

ENHANCING RETAILERS' OPERATIONS PERFORMANCE WITH LEAN SIX SIGMA APPROACH

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ABSTRACT

Purpose

Retailers face many challenges due to uncertain business environment negatively influencing their performance. In this context, Lean Six Sigma (LSS) deployment in the retail industry provides various benefits in terms of higher efficiency and effectiveness. LSS is robust and flexible in nature and hence fits well into the fast-paced and competitive retail environment.

Design/methodology/approach

LSS transforms the various retail operations and creates competitive advantages by building new operational capabilities for the retailers. To highlight this transformation, the research provides a clear roadmap for LSS deployment in the retail industry. Research develops retail LSS synergy framework as well as financial evaluation metric and underscores that LSS deployment positively affect retailers' business performance. By using these frameworks, research also discusses various illustrations to highlight successful deployment of LSS by retailers.

Findings

LSS deployment immensely benefits the retail industry as it mitigates many challenges faced by retailers. With LSS initiatives, traditional retail operations are transformed to represent higher cost efficiency and customer effectiveness in operations and thus helps in building sustainable competitive advantages.

Research Implications/implications

Research emphasizes the critical issue of measurement and evaluation of the financial contribution that the LSS practices make on various retail operations. There are various format of retail: discount, specialty, apparel, grocery, convenience stores, and quick-service restaurants. Hence, there is a need to compare LSS deployment performance among various types or formats of retail sector. An empirical investigation that quantifies the overall benefits of retail LSS is necessary and hence future research may focus on it.

Originality/Value

The research emphasizes the significance of LSS deployment in retail and underscores how synergy of Lean and Six Sigma enhances cost efficiency and customer effectiveness for a retailer. Research also provides illustrations of successful LSS deployment in retail industry.

Keywords: *Lean, Six Sigma, Lean Six Sigma, Retail, Efficiency, Effectiveness, Competitive Advantages*

1. INTRODUCTION

As the competition is increasing at a very faster rate in the current business scenario, it becomes very difficult for organizations to manage production and service costs, improve overall quality and productivity and still enhance customer satisfaction. In this context, the popularity of Lean and Six Sigma has grown considerably because of its rapid large-scale deployment as industry- recognized business improvement methods (Nonthaleerak and Hendry, 2006; Schroeder et al., 2008). For manufacturing as well as service organizations, Lean and Six Sigma synergies are considered as a vital business strategy to enhance the overall quality and productivity. The term "Lean Six Sigma" coined by George (2002b), has gained wide acceptance among practitioners as Lean Six Sigma (LSS) creates great synergy by integrating Lean and Six Sigma practices (Furterer, 2016; Shah et al., 2008). According to Snee (2010), Lean Six Sigma is a robust methodology that boosts process performance and hence, increases customer satisfaction and enhances bottom-line results of the business.

Lean Six Sigma (LSS) facilitates employee empowerment and thus builds synergies for process improvements (Sunder, 2016b; Higgins, 2005). LSS provides superior results, as is a better tool than either Lean or Six Sigma deployed in isolation. Similarly, Six Sigma applied in isolation without Lean involves several tools for process improvement but lacks strategy or structure to guide the system (Pepper and Spedding, 2010). According to a research study of different transaction-based organizations in the service industry, for measuring preferences for

process improvement tools, it was found that 98.8% of the LSS professionals (sample size, 85) preferred LSS over the use of Lean or Six Sigma separately (Sunder, 2013).

The LSS deployment emphasizes performance measurement for various retail processes and activities and therefore highlights the importance of process discipline. As a team-based and holistic approach, LSS requires commitment and dedication to detect inefficiency and control waste. Being a hybrid methodology LSS overcomes the limitations of Lean by facilitating the reduction of process variations and defects. LSS is extensively used as a transformation tool for migrating discrete and functionally reactive service organizations into cross-functional and proactive organizations (Corbett, 2011). The business world recognizes the value and significance of LSS methodology as more than 70 percent of Fortune 500 companies across various services endorsed its importance (Antony, 2015).

In the U.S., retail is the largest private-sector employer as one in four jobs come from retail. The retail sales during the year 2019 were more than \$3.76 trillion and contributed \$2.6 trillion to annual U.S. GDP as 42 million Americans were working in the retail sector (www.nrf.com). However, increased competition from online shopping threatens the very existence of many traditional retailers (i.e., brick-and-mortar (B&M) stores) (Madhani, 2021c). The retail industry will benefit by deploying the LSS methodology to solve the industry's unique challenges. Major U.S. retailers such as Amazon, Best Buy, Big Lots, Target

Corporation, Home Depot, and Lowe's have deployed LSS. According to a traditional view, retail management is considered as a wide variety of functions, such as human resources, procuring, merchandising, operations and marketing, etc.

