



## Management accounting and control practices in a lean manufacturing environment

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### A B S T R A C T

A lean strategy is rapidly becoming the dominant paradigm in manufacturing. Kennedy and Widener (2008) use a case study to develop a theoretical framework of management accounting and control practices for firms following a lean manufacturing strategy. We build on Kennedy and Widener (2008) by examining a structural equation model that provides evidence on the extent to which a lean manufacturing implementation is related to five management accounting and control practices. Using survey data from 244 US companies with an interest in lean manufacturing, we find a direct positive relation between the extent of a lean manufacturing implementation and a simplified strategic reporting system, value stream costing, visual performance measurement information, and employee empowerment. We find a direct negative relation with inventory tracking; however, we find it is conditional on the extent of top management support for change in production strategies such that firms decrease reliance on inventory tracking in the presence of strong management support. We also conclude that the management accounting and control practices work together as a package in a lean manufacturing environment as evidenced by the many direct associations among the five management accounting and control practices.

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### Introduction

Lean manufacturing is often regarded as the most important strategy for manufacturing firms desiring to achieve world-class performance (Rinehart, Huxley, & Robertson, 1997). As firms progress in their implementation of lean manufacturing, many are recognizing the need for a supportive management accounting and control system (see *Statements on Management Accounting (SMA)*, 2006). Yet, accounting research (and education) has been slow to recognize the importance of aligning management

accounting and control practices with a lean manufacturing strategy (Castellano & Burrows, 2011; Haskin, 2010). This study addresses this limitation by investigating whether and how management accounting practices and controls are used in support of lean manufacturing.

Manufacturing firms have responded to the highly competitive market of the past two decades by implementing such practices as quality circles, statistical process control, theory of constraints, just-in-time inventory management (JIT), total quality management (TQM), six sigma, and total preventive maintenance (TPM). More recently, these practices are recognized as elements of a lean manufacturing strategy. The essence of the lean manufacturing strategy is that “all business processes and functions integrate into a unified, coherent system whose single purpose is to continue to provide better value to customers...” (Grasso, 2005, p. 19).

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Consistent with this notion of integration is the idea that accounting and control systems are aligned with strategy (Langfield-Smith, 1997); however, there is little empirical evidence that sheds insights on the integration of management accounting and control practices with a lean manufacturing strategy. Using a qualitative case study, Kennedy and Widener (2008) conclude that management accounting and control practices change in support of a lean manufacturing strategy. The aim of this study is to build on the Kennedy and Widener (2008) study and provide a deeper empirical understanding of the management accounting and control practices used by a cross-section of manufacturing firms to support their lean manufacturing strategy.

Specifically, our first purpose is to describe empirically the relations between a lean manufacturing strategy and five management accounting and control practices. Although several studies investigate various aspects of lean manufacturing practices, we know little about the use of management accounting and control practices in these environments. Therefore, we lack empirical understanding of such basic questions as whether firms alter their management accounting and control practices to support their lean manufacturing strategy. Our second purpose is to gain insight regarding how management accounting and control practices work together to support a lean manufacturing strategy. Although it is well-accepted that accounting and control practices are related and work as a “package” (Otley, 1980), information on what constitutes the package<sup>3</sup> used to support a lean manufacturing strategy is lacking.

Consistent with Kennedy and Widener (2008), we examine both management accounting and control practices. *Management accounting practices* refers to transaction processing that gathers and aggregates data in a meaningful manner. Drawing from Kennedy and Widener (2008), we examine the use of value stream costing (VSC), inventory tracking, and a simplified strategic reporting system. Most lean manufacturing firms will move from a functionally-oriented organization to one organized around value streams. “A value stream is the sequence of processes through which a product is transformed and delivered to the customer” (Haskin, 2010, p. 91). Value streams thus span functions from product design to sales to office support. VSC directly traces *actual* material and conversion (labor and overhead) costs to individual value streams. Inventory tracking is the monitoring and allocation of overhead and other inventoriable costs as raw materials move through production and are processed into final products. Finally, a simplified strategic reporting system

is one that is efficient, minimizes transaction processing, and more generally supports the decision-making process of a lean manufacturing strategy.

*Management accounting controls* monitor and direct behavior in order to achieve goal congruence. Again drawing on Kennedy and Widener (2008), we examine employee empowerment and visual performance measurement information. The visual performance measurement information provides goals, targets, and feedback in a simplified way, making the information more powerful and easy for shop-floor workers to process (Galsworth, 1997). Empowered employees are able to effectively participate in quick and timely decision-making, which facilitates the achievement of goals inherent to lean manufacturing (see e.g., Fullerton & McWatters, 2002; Kennedy & Widener, 2008).

Using data from 244 US companies with an interest in lean manufacturing,<sup>4</sup> we test a structural equation model (SEM) that examines the relations between lean manufacturing and management accounting and control practices. We hypothesize and find that the extent of lean manufacturing implementation positively influences employee empowerment, visual performance measurement information, a simplified strategic reporting system, and VSC; and negatively influences inventory tracking. However, we find that the negative relation with inventory tracking is conditional on the level of top management support for change in production strategies. That is, top management support for change is necessary to reduce reliance on inventory tracking. These findings indicate that the form of four of the examined relationships are additive<sup>5</sup>; however, the form of the relationship between the extent of lean manufacturing implementation and inventory tracking is interactive, as it is a function of the level of top management support for change in production strategies.

We then examine the set of management accounting and control practices. After controlling for the extent of lean manufacturing implementation, we find many significant associations, which indicates these practices work together as a package. This finding shows that the relations between the extent of lean manufacturing implementation and each of the management accounting and control practices are not only additive, but also intervening. Thus, we find that the total effect of the extent of lean manufacturing implementation on each of the management accounting practices is greater than only the direct (additive) effect. Finally, we further examine the association between inventory tracking and VSC and find that firms run dual accounting systems in the group of firms that has implemented lean to a low extent; it is only when the extent of lean manufacturing implementation is high that firms substitute VSC for inventory tracking. This indicates that the form of the relation between VSC and inventory tracking is interactive as it depends on the extent of lean manufacturing.

<sup>3</sup> Malmi and Brown (2008) note that discussion of a *package* of controls dates back to Otley (1980) and state, “as a general conception, a management control system (MCS) package is a collection or set of controls and control systems.” Although it has been discussed as such in the literature for over 30 years, Malmi and Brown (2008) note that there has been little theorizing or empirical testing of control packages. We use the term package to denote that significant associations exist among the set of practices (as opposed to each practice working in isolation). Note that we do not claim that this package necessarily includes all accounting practices and controls that could be used by the organization, and hence it could be an “incomplete” package.

<sup>4</sup> All but 17 of the respondent firms indicated they have adopted lean manufacturing.

<sup>5</sup> Luft and Shields (2003) identify various causal-model forms as: additive, intervening-variable, and interaction. We hypothesize and examine all three causal-model (linear) forms in this paper. For a more thorough discussion of these concepts, please see Luft and Shields (2003).

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