

Chapter 6

Lean Six Sigma in Healthcare: A Review of Theory and Practice

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ABSTRACT

The chapter clarifies emerging aspects and trends of Lean Six Sigma (LSS) in healthcare through the systematic examination of 162 peer-reviewed articles in business, management, and healthcare disciplines that have been published over a ten-year period from 2004 to January 2014. Every article is analyzed using a scheme of six distinct dimensions including year of publication, journal, applications areas, tools and techniques, benefits and improvements, and research type. The chapter provides significant insights into the state of the art of LSS in healthcare research and clarifies confusion in the literature as to what constitutes LSS role in improving healthcare context.

INTRODUCTION

Implementing Lean Six Sigma (LSS) in non-manufacturing sector like healthcare is interesting and challenging topic. Healthcare service contains many complex systems and processes with various stakeholders that should operate under pressures of high clinical and administrative quality levels. LSS methodology has been gradually adopted in healthcare since early 2000s in order to reducing medical errors and improving quality of patient care and safety levels for patients and healthcare workers (Taner et al, 2007).

The pressures on healthcare services have increased dramatically in the last decade due to increasing financial pressures, ageing population, managerial sophistications, and operational

and technological inefficiency (de Koning et al, 2006). Accordingly, many researchers and practitioners consider LSS as the magic cure of healthcare problems as it supports and sustains capacity, speed and accuracy of various healthcare processes such as improving MRI exam scheduling and increasing capacity in X-ray rooms (Taner et al, 2007), improving waiting time for the medical service (Ahmed et al., 2013; Roth et al (2010), reducing clinical and administrative errors (Gowen III et al., 2012), eliminating waste Elimination (Cima et al., 2011; de Bucourt et al., 2011), increasing satisfaction of patients and health employees (Bucci and Musitano, 2011; Chiarini, 2013), and reducing length of stay (Gayed et al., 2013; Mandahawi, 2011).

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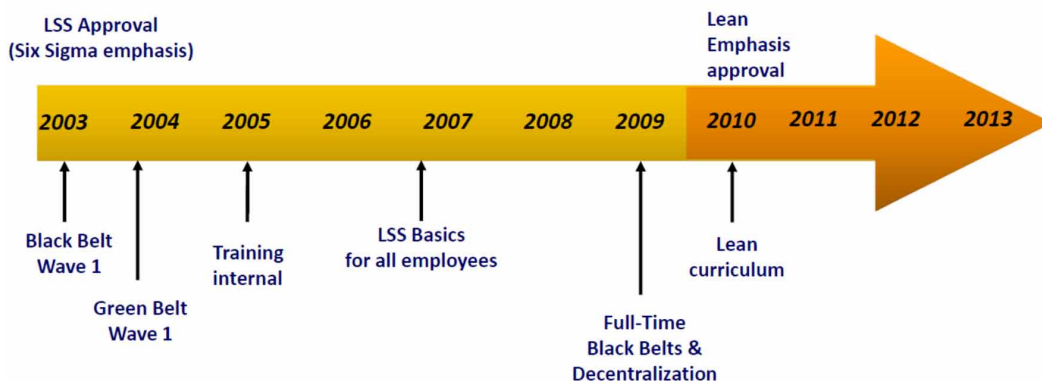
While there is an agreement on the historical development of Six Sigma methodology as presented in the Figure 1, it appears that there is a little consensus on the definition of the term. Six Sigma has been developed by Motorola in the 1980s as a result of linking finest elements of scientific management and continuous quality improvement initiatives. From a statistical perspective, Six Sigma can be considered as a metric of process measurement symbolized by the Greek letter σ that represents the amount of variation with a normal data distribution that targets quality level of 3.4 defects per million opportunities (DPMO) (Aboelmaged, 2011).

The focus of Six Sigma is not on counting the defects in processes, but rather the number of chances or opportunities in a process that could produce defects therefore causes of quality problems can be eliminated before they are transformed into defects (Antony, 2006). From a managerial perspective, Six Sigma can be considered as an improvement program for reducing variation (Andersson et al., 2006). From a strategic perspective, Six Sigma could be described as a business strategy to improve business profitability, effectiveness and efficiency of all operations to increase customer satisfaction (Kwak and Anbari, 2006).

The labeled concept Lean Six Sigma (LSS) is a combination of two complementary philosophies; Lean and Six Sigma. LSS is a business improve-

ment methodology aiming at maximizing shareholders' value by enhancing costs, speed, quality, speed, and customer satisfaction. Although LSS has its origins in manufacturing organizations, it has been widely adopted by service organizations. What makes Lean Six Sigma different from previous quality methodologies is the adoption of structured quality roles and tools across organizational hierarchy instead of transferring quality issues to first administrative line or to specific quality department (Snee, 2004). According to George (2002), the key focus of LSS is on activities that cause the customer's critical-to-quality issues and create the longest time delays in any process. Working on these activities offer the greatest opportunity for improvement in cost, quality, capital, and lead time. Although the guiding theories of Lean and Six Sigma methodologies are different, they are complementary in nature since both seek to improve the process. Lean philosophy establishes the standards of eliminating waste and reducing cycle time in processes with little impact on process variation, while Six Sigma shows how these standards can be achieved with minimum variation through applying a problem-solving approach using statistical tools and techniques (Aboelmaged, 2010). In addition, lean standards covers the entire organization value chain, while Six Sigma concentrates more attentively on certain projects or processes within an organization.

Figure 1. Timeline of LSS (adapted from Heckert, 2013)



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