Nevertheless, the major driver of customer value is processes and not functions. With the LSS approach, when processes are examined for improvement, it is commonly observed that a great deal of duplication of effort exists and for some important tasks, there are confusing lines of authority and no clear responsibility. There are many such processes in a retail store setting as retail chains serve millions of customers from hundreds of stores. Customers are demanding greater variety in retail products and their preferences are getting much harder to predict.

The deployment of LSS has been extensively used in the manufacturing and financial service sector (Madhani, 2018c), but there is little information available about the deployment of these approaches in the retail sector to attain a common goal of improvement. The research seeks to explore the Lean Six Sigma (LSS) approach and deploys its concepts to retail operations. Research also emphasizes the critical issue of measurement of the contribution that the LSS practices make for retailers and develops various measurement frameworks. During the analysis, the following research questions will be addressed:

1. What are the key drivers of LSS deployment in retail processes? How these initiatives can be sustained for developing competitive advantages?

2. How does LSS deployment in retail operation transform traditional retail processes to build differentiation advantages?

The study is structured into eight sections. Following this introduction, section two presents the view of the literature on the role of Lean, Six Sigma, and Lean Six Sigma (LSS) in enhancing business performance. Section three dwells on the transformation of retail operation with LSS deployment. Section four dealt with the synergy of Lean and Six Sigma while section four focused on Lean Six Sigma deployment in retail (i.e., retail LSS). Section six and section seven provides research methodology and findings, respectively. Section eight discusses the managerial and research implications.

2. LITERATURE REVIEW

Six Sigma emphasizes process performance parameters, that are very critical to quality (CTQ), and hence enables organizations to identify and eliminate failures or defects in business operations (Antony et al., 2008). Six Sigma measure defects and reduce it to 3.4 parts per million opportunities (PPMO) and hence Six Sigma improves product quality in the organizations (Lee et al., 2009; Chen and Lyu, 2009). Six Sigma is a business process improvement strategy and focuses on reducing process variation to improve quality (Kumar et al., 2008). Six Sigma focuses on customer needs and requirements and hence it is aimed to enhance customer satisfaction on a sustainable basis (Seth and Rastogi, 2004).

Six Sigma also focuses on process variables that are critical to quality (CTQ) and hence better manages the issues affecting customer satisfaction (Snee, 2004). Six Sigma is a well-established statistical approach that may be used by organizations to reduce variation in the business process (Chakravorty, 2009; Naslund, 2008). There are many benefits of Six Sigma: reduces costs in manufacturing and services; enhances customer satisfaction and ultimately improves the bottom line (Drohomeretski et al., 2014; Manville et al., 2012). Six Sigma monitors problems of poor quality by decreasing large variation in processes and hence, creates robust products and processes. Thus, the Six Sigma approach is more suitable where process variations need to be reduced (Snee, 2010). Six Sigma projects will be more successful if tools of Lean methodology are deployed in Six Sigma implementation (Shah et al., 2008).

Six Sigma also supports the Lean deployment process by acting as one of the inputs in such a process (Hines et al., 2004). Thus, Six Sigma as an integrated part of operational strategies fits well into the higher-level strategic Lean process (Hill et al., 2018). Six Sigma is a process improvement strategy to enhance the quality of products and services throughout their life cycle (Harry and Schroeder, 2000). Apart from manufacturing, Six Sigma has been applied in human resources (HR) (Madhani, 2017a; Madhani, 2018b), sales and marketing (Madhani, 2017b; Madhani, 2018a), finance and accounting services (Madhani, 2021a) as well as in BFSI (The Banking, Financial Services and Insurance) sector (Madhani, 2018c). Six Sigma aims at solving the different problems of organizations by collecting data and then using advanced

statistical analysis tools (George, 2003; Snee and Hoerl, 2007).

Although the Lean approach was first applied to manufacturing, it has also been used in services (Bowen and Youngdahl, 1998). The Lean methodology application in services is governed by various steps such as identifying value, mapping the value stream, improving flow and eliminating waste, implementing pull, and driving for perfection (Gupta et al., 2016). Lean deployment in the services sector saves customer time as with better coordination of operations it provides exactly what, when, and where the customer wants (Womack and Jones, 2005). It is mainly because, Lean requires less human effort, less equipment, less time, and less space due to its focus on doing more with less (Womack and Jones, 2003).

