



The impact of manufacturing and supply chain improvement initiatives: A survey comparing make-to-order and make-to-stock firms

Jan Olhager^{a,*}, Daniel I. Prajogo^b

^a Department of Management and Engineering, Linköping University, Sweden

^b Department of Management, Monash University, Australia

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ABSTRACT

Manufacturing firms aim at improving both internal and external processes to improve the competitive advantage. Such initiatives include lean practices as well as supplier rationalization and integration. In this paper, we analyze these improvement initiatives and their impact on business performance. In particular, we explore potential differences between make-to-order (MTO) and make-to-stock (MTS) firms. We use data from 216 Australian manufacturing firms. We find a clear difference of improvement focus between MTO and MTS firms. MTO firms exhibit a significant impact of supplier integration on business performance, but not for lean practices and supplier rationalization. The situation is completely reversed for MTS firms, since they have significant effects for internal lean practices and supplier rationalization, but not for logistics integration with supplier. The results show that the distinction between MTO and MTS firms is important when analyzing manufacturing and supply chain improvement initiatives.

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1. Introduction

Manufacturing firms increasingly understand that gains in competitive advantage are not restricted to improvements in their internal operations but that external supply chains need to be considered as well. A wide range of potential improvement initiatives is available for shaping internal and external processes. Lean practice, logistics integration and supplier rationalization are all examples of such initiatives. Lean practice is an example of internal process improvement initiative, while the other two are examples of externally oriented initiatives. Such practices and programs are generally considered to be beneficial for any type of manufacturing firm, while some researchers suggest that some improvement initiatives are more applicable in certain manufacturing environments. Thus, there is some disagreement. Furthermore, we have not found any previous large-scale empirical research that contrasts different types of firms and explores potential differences in this context.

For example, lean production is typically considered a fundamental program for any firm that wants to improve their manufacturing operations, by e.g. removing waste and creating a smooth production flow [1]. However, the research stream on

“leagility” that contrasts lean with agile, suggests that lean production is applicable for MTS operations and upstream the decoupling point in the supply chain material flow, while agility is advocated for MTO operations and downstream the decoupling point [2].

Furthermore, logistics integration is considered a vital part for any firm in a supply chain context. In order to create a strong supply chain, the logistics between successive partners need to be integrated. Many researchers regard this as important for supply chain operations in general [3]. However, some suggest that this is particularly true for MTO firms that rely on the support of their suppliers for providing variant-creating components and for delivering customized products on time [4], while MTS firms purchase standard components and may prefer arms-length relationships with suppliers and subsequently do not require logistics integration with suppliers [5]. Thus, lean production may be more applicable to MTS operations and logistics integration more applicable to MTO operations. Consequently, it should be both important and fruitful to explore if such differences exist.

As a third example, supplier rationalization is an improvement initiative that seems to be generally applicable according to the literature [6]. A limited supply base can be beneficial for both MTO and MTS operations, being able to focus on a few suppliers that provide quality items and components and dependable deliveries. We therefore include supplier rationalization in our study to have a full set of alternatives related to MTO and MTS operations: one that may be more applicable to MTO operations

* Corresponding author. Tel.: +46 13 281000.

E-mail addresses: jan.olhager@liu.se (J. Olhager), daniel.prajogo@buseco.monash.edu.au (D.I. Prajogo).

(i.e. logistics integration), one that may be more applicable to MTS operations (i.e. lean practices), and one that seems applicable to both MTO and MTS operations (i.e. supplier rationalization).

We have not found any previous survey research that contrasts MTO and MTS firms and explores potential differences. In this paper we take a contingency theory view, in that we investigate if the impact of manufacturing and supply chain improvement initiatives on business performance is contingent upon whether the plant is operating on an MTO or MTS basis. We aim to contribute to the research on decoupling points by providing survey research results on the differences between MTO and MTS firms.

We first present the theoretical background and related literature, and discuss the hypotheses. Then, we present the research methodology and the results. Implications for managers and researchers are discussed and finally the conclusions are drawn.

2. Theoretical background and hypotheses

In this section, we first explain the theoretical foundation of this study. We then continue with the notions of business performance, internal lean practices, logistics integration, and supplier rationalization. We then discuss the role of make-to-order versus make-to-stock in this context.

