



# The integration of human resource and operation management practices and its link with performance: A longitudinal latent class study

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## ABSTRACT

This paper reviews the literature on the association between lean production and performance. From this, propositions on the integration and evolution of operation and human resource management practices associated with the lean production concept are developed. Using 24 years of data on the use of seven core OM and HRM practices in British manufacturing firms, the potential link between integration in the use of practices and productivity is tested. In each year, three latent clusters are identified via ordered restricted latent class models; the cluster that consistently makes a more integrated use of practices outperforms the others. Furthermore, the longitudinal nature of the data permits modeling the growth curves of each practice in the sample, recognizing any similarity in growth and investigating whether or not an early integration in adoption of practices is associated with higher final productivity. The results show that pioneers are more productive, thus suggesting that the head start in integrating core OM and HRM practices associated with the lean production concept has paid off.

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## 1. Introduction

Markets are increasingly more competitive and global, so quality standards and product or service efficiency is crucial to the survival of any organization. In this context, the lean production concept has been increasingly advocated beyond manufacturing (e.g. in services: [Abdi et al., 2006](#); [Abemathy et al., 2000](#); [Swank, 2003](#)); in the public sector and healthcare: [Kollberg et al., 2007](#)). The spread and interest that it has attracted are possibly due to claims of cost and waste reduction, superior performance and competitive advantage that have been consistently made by academics and practitioners alike (e.g. [Chandler and McEvoy, 2000](#); [Dennis, 2002](#); [Hart and Schlesinger, 1991](#); [MacDuffie, 1995](#); [Powell, 1995](#); [Womack and Jones, 1994](#); [Womack et al., 1990](#); [Wood et al., 2004](#); [Youndt et al., 1996](#)). Despite controversies about the precise meaning of lean production ([Li et al., 2005](#); [Shah and Ward, 2007](#)), it has commonly been taken to involve techniques concerned with production, work organization, quality management, logistics, supply chain, customer satisfaction, efficient delivery and continuous improvement methods. In other words, the adoption of lean production implies integration in the

use of operation (OM) and human resource management (HRM) practices.

The quality management literature, which can be traced back to 1949 when the Union of Japanese Scientists and Engineers formed a committee to improve Japanese productivity ([Powell, 1995](#)), also offers competing definitions for total quality management (TQM). Some authors argue that it is a managerial philosophy (e.g. [Martinez-Lorente et al., 1998](#)), whose principles imply an integration of operations and people management ([Wickens, 1987](#)). Yet [Deming \(2000\)](#) focused on an organizational system that promotes cooperation and learning for facilitating process management, resulting in the constant improvement of processes, products and services, as well as employee fulfillment and customer satisfaction. This system, then, becomes critical to the survival of organizations ([Anderson et al., 1994](#)). [Juran \(1993\)](#) emphasized not only team and project work, participation and recognition, but also highlighted the need to achieve the best return on investment. According to him, the primary responsibility of management is to minimize the total cost of quality and to decide when quality management efforts should be stopped. Deming also argued that the improvement of the work process reduces cost because of less re-work, fewer mistakes or delays and less waste in manpower and materials, but (in contrast to Juran) prescribed constant improvements.

In this context, important questions for managers and scholars are: How do different managerial practices impact on performance? Which practices have greater impact on performance

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outcomes? Does the integration of operations management and human resource management practices pay off? Are expectations of long-lasting gains fulfilled? For several decades the link with performance has mainly been investigated by addressing the first two questions. However, not only do results and measures vary within studies but the focus has generally either been on individual practices or sets of practices that are presumed to result in superior performance. For example, a common view is that HRM practices – for instance those that empower or involve the employee – support specific OM practices; jointly they have a higher, possibly nonlinear, effect on performance (Kufidu and Vouzas, 1998; Lawler et al., 1995; MacDuffie, 1995). Longitudinal studies remain rare and tend to rely either on subjective assessments of practice implementation (Easton and Jarrell, 1998; Fullerton et al., 2003) or on relatively short periods (e.g. Callen et al., 2000; Capelli and Neumark, 2001).

In this paper, we concentrate on the integration of HRM and OM practices and its potential impact on performance, by reviewing the empirical literature and developing a set of propositions, which we then test. In our analysis, we assume that there is a philosophy or culture underlying the integration of OM and HRM practices, whose principles are not only concerned with eliminating waste and adding value for customers but also entail the pursuit of continuous improvements. The latter cannot be achieved without worker participation, such as quality at source inspections that imply responsibility for checking one's own work. Learning and cooperation thus facilitates process management, and integration should continue to pay over time; those organizations that adopt this managerial philosophy should outperform those that do not.