The goal of Lean is to accelerate the velocity of any process by reducing waste in all its forms (George, 2003), by segregating value-added (VA) activities from non-value-added (NVA) activities to understand the root causes of wastes (George, 2003). Lean is normally applied in knowledge-based tasks to eliminate NVA activities (Bhasin and Burcher, 2006). Lean methodology focuses on identifying and eliminating the following wastes: transportation; inventory; motion; over-processing; overproduction; waiting; defects; underutilization of people's creativity and environmental waste (Vinodh et al., 2011; Wong et al., 2014). Lean helps organizations in producing and delivering products and services at the lowest cost and as fast as possible (Antony, 2011). It is mainly because

Lean methodology focuses on reducing lead times, inventories, cycle time, set up times, equipment downtime, scrap, rework, and other wastes to enhance overall cost efficiency (Sharma, 2003; Pettersen, 2009). Six Sigma approach involves sophisticated data-based statistical and analytical tools while Lean is relatively simple and a more practical approach (Salah et al., 2010). Lean focuses on the elimination of waste and enhancing throughput and efficiency while Six Sigma focuses on the removal of process variation and defects in quality (Gibbons et al., 2012). Although both Lean and Six Sigma differ in their approach, the goal of these methods seems to be alike (Andersson et al., 2006).

Lean methodology alone does not take advantage of statistical tools and techniques offered by Six Sigma. Similarly, the Six Sigma approach alone does not contribute enough to increase process flow and reduce capital investments (George, 2002a). Lean methodology adopts a more knowledge-based approach to decrease waste and improve productivity while the Six Sigma approach typically uses statistical methods to solve problems (Snee and Hoerl, 2007). Although the Six Sigma approach was developed in the 1980s by USA-based Motorola, it was combined with Lean methodology only in the early 2000s (Linderman et al., 2003; Snee, 2010; Cherrafi et al., 2017).

There are many benefits of Lean deployment in retail: decreased inventory by 10 to 30 percent; reduced labor costs by 10 to 20 percent; decreased stock-outs by 20 to 75 percent, and increased comparable sales by up to 10 percent. Lean significantly contributes to improved customer satisfaction and retail store profitability

measured in terms of return on equity (ROE), as it increased by 5 to 10 percent (www.mckinsey.com). Lean deployment in organizations uses many tools and techniques for process improvement such as cause and effect (C&E) analysis, Kanban system, 5S, value stream mapping (VSM), etc. (Chen and Lyu, 2009; Thomas et al., 2008).

Although Lean and Six Sigma are considered as separate approaches for process improvement, both complement each other to systematically drive process innovation. Lean Six Sigma (LSS), in the combination of Lean and Six Sigma, presents an integrated framework for developing innovations (De Koning et al., 2008). LSS applies the tools and techniques of both Lean and Six Sigma and hence removes the disadvantage of each method (Imam et al., 2012). LSS with the integration of Lean and Six Sigma provides powerful analysis and problem-solving tools for process improvement and performance enhancement in the organizations (Andersson et al., 2006; Thomas et al., 2015). LSS helps organizations in enhancing quality, decreasing variation, and removing waste (Furterer, 2016). With the lack of cost advantages or differentiation advantages, it is difficult to maintain competitive advantages. However, cost advantages and differentiation advantages together lead to overall competitive advantages (Madhani, 2008). By decreasing costs and enhancing value, LSS imparts a competitive advantage to the organizations (Arnheiter and Maleyeff, 2005).

LSS is a business improvement methodology that provides many benefits: minimize cost and

invested capital; improve speed, customer satisfaction, and quality; and ultimately enhance shareholder value (Laureani and Antony, 2017; Akkucuk, 2014). LSS helps organizations in reducing production costs; solve problems quickly and enhancing capability and bottom-line (Lee and Wei, 2009; Antony et al., 2017). LSS provides a formal organizational infrastructure to create an environment where everyone is responsible for the quality and hence plays an important role in its implementation (Sony et al., 2019). Laureani et al., (2010), emphasized that a combination of Lean and Six Sigma can benefit not only the manufacturing but also service organizations.

