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# Just in time, total quality management, and supply chain management: understanding their linkages and impact on business performance

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**Abstract**

In recent years, numerous approaches have been proposed to improve operations performance. Three in particular, just in time, supply chain management, and quality management, have received considerable attention. While the three are sometimes viewed and implemented as if they were independent and distinct, they can also be used as three prongs of an integrated operations strategy. This study empirically examines the extent to which just in time, supply chain management, and quality management are correlated, and how they impact business performance. Results demonstrate that at both strategic and operational levels, linkages exist between how just in time, total quality management, and supply chain management are viewed by organizations as part of their operations strategy. Results also indicate that a commitment to quality and an understanding of supply chain dynamics have the greatest effect on performance.


*Keywords:* Just in time; Quality management; Supply chain management; Empirical research

## 1. Introduction

Numerous operations paradigms, initiatives, and practices have emerged in recent years in response to competitive pressures calling for improved product quality, increased responsiveness, and shorter lead times, but at lower cost. Three that have received particular attention in both academic and practitioner circles are just in time (JIT), total quality management (TQM), and supply chain management (SCM). The JIT philosophy advocates the elimination of waste by simplifying production processes. Reductions in setup times, controlling material flows, and emphasizing preventive maintenance are seen as ways by which excess inventories can be reduced or eliminated, and resources utilized more efficiently. The TQM movement calls for developing and implementing a corporate wide culture emphasizing customer focus, continuous improvement, employee empowerment, and data driven decision-making. Aligning product design with customer expectations, and focusing on quality at all stages of development and production processes, are seen as drivers of improved product quality and in turn improved business performance. SCM calls for the integration of buyers' and suppliers' decision-making processes with the goal of improving material flow throughout the supply chain. Effective management of the supply chain is viewed as the driver of reductions in lead times and material costs, and improvements in product quality and responsiveness.

JIT, TQM, and SCM represent alternate approaches to improving the effectiveness and efficiency of an organization's operations function. While differences in their moti-

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vations and objectives have sometimes led to them being presented as being distinct and separate, it is short sighted to view them as being unrelated. Both JIT and SCM seek improvements in quality, the former by way of improvements in production processes, the latter by integrating development and production processes throughout the supply chain. Successful JIT implementation depends on the coordination of production schedules with supplier deliveries, and on high levels of service from suppliers, both in terms of product quality and delivery reliability. This requires the development of close relations with suppliers and the integration of production plans with those of suppliers. It can be surmised that while the three approaches have certain defining characteristics, they represent elements of an integrated operations strategy. Snell and Dean [1] indeed found it hard to distinguish between JIT and TQM since the two have common elements. The concept of an integrated operations strategy incorporating elements of different but complementary manufacturing practices and strategies is not new [2–4]. 'Important strategic potential' exists from the use of integrated management, the adoption of advanced manufacturing technology in conjunction with JIT and quality management methods [5]. 'Streamlined flow of automated value added activities, uninterrupted by moving, storage, or rework' has also been claimed to be consistent with enabling goals of improvement and cost reduction to be achieved simultaneously [1].

While the idea of incorporating elements of different operations paradigms into a unified operations strategy is not without merit, only limited empirical evidence exists of the impact of such a strategy on performance. Flynn et al. [6] demonstrated that JIT and TQM practices are mutually supportive, and that their synergy contributes positively to manufacturing performance. They also found that common infrastructure factors positively influence performance. Nakamura et al. [7] also demonstrated that both JIT and TQM are necessary to improve manufacturing performance, though TQM had a stronger and more consistent impact on performance. In contrast, Dean and Snell [5] showed that while quality management methods affect performance, JIT practices do not. Sakakibara et al. [8] suggested that JIT practices affect performance only by virtue of the strategic, quality focused infrastructure needed to support them. Tan et al. [9] suggested that TQM must be implemented in conjunction with attempts to rationalize the supplier base to achieve benefits in business performance.

The apparent linkages between JIT, TQM, and SCM strategies and practices raise two questions yet to be addressed, namely which specific elements of JIT, TQM, and SCM strategies are consistent with each other, and how do they influence a firm's business performance. The objective of this study is to answer these questions. The remainder of this paper is organized as follows. The next section summarizes the literature on JIT, TQM, and SCM with particular reference to their effect on performance. Details of the survey methodology and statistical analysis are then presented, followed by discussion of the results and their implications.

## 2. Literature review

### 2.1. Just in time

Since its introduction in the English language literature [10] and early articles on its core elements such as setup time reduction, small lot production, the use of kanbans, level production scheduling, and preventive maintenance [3,4,11], numerous studies have examined issues related to the implementation of JIT. These include the relationship of JIT to other manufacturing practices [12,13], vendor and customer relations [14–17], and JIT implementation [18–23]. The impact of JIT strategy on performance, and in particular manufacturing performance, has also been the subject of a number of studies. These have consistently found the use of JIT methods to be consistent with gains in inventory [7,24–27], quality [7,21,25,28], and throughput [6,7,21,25,28,29] performance. Several studies have also found evidence of improved business performance associated with the use of JIT methods. Gains in both financial [24–27,30], and market performance [26,30] have been observed.

### 2.2. Quality management

While the TQM literature base is extensive, until recently, much of it has been descriptive or anecdotal in nature [31] and of little help in guiding the deployment of quality management programs. Not until the late 1980s was an attempt made to identify the underlying constructs of quality management [32]. Within the last several years however, several studies have examined linkages between quality and performance. Anderson et al. [33] identified visionary leadership, internal and external cooperation, process management, and employee fulfillment as key constructs of quality management. Moreover, they demonstrated that these constructs are drivers of customer satisfaction. Similar constructs have been identified in other studies and been shown to positively affect product quality [34,35] and broader measures of manufacturing performance [31,36]. Evidence of the impact of quality management practices on business performance is more limited [37–39]. Wilson and Collier [40] demonstrated that the underlying premise of the Malcolm Baldrige National Quality Award [41] that leadership drives the quality management system, which drives business performance, is valid. Studies have also shown that the MBNQA framework not only provides a valid representation of constructs generally referred to under the label TQM [42], but that the constructs are consistent with those found in other studies [43].