

2.2. JIT implementation benefits

By 1982, only three English-authored publications related to JIT were available (Schonberger, 1982a). Subsequently, growing interest in JIT has led to a proliferation of articles. Field studies of companies that have had success with JIT adoption comprise much of the published research. Most survey studies examining the benefits from JIT adoption have reported only descriptive statistics. The sample sizes are generally quite small because of the difficulty in effectively identifying JIT firms and collecting survey responses. The most consistent benefit from JIT adoption found in the empirical studies is a reduction in inventory levels and/or an increase in inventory turns (Balakrishnan et al., 1996; Billesbach, 1991; Billesbach and Hayen, 1994; Celley et al., 1986; Crawford and Cox, 1990; Droge and Germain, 1998; Gilbert, 1990; Huson and Nanda, 1995; Im and Lee, 1989; Norris et al., 1994; Ockree, 1993).

Some survey studies examining the relationship between JIT practices and firm performance, as measured by productivity, lead-time, and quality, have failed to find a significant relationship (Flynn et al., 1995; Sakakibara et al., 1997; Dean and Snell, 1996). However, both Kim and Takeda (1996) and Nakamura et al. (1998) reported an improvement in several production performance measures subsequent to JIT adoption. In a comparison study of JIT and non-JIT

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