In the global economy and job market, service-related activities and jobs are taking considerable share (Madhani, 2021b). In the late twentieth century, the service sector related employment represented more than 80 percent of all jobs in the USA. However, in 1990, service-related employment was 71 percent (Bureau of Labor Statistics, 2015). In emerging economies, a major proportion of the gross domestic product (GDP) is represented by services (Loungani and Mishra, 2014) as in FY 2020, 55% of India's GDP is contributed by services (IBEF, 2020). In the USA, the share of the services sector is 80% of GDP.

LSS initiatives can help cut waste and make retail processes more effective. LSS deployment in retail operations will enhance cost efficiency (effective utilization of resources in various processes) and customer effectiveness (fulfilling quality requirements in various activities). According to Hines et al., (2004), as wasteful activities and related costs reduce the customer value proposition increases. This results in

shorter delivery time without additional cost and hence enhances customer value proposition. LSS has enjoyed significant success in service operations (Sunder, 2016a). Hence, this research focuses on LSS deployment in retail operations for enhancing competitive advantages for retailers.

3. LEAN SIX SIGMA DEPLOYMENT: TRANSFORMATION OF RETAIL OPERATIONS

There are various formats of retail stores: discount, specialty, apparel, grocery, and convenience stores, and quick-service restaurants and provide a wide range of products such as clothing, kitchenware, homeware, furniture, white goods, grocery staples, and fresh food. Many industry-specific challenges are impacting the performance of the retail industry. For better service delivery, retail stores need to collect customer data at the point of sales, engage with customers, empower associates, predict changing customer demand, collect information effectively, provide personalized service, and ensure customer satisfaction.

Retailers require rapid responses to meet ever-changing customer needs. Following are major challenges faced by retailers (Curtis et al., 2008):

1. A Large Number of Independently Operated Retail Stores

Retailers can have a large number of stores spread across the geography. Although, the individual retail store has some autonomy for making local operational decisions, most tactical and strategic decisions are made at the corporate level by the parent organization. Such a policy makes it very difficult to execute changes across the retail chain due to increased challenges and complexity.

2. Multiple Functional Areas Providing Inputs for Changes

Various functional departments of a retail store frequently require changes and enhancement plans for their specific requirement. These simultaneous demands for changes from various corporate units make it difficult for the retail store managers to decide which solutions should be implemented, ignored, or postponed and can turn even the simplest changes into a complex process because of different footprints, models, and sizes. There is usually no reward or benefit to sharing information among retail stores whose managers compete with their peers. As departments are often working in silos, the changes stores are asked to implement frequently conflict, requiring store managers to make choices between options.

3. Tight Labor Budget

The retailer should ensure appropriate levels of staffing during the period of high

demand. However, to maintain profitability, retailers are constantly manipulating employee hours even during the period of higher seasonal demands to reduce labor costs. This makes it hard for store employees or associates to work on process improvements without affecting other store operations. Hence, process improvement is often pushed to the bottom of the priority list. It also makes difficult for store associates to ensure customer satisfaction through exemplary engagement and interaction with customers. As human resources are limited, retail stores have little scope to implement local improvements that would serve as differentiators from competitors.

4. Minimizing Impact of Process Changes on Customers

To minimize the potential impact that physical changes or process changes may have on customers, stores are making these changes after hours and out of view to avoid negatively affecting the customer experience. This challenge typically delays or limits what changes a retail store can implement quickly.

5. High Employee Turnover

In the retail industry, the employee turnover rate is very high (~35%) (Curtis et al., 2008). This has a huge impact on the sustainability of improvements that are made. Because of the high turnover rate,

much of the training budget is allocated to provide continual basic training to new hires. More than 50% of all employees or associates working in the retail industry are relatively young under the age of 25 (Curtis et al., 2008). Their limited business experience results in less freedom or responsibility given to them to make important decisions. With inexperienced and part-time associates, it becomes more difficult for retail stores to accomplish long-term and impactful change.

6. Constantly Evolving Consumer Demographics

Because consumer demographics are constantly evolving, retail stores are forced to make frequent changes to meet varying demands for specific local requirements. Hence, many retail stores are being designed after customer segmentation, based on the demographics of local customers. However, the design of more locality focused retail stores creates several internal problems. For example, simple planogram changes require hundreds of versions to satisfy each store's individual needs based on local neighborhood requirements, delaying the speed at which changes can be implemented. This type of demographic segmentation and planning creates different experiences for customers who visit multiple stores, which can confuse

them with different footprints, designs and assortment.

