Chapter 3
Applying Lean Production and Six Sigma in Global Operations

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ABSTRACT

This chapter aims to apply the Lean Production and Six Sigma in global operations, thus describing the theoretical and practical overviews of Lean Production; Lean Production in sustainable operations; Lean Production in human resource management; Lean Production in health care; Lean Production and environmental management; Lean product development; Lean Management and sustainability; Six Sigma; Six Sigma, learning, and knowledge management; Six Sigma in health care; Six Sigma in service industry; Lean Six Sigma; and the significance of Lean Production and Six Sigma in global operations. The creation of Lean Production and Six Sigma is crucial for modern organizations that seek to serve suppliers and customers, increase business performance, strengthen competitiveness, and acquire regular progress in global operations. The chapter argues that applying Lean Production and Six Sigma has the potential to enhance organizational performance and achieve strategic goals in global operations.

INTRODUCTION

Lean Production is a philosophy that promotes continuous improvements with its roots in the Japanese automotive industry (Womack, Jones, & Roos, 1991). Powell et al. (2013) defined Lean Production as a set of tools and practices for the continuous improvement of operations. The concept of Lean Production is important to sustain operations management (Wong & Wong, 2014). Holden et al. (2015) stated that the application of the Lean Production approach is widely recognized to improve performance in a wide range of industries. Ringen et al. (2014) stated that companies have tried to figure out how to consistently organize their business units for improving efficiency and reducing costs and lead times. The implementation of Lean Production practices enhances flexibility performance (Vinodh & Joy, 2012).

Six Sigma is the strategy for problem solving and engineering improvements with its roots in the United States electronics industry (Krogstie & Martinsen, 2013). Adopting Six Sigma positively impacts organizational performance primarily through the efficiency with which employees are deployed

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(Shafer & Moeller, 2012). As a quality management methodology, Six Sigma uses the different theories and tools to improve upon the processes of a certain business (Adina-Petruta & Roxana, 2014). Two separate models (i.e., DMAIC and DMADV) are used in Six Sigma. The DMAIC (define, measure, analyze, improve, and control) is a systematic method for analyzing & improving business processes. The DMADV (define, measure, analyze, design, and verify) is an improvement system used to develop new processes or products (Selvi & Majumdar, 2014).

The strength of this chapter is on the thorough literature consolidation of Lean Production and Six Sigma. The extant literature of Lean Production and Six Sigma provides a contribution to practitioners and researchers by describing a comprehensive view of the functional applications of Lean Production and Six Sigma to appeal to the different segments of Lean Production and Six Sigma in order to maximize the business impact of Lean Production and Six Sigma in global operations.

BACKGROUND

Lean Production and Six Sigma have been the powerful movements for improved product quality, optimized material flow and reduced waste within manufacturing and service industries (Krogstie & Martinsen, 2013). Lean Production targets the non-value added (NVA) work to make processes more efficient (El-Homsi & Slutsky, 2010). Lean Production, also known as Lean Manufacturing or Lean, is considered as a well-consolidated strategy for cutting down costs, especially costs related to production processes. Lean Production derives from Toyota Production System (TPS), a term that is coined by Womack et al. (1991). A critical point in the Lean Production approach is value creation (Hines, Holweg, & Rich, 2004).

Six Sigma approach was first developed in the late 1980s within a mass manufacturing environment in Motorola (Lighter, 2011) as it struggled to meet demanding quality targets on complex manufactured product, and became widely recognized when GE adopted it in the mid-1990s when it evolved from being a process improvement methodology to a broader, company-wide philosophy. Motorola and GE still consider Six Sigma as the basis for their strategic improvement approach. Since the 1980s, Six Sigma has become one of the most famous improvement actions, broadly implemented around the world in a broad range of companies (e.g., Boeing, DuPont, Toshiba, Seagate, Allied Signal, Kodak, Honeywell, Texas Instruments, Sony, Bombardier, and Lockheed Martin) that all declared considerable financial savings (Kwak & Anbari, 2006). Other benefits claimed for Six Sigma include increased stock price, improved processes and product quality, shorter cycle times, improved design, and increased customer satisfaction (McAdam, Hazlett, & Henderson, 2005).

Six Sigma is a proper topic and appears to be gaining momentum in practice (Linderman, Schroeder, Zaheer, & Choo, 2003). Six Sigma focuses on nonconformities and defects to eliminate errors (El-Homsi & Slutsky, 2010). Six Sigma has been credited as an important contributor to its winning the Malcom Baldrige Award for Quality in 1988 (Hahn, Hill, Hoerl, & Zinkgraf, 1999). DMAIC is applied in practice as a generic problem solving and improvement approach (McAdam & Lafferty, 2004). DMAIC is instrumental in the implementation of Six Sigma as a process improvement methodology (Chakravorty, 2009). The DMAIC method in Six Sigma is often described as an approach for problem solving (de Mast & Lokkerbol, 2012). New methodologies, stemming from the original methodology, are expanding: researchers are delivering second generation approaches such as New Six Sigma (Barney & McCarty, 2003), Lean Six Sigma (Wheat, Mills, & Carnell, 2003), Fit Sigma (Basu & Wright, 2003), and Customer-centered Six Sigma Quality Management (CSSQM) (Kuei & Madu, 2003).