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Organizational modifications to support JIT implementation in manufacturing and service operations

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Abstract

This study investigates JIT implementation practices and performance in manufacturing and service organizations in the US. Literature related to JIT usage and performance in both sectors is reviewed. A field study is then conducted to investigate the actual implementation experiences of a selected group of service and manufacturing users of JIT. Our findings from the literature and the field study are used to develop four research hypotheses that are tested using survey data from 130 manufacturing and 61 service firms. Manufacturing and service firms that had engaged in modifications such as operator and management training and improving linkages with suppliers prior to implementing their JIT systems experienced less implementation problems and achieved higher levels of success than firms that placed less emphasis on these modifications. This paper details and discusses these and other results from our study. In addition, managerial implications of our findings are presented.

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1. Introduction

The implementation and performance of JIT in the US manufacturing sector has been the subject of many investigations. Generally, findings from these studies support the contention that usage of JIT leads to improvements in operational efficiency and in performance. Significantly less research effort has been exerted on examining the usage and impact of JIT in the service sector. There are several reasons for this, foremost among which is the fact that some have questioned and continue to question the applicability of many components of JIT to service operations. Randall J. Benson's 1986 paper entitled "JIT: Not Just for the Factory"

presented at the APICS 29th Annual International Conference represents one of the first serious attempts to report on JIT applications in service operations. Notwithstanding this and other early efforts, many service firms have been reluctant to get on the JIT bandwagon. For example, Duimering and Sajayeni [1] indicated that, up to the time of publication of their article, groups outside the production organization continued to show less enthusiasm for JIT systems. Indeed, it was only in the mid-1990s that many service providers began to embrace some aspects of the JIT philosophy.

In manufacturing, JIT has been credited with many holistic benefits. These benefits include reduced inventory levels; reduced investment in inventory; improved quality of incoming materials; and consistent high-quality products. Some additional benefits of JIT that have been achieved in manufacturing firms are: improved operational efficiency, uniform workstation loads; standardized components; standardized work methods; cooperative relationships with suppliers; closer collaboration with customers, and improved

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customer satisfaction. Despite the delayed start in service applications of JIT, there have already been some success stories which indicate that many of these JIT benefits that have been achieved in manufacturing can be replicated in services, although sometimes in a slightly different form.

The service JIT literature, paltry though it might be, indicates that service providers in the healthcare, retail, distribution and transportation services have achieved some of the JIT benefits that have been attributed to JIT production (see, e.g. [2–5]). Hospitals and medical establishments, such as the Mayo Clinic, that have implemented some aspects of JIT have seen remarkable *reductions in inventory/supplies and improvements in operational efficiency and organizational effectiveness*. Distribution services such as Federal Express and UPS have reaped considerable benefits from *revision and standardization of work methods*.

Recent improvements in *information technology* have also enhanced the ability of services to benefit from JIT systems. For example, bar-code technology and point-of-sale (POS) systems have made it possible to create a *just-in-time replenishment system* between vendors and retailers which *improves customer service*. Wal-Mart utilizes the Wal-Mart Information System that incorporates a Retail Link (bar-coding technology, POS systems, and electronic data interchange (EDI)) and a satellite network to better *manage its inventory*, achieve better demand forecasts and build more *collaborative buyer-supplier relationships*. The introduction of automated teller machine (ATM) has also had a huge impact on improving and expanding banking services and *improving customer service and customer satisfaction*. Airlines and hotels use reservation systems and differential pricing to create *uniform facility loads*. Such successes have influenced many other service-oriented organizations, including government agencies, to adopt some aspects of JIT.

We believe that the increasing number of implementations of many aspects of JIT in the service-sector and the increasing number of JIT success stories from this sector provide a great opportunity to review and compare JIT implementation practices and performance in manufacturing and services. This study seeks to provide answers to the following questions. (1) Do service and manufacturing firms make the same types of operational and organizational modifications to support their JIT implementations? (2) Does the level of effort exerted on these modifications have any impact on firm performance? (3) Is top management involvement critical to the success of JIT efforts in both service and manufacturing organizations? (4) What role should external partners, such as customers, suppliers and consultants play in the JIT implementation process?

This research was conducted in two stages. First, a literature review was performed to harness theoretical and practical information about past JIT implementations in both manufacturing and service facilities in the USA and about their subsequent performance. In the second stage, a two-phase empirical study was performed. In the first

phase, a field study involving extensive interviews of manufacturing and service users of JIT was utilized to obtain more detailed information about actual implementations and about their perceptions of JIT impact on their firm's performance. The results from the field study were particularly important to this research since it provided additional information on JIT implementation and performance in the service sector that was not available in the literature. Based on the information gleaned from the literature review and from our field study, a conceptual framework consisting of four research hypotheses was developed.

In the second phase, a mail-administered survey was used to obtain the information required to test these hypotheses. Details of the development and administration of the field study and survey are provided. The hypothesis test results are presented and discussed. Managerial implications of the findings are also advanced. This study provides the following contributions to the JIT literature:

- (1) It uses information from our field study and survey to report on the actual modifications being enacted by both service and manufacturing firms as they prepare for JIT implementation.
- (2) It proposes measures to assess items such as the effectiveness of JIT implementation, the extent of organizational modifications and other related variables.
- (3) It compares and contrasts JIT practices in manufacturing and service organizations. Such comparisons are rarely found in the JIT literature.

2. Relevant literature

Much has been written regarding the positive strategic influence of JIT on Japanese organizations [6,7]. However, the usefulness of JIT to US organizations is still the subject of great debates. It has been suggested that, in the USA, the JIT experience has been almost a total disaster [8]. Some also indicate that, in the USA, threats such as union strikes against suppliers to JIT producers make JIT environments unpredictable and potentially devastating [9]. However, the preponderance of the evidence from the literature indicates that JIT has, in most instances, had a significant and positive impact on US manufacturing businesses (see e.g. [10–13]).

While the literature on the utilization of JIT in US manufacturing organizations is substantial, the same is not true for service organizations. The experiences of K-mart [14] and Wal-Mart [15] are certainly two of the prime exceptions to this observation. However, there are also some examples of JIT effectiveness in non-retail services. The rising cost of healthcare delivery underscores the need for cost containment in healthcare facilities. One report indicates that about 35% of the budgets of most hospitals and medical establishments are spent on inventories and supplies and in remuneration for the personnel involved in managing this inventory [4]. Therefore, reduction in inventory cost has

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