Firm performance is examined in terms of efficiency and effectiveness. Efficiency is doing things right, and effectiveness is doing the right things. Hence, performance measurement is an analysis of both efficiency and effectiveness in accomplishing a given task (Fugate et al., 2009). Efficiency is a measure of how well resources are utilized. Efficiency is a ratio between the normal levels of inputs over the real level of outputs. Hence, it is improved through waste elimination, i.e., reducing the input levels while increasing the output levels. Cost efficiency is defined as the ratio of resources utilized against the results derived (Goldsby et al., 2006).

Effectiveness refers to the ratio between the real or actual outputs and the normal or expected outputs (Sink, 1985). Effectiveness describes the extent to which goals are accomplished by an organization. Effectiveness is considered a response-oriented concept as firms identify customer demands and work to create effective solutions to meet those needs. Hence, it is a customer-centric performance goal as it allows the firm to deliver products to end consumers in a manner that creates customer value and satisfaction. Effectiveness assesses the extent to which customer service demands were met and whether customers were satisfied with the

level of service provided (Otto and Kotzab, 2003). Customer effectiveness is referred to as the extent to which customer-related objectives have been met. Effectiveness can be improved through the enhancement of the value proposition; for instance, new features could be added to a product to fulfill an unmet consumer need. Customer effectiveness is defined as the extent to which customer-related objectives have been met (Mentzer and Konrad, 1991).

With LSS deployment, the specific challenges of the retail industry can be addressed and effectively managed. LSS deployment can be considered as the driving force for the transformation of retail operations as it provides the following advantages of cost efficiency and customer effectiveness (**Table 1**).

4. SYNERGY OF LEAN AND SIX SIGMA: LEAN SIX SIGMA

According to Laureani and Antony (2017), Six Sigma is used to achieve stable and expected process performance by reducing process variations and defects, while Lean is used to deliver products and services better and faster at a lower cost. Lean removes non-value-added (NVA) steps and waste and hence reduces process time. With combinations of Lean and Six Sigma, in the form of Lean Six Sigma (LSS), organizations improve business performance (Gupta et al., 2012). Lean Six Sigma (LSS), developed by effective integration of Lean and

Six Sigma, will provide competitive advantages for the organizations (Salah and Rahim, 2019). LSS creates more flexible, vigorous, and cost-efficient processes by developing synergy of Lean and Six Sigma (Andersson et al., 2014). LSS program is a data-driven, systematic, and customer-focused approach for managing and improving process performance quality (Cournoyer et al., 2013). LSS effectively manages customer satisfaction, cost, quality, process speed, and invested capital and hence, maximizes shareholder value (Wang and Chen, 2012). LSS is considered as one of the best strategies for business excellence (Sreedharan et al., 2017).

LSS delivers better quality and enhances process flow as it is based on strong synergy developed by utilizing tools from Lean and Six Sigma (Mader, 2008). According to Antony et al., (2017) "Lean Six Sigma [...] has become one of the most popular and proven business process improvement methodologies organizations have ever witnessed in the past". LSS leads to business process excellence in various industries, by better management of processes to eliminate defects and reduce variations (Snee, 2010). LSS helps organizations in improving performance by providing a holistic and team-driven approach to enhance quality and eliminating waste (i.e., non-value-added activities) (Liebtag, 2013). LSS is a powerful quality initiative successfully deployed by various organizations as it creates the best synergy when Lean and Six Sigma are used together (O'Rourke, 2005). As Lean and Six Sigma, complement each other, the synergy of LSS plays a significant role in

creating and sustaining improvements. LSS enhances performance in every industry as it provides synergy by combining Lean and Six Sigma (Allen and Laure, 2006) and hence it is the most popularly used improvement approach (Pedersen and Huniche, 2011; Costa et al., 2017). Initially, organizations improved performance on the deployment of LSS, and with sustained improvement; it resulted in competitive advantage (Antony et al., 2003; George et al., 2004). According to Vinodh et al., (2014), organizations achieve cost saving on the deployment of LSS, as it combines various improvement tools from Lean and Six Sigma. Lean provides non-value-added (NVA) and waste elimination tools while Six Sigma provides variability control tools.

5. RETAIL LEAN SIX SIGMA: DEPLOYMENT OF LSS IN RETAIL OPERATIONS

Lean in retail operations focuses on improving efficiency and hence seeks to manage processes with high speed and low cost. Lean involves the empowerment and education of retail associates and employees to identify and eliminate non-value adding (NVA) activities to improve throughput and increase productivity. The full involvement and empowerment of the employees in a Lean initiative have the effect of improving retail employee motivation and engagement. This feature of Lean is also relevant to change management with regard to

the acceptance and sustainability of the retail process improvements.