2.1. Contingency approach

Contingency theory [7,8] argues that no theory or method can be applied in all instances [9,10]. In other words, there is no one best way to organize for effective results and the emphasis on results may vary from organization to organization [11]. This suggests that organizations should match their structures and processes to their environment, in order to maximize performance [7,12].

Although contingency theory has been applied to other areas of operations management (primarily, manufacturing strategy), little application of contingency theory has taken place in the study of operations management practices [9]. In particular, Sousa and Voss [9] identify only one example related to MTO or MTS, namely Hendry [13], who discuss the policy for satisfying customer demand (make-to-order versus other policies) and make case-based recommendations concerning how to adapt practices to a particular context (make-to-order/job shop production).

Previous case studies based research [13–16] have found that MTO operations are different from MTS operations and mathematical modeling researchers [17–20] have modeled MTO and MTS situations differently. Therefore, it would be important to explore potential differences in operations management practices between MTO and MTS in a survey.

In this paper, we explore whether various improvement initiatives impact business performance differently contingent upon the market-manufacturing orientation in terms of MTO versus MTS. In doing so, we address the call from Sousa and Voss [9] to identify and consolidate relevant contingency variables.

2.2. Business performance

The use of business performance as a performance measure is common for capturing the long-term behavior of the firm [21–25]. Typically, market share, return on investment, assets, and sales, or similar measures such as the change in these measures are used to capture business performance. Thus, these measures are concerned with both market and financial performances. A reason for using business performance instead of operational performance is that

MTO and MTS firms may well focus on different competitive priorities and operational performance outcomes, while business performance is not associated with a particular type of decoupling point (such as MTO or MTS). For example, MTS firms typically compete on price and cost efficiency, while MTO firms compete on customization and flexibility. Thus, MTO and MTS firms may use different practices or paths to reach high levels of performance, but both types of firms should be able to achieve good business performance. Therefore, business performance can be used to measure the impact of initiatives in manufacturing firms irrespective of decoupling point.

2.3. Internal lean practices

The source of the term lean production can be traced to the International Motor Vehicle Program [26]. Lean manufacturing was offered as a synonym for the practices pioneered by Toyota [27]. However, the concepts and techniques under the lean label were basically the same as those of just-in-time a decade earlier [28]. Womack and Jones [1] provided five lean principles: value, the value stream, flow, pull, and perfection, described in the following way: (i) value is defined by the ultimate customer, (ii) the value stream is the set of all the specific activities required to bring a specific product through the internal value chain, (iii) make the value-creating steps flow, (iv) use a pull schedule, and (v) make improvements a continuous effort. Following these principles, internal lean practices include set-up reduction, pull production system, small lot sizes, and streamlining the layout through e.g. cellular manufacturing or focused factory concepts [29–31]. More specifically, these are internally related practices, rather than customer or supplier related [30,31]. Several studies have found evidence that improved business performance in general is associated with the use of JIT/lean methods; gains in both financial [32–35] and market performance [35,36] have been observed. Hence, the first hypothesis is concerned with the impact of internal lean practices on business performance.

H1. Internal lean practices have a positive relationship with the firm's business performance.

2.4. External logistics integration

The increasing competition has driven firms to not only improve their internal operations (such lean practices), but also focus on integrating their suppliers into the overall value chain processes. The contribution of suppliers in delivering values to customers, hence, building competitive capabilities (quality, delivery, flexibility, and cost) has been well recognized. The essence of logistics integration is well-coordinated flow of materials from suppliers [37]. Improved logistics integration between supply chain partners yields a number of operational benefits as well as improvement in customer service and sales [38]. De Toni and Nassimbeni [39] found that better performing firms exhibit a higher level of logistical interactions, Frohlich and Westbrook [37] found that the widest arcs of integration had the strongest association with performance improvement, and Flynn et al. [10] found a significant relationship with business performance. In a review of empirical surveys on supply chain integration [3] found that the majority of surveys report a positive relationship between integration and performance, and that about half of these surveys used business performance.

H2. External logistics integration has a positive relationship with the firm's business performance.

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