We use secondary data of 448 British firms (Birdi et al., 2008) on seven management practices that are the most extensively employed in British manufacturing (Wood et al., 2004), and company records for the period 1980–2003. Of the seven management practices, the OM practices are total quality management, just-in-time procedures (JIT), integrated computer-based technology (ICT, also known as advanced manufacturing technology), and supply-chain partnering. The first three are central to the lean manufacturing system and the last adds the customer–supplier relationships that are necessary for the delivery of desired standards at a minimum cost. HRM practices included are learning culture (or extensive training), empowerment and teamwork. The first two have consistently been associated with quality management, as shown by the criteria of the 1992 Baldrige Award (George, 1992) and can be easily traced back to two of Deming's 14 points (Walton, 1986). Empowerment has been described as critical to successful JIT initiation and implementation (Koufteros and Vonderembse, 1998), whereas teamwork is core both to high involvement (Bailey, 1993; de Menezes and Wood, 2006) and quality managements (Wickens, 1987). Together, we would expect that these HRM practices will allow employees to enhance their knowledge of the company, work more flexibly, and take more responsibility in quality management and decision-making.

By focusing on the philosophy that underlies the co-existence (correlation in the use) of different types of practices, we also address the measurement problem that has been identified in the academic literature (e.g. Shah and Ward, 2007). This is done not in terms of what should be included in the measure, but in terms of how it should be constructed. If the lean production concept implies a managerial philosophy, culture or way of thinking, as advocated in the literature (Womack and Jones, 1994), the co-existence of OM and HRM practices that are traditionally associated with this concept should reflect this philosophy. Moreover, if this philosophy is geared towards improving performance, the direct link between the philosophy and performance should be investigated rather than the association between

its elements and performance. If practices co-exist, the longitudinal nature of our data also permits an assessment of the overall evolution of practices and the association with performance. Our longitudinal study thus investigates whether: (1) the integrated use of core OM and HRM lean practices is associated with higher performance; (2) there are performance gains from being an early adopter of such an integrated approach.

In the following sections, we review the empirical evidence on the link with performance as well as the literature on the evolution of management practices, which set the background to the propositions that are tested. We then describe the data, the methodology that we use and report our results. Finally, we assess our contribution and conclude.

## 2. Background

Empirical studies of the link between a lean production philosophy and performance have concentrated on assessing whether one or more of its elements are key, or whether combinations of these lead to higher performance. In general, cross-sections were analyzed; definitions of constructs as well as sample sizes vary considerably. Consequently, it is not only difficult to compare studies, but, as observed by Shah and Ward (2003: 130), analyses of the performance effects that focus on multiple components of lean production remain rare.

In the HRM literature, diverse sets of practices have been assumed to be part of a high performance work system (Becker and Gerhart, 1996; Huselid, 1995) and as such are linked with performance. Fundamental practices like empowerment or work enrichment that we would associate with the high involvement concept (Bailey, 1993) are often omitted in empirical analyses. Results on the link with performance also reflect the diversity in measurement constructs and dependent variables (Wall and Wood, 2005). The empirical evidence ranges from positive association with all practices (Arthur, 1994), to lack of association and even a negative correlation (Capelli and Neumark's 2001 panel study showed no association, but one practice was negatively related to both productivity and its change).

Overall, longitudinal studies are rare and the potential impact of integrating practices has been generally neglected, though it is often argued that practices should be adopted in an integrated fashion. We now review the empirical evidence from studies on quality management and lean production, which justify our assessment of the current state of the literature and the need for studies like ours.

### 2.1. The empirical evidence on the link between lean practices and performance

Initial reviews of the evidence reported a lack of association between practices and performance. Powell (1995) offered several anecdotal examples where the costs of implementing a TQM strategy outweighed its benefits. Reed et al. (1996) concluded that any observed benefits were simply contingent on matching environmental conditions to firm orientation. Samson and Terziowski (1999) argued that the lack of evidence was due to small samples and measures that did not reflect the various dimensions of quality management. They examined the relationship between TQM and quality, operational and business performance in Australian and New Zealand manufacturing ( $n = 1200$ ), using multi-item measures that were thoroughly constructed and validated. A positive link with performance was then observed, but not all categories of TQM were strong predictors of performance. It appeared that gains from quality management might be due to the interaction of practices, thus leading to subsequent research where synergistic effects were found between distinct elements of lean

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