Lean methodology focuses on continuous improvement and aims to identify and eliminate waste from various processes. Lean also brings permanent behavior change among employees as it helps in changing the culture of the organization. Six Sigma is typically considered for improving processes effectiveness, while the Lean approach is usually deployed for decreasing the process inefficiency (Antony 2011). Six Sigma does not integrate quality and process flow and Lean does not provide statistical control for reducing variation, Lean Six Sigma (LSS) offers a better solution by combining Six Sigma and Lean. LSS is extensively used by organizations as it enhances process efficiency and maintains quality. With LSS deployment, organizations improve the product and service quality, enhance flexibility to meet customer demands, and increase the speed (Bhuiyan and Baghel, 2005). As Lean and Six Sigma are compatible, they create synergy by complementing each other, and hence, LSS deployment in retail operations provides many benefits (**Figure 1**).

With LSS synergy, processes of retail operations are improved by delivering better results than usually be achieved by either the Six Sigma or Lean approach alone. Retail LSS (i.e., deployment of Lean Six Sigma in retail) has a positive impact on retail operations as it enhances cost efficiency and customer effectiveness with the better synergy of Lean

and Six Sigma (Figure 1). Various retailers have used LSS to streamline their diverse retail activities for overall performance enhancement and building competitive advantages (Madhani, 2020).

6. RESEARCH METHODOLOGY AND SYNERGY FRAMEWORK

Lean Six Sigma (LSS) is a customer-focused improvement strategy. The retail industry requires flexibility and diversity for any sustainable improvement. LSS deployment will be highly successful in the retail industry because its robust and flexible nature fits into the fast-paced and dynamic competitive environment. This research develops various frameworks for identifying and estimating benefits of the LSS deployment in the retail industry. The research uses a sequential approach as it develops a retail LSS synergy framework (step-I) and then provides a retail LSS evaluation metric along with an illustration for segregating various financial benefits to measure its impact on top-and bottom-line performance. The study adopted a hypothetical illustration using the case approach and performance data collection from functional areas of various retailers. The financial and operational performance data for the illustration were collected from respective functional areas with the help of a performance measurement template circulated across the departments (step-II).

6.1 Development of Retail LSS Synergy Framework

The deployment of LSS in the retail industry has twin objectives: the objective of cost reduction (to reduce process waste, decrease process variability, enhance revenue, and generate a profit) and the objective of customer satisfaction (to improve levels of service and enhance responsiveness). The Retail LSS Synergy (RLS) framework explains these twin objectives (Figure 2). The retail LSS synergy framework combines various performance drivers of retailers. Cost efficiency (related to cost reductions and underlying financial benefits) and customer effectiveness (related to customer satisfaction and underlying customer metrics) are two major building blocks of retail operations. Lean facilitates cost advantages while Six Sigma facilitates differentiation advantages. Higher efficiency results in substantial cost reductions while higher effectiveness results in customer service level improvements. Improvement in cost efficiency and customer effectiveness drives revenue, decreases costs, enhances profit, and ultimately raise enterprise value.

6.1.1 Higher Cost Efficiency

LSS deployment improves retail performance by simplifying processes, increasing flexibility, reducing inventory, establishing smooth material flow, controlling freight expenses, and reducing sources of waste and delay. LSS provides cost efficiency in the areas of procurement, logistics, supply network, and inventory management. Higher cost efficiency is accomplished through the reduction of operating expenses, the efficient use of fixed assets and working capital, and better process management by reducing or eliminating

wastes. Retail LSS also helps in reducing costs by better space management in warehouses, distribution centers, and retail stores and reducing labor costs involved in retail operations. With LSS deployment, retailers create value for themselves by reducing cost and enhancing efficiency.

6.1.2 Higher Customer Effectiveness

LSS deployment in retail improves customer satisfaction as the retailer can deliver responsiveness, relatedness, and refinement. Responsiveness refers to responding quickly when the customer needs, preferences, and demands change. Responsiveness strengthens customer relationships and hence increases the customer buying frequency. The most relevant information is related to recent needs, shopping patterns, and individual tastes of the customers and shared among parties in the retail value chain. Refining the operational process in the areas of shop floor management, customer relationship management, marketing and promotion, and logistics and inventory management, enhances quality into retail operations. Customer effectiveness is considered a customer-centric performance goal as LSS reduces variation within and across the value-adding steps in retail operations.

Retail LSS has a positive impact on retail operations due to the synergy of LSS performance drivers (i.e., cost efficiency and customer effectiveness) and thus enhance retailers' performance and leads to enterprise value creation (**Figure 2**). Various retailers (e.g., Walmart, Target Corporation, Big Lots,

Home Depot, IKON Office Solutions, Macy's, Office Depot, Radio Shack, Best Buy, Home Depot, Lowe's, etc.) have used LSS to streamline their diverse retail activities for overall performance enhancement.

6.2 Development of a Retail LSS Evaluation Metric

In the context of the challenging business environment faced by retailers, LSS deployment improves performance across the entire retail value chain. In retail operations, for effective LSS deployment, monitoring, and management, a financial metric is required for evaluating performance improvement across various processes. Hence, this research develops a retail LSS evaluation metric for measuring the overall financial impact on LSS deployment in retail operations (**Table 2**). This research provides a methodology, for calculating improvement of Gross Profit (GP), Operating Profit (OP), and Net Profit (NP), on the deployment of LSS in retail operations. It is evident from the metric that, retail LSS on Lean and Six Sigma synergy improves various processes of retail operations which results in higher revenue (more sales) and lower cost (decrease in COGS, depreciation expense, SG&A expense, logistics expense, and interest expense). Hence, LSS deployment significantly enhances retailers' performance (**Table 2**).

7. FINDINGS AND DISCUSSION

This section describes the deployment of 'Retail LSS Synergy Framework' and 'Financial

Evaluation Metric' developed in 'Research Methodology' section.

7.1 Retail LSS Synergy Framework

Following illustration of Staples explains deployment of 'retail LSS synergy framework' developed in earlier section and shows resultant benefits in terms of enhanced performance.

7.1.1 Staples

Staples, Inc. invented the office superstore concept when the company opened its first store in Brighton, Massachusetts, the U.S. on May 1, 1986. Staples' caters office supplies, furniture, and technology to consumers and businesses. Following are major benefits (cost efficiency as well as customer effectiveness) of LSS deployment at Staples (www.accenture.com):

7.1.1.1 Cost Efficiency

1) Staples gained inventory savings of \$3.3 million by releasing space in smaller stores. It was made possible by streamlining the item-order cycle. In this way, Staples was able to manage that promotional items arrive at stores closer to sale dates.

2) Staples enhanced on-time performance by 21 percent with the implementation of various steps: a) establishment of a "receiving and put away team" within fulfillment center; b) reconfiguration of the loading dock layout; and c) controlling extra handling of merchandise.

3) Staples reduced freight cost by over 50% by effectively managing freight movement from suppliers to its distribution/fulfillment centers.

7.1.1.2 Customer Effectiveness

1) Before LSS deployment, Staples improved approximately 60 processes per year. After LSS deployment, the company has improved more than 300 processes.

2) Staples rebalanced lease negotiations and construction processes improvement activity. Hence, the time needed to open a new store was reduced by four weeks. These efforts also resulted in higher sales equivalent to the annual sales of eight new stores.

With Lean Six Sigma deployment Staples (the world's largest retailer for office products) produced a 10-fold return on the investment is made in the process improvement program and thus generated tens of millions of dollars in benefit (www.goleansixsigma.com).

7.2 Financial Evaluation Metric

Following hypothetical illustration of a grocery retailer provides step-by-step methodology for analyzing and measuring the financial impact of LSS deployment by a retailer.

7.2.1 Illustration

In this illustration of a grocery retailer, it is assumed that the performance of various retail operations improved at least by 1% on LSS deployment. These activities are segregated

according to revenue and cost items required for net profit calculation. In **Table 3**, the initial case represents the existing operations of a grocery retailer, while the final case represents the performance of a grocery retailer after LSS deployment.

As calculated in Table 3, gross profit, operating profit, and net profit increase on the deployment of LSS by a grocery retailer. With a 1% positive impact on all line items of these calculations, the final net impact on net profit will be more than 13%. With the increase in efficiency and effectiveness of various processes, LSS deployment enhances the overall performance of a grocery retailer.

8. MANAGERIAL IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

In the current era of stiff competition with both offline and online retailers, the retailers must make improvements in existing processes to survive and grow. By analyzing, monitoring, and making retail operations more efficient and effective, the retailer will build competitive advantages. According to Peng et al., (2011), certain intended competitive capabilities can be developed with competitive priorities. The priority of operations is described by competitive priorities such as cost, quality, speed (or delivery time), and flexibility (Wheelwright, 1984; Fine and Hax, 1985). Retail LSS attempts to strengthen these

competitive priorities for performance improvement of retail operations. With retail LSS, the improved performance of a retailer in these competitive priorities will increase the cost efficiency and customer effectiveness of a retailer. With retail LSS initiatives, traditional retail operations are transformed to represent various competitive capabilities. Future research may focus on LSS deployment among various retail formats as well as types and quantify various benefits of retail LSS by using the evaluation metric developed in this research.

9. CONCLUSIONS

Lean Six Sigma (LSS) improves the operational performance of the retailers by making improvements in various retail processes. As LSS transforms the existing business operations of a retailer, it leads to many cost advantages. With such transformations, it also creates differentiation advantages by converting business strategy from vision to reality. With LSS deployment, retailer reduces cost, enhances customer satisfaction, and creates value for the customers by enhancing customer value propositions. Retail LSS enhances store performance by increasing cost efficiency and customer effectiveness. Retail LSS synergy adds more science to the art of retail selling and builds new operational capabilities for the retailer. As retail LSS synergy drives sustainable improvement across various performance drivers, it enhances enterprise value and improves overall performance. The research proposes a retail LSS synergy framework as well as a

financial evaluation metric to underscore the roles of LSS in improving retail store performance.

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Enhances Customer Effectiveness (Better customer value proposition)

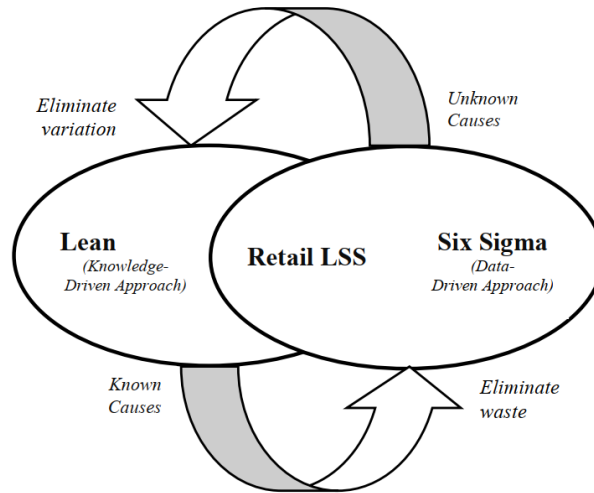


Figure 1: Retail LSS Synergy: Enhancing Cost Efficiency and Customer Effectiveness in Retail Operations

(Source: Framework developed by the author)

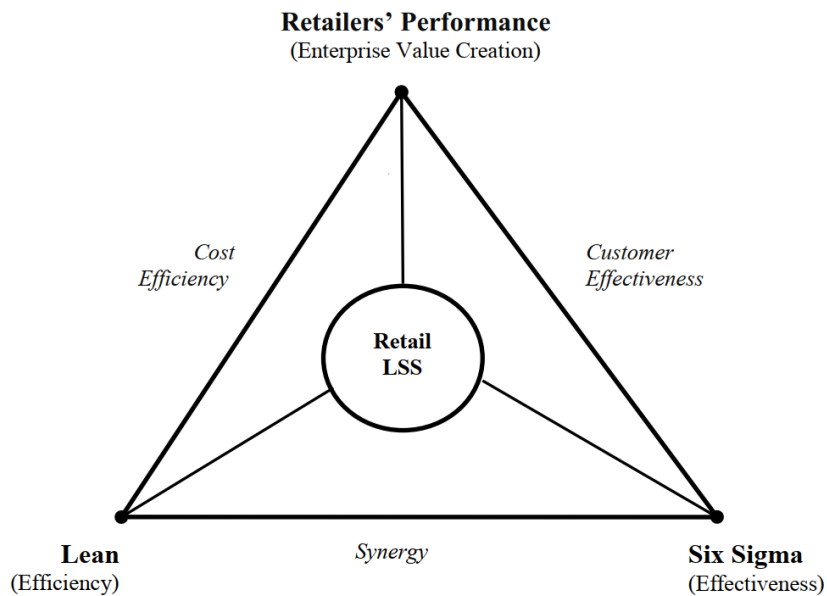


Figure 2: Retail LSS Synergy Framework: Enhancing Retailers' Performance

(Source: Framework developed by the author)

Table 1: Lean Six Sigma Deployment: Transformation of Retail Operations

Sr. No.	Lean Six Sigma Deployment in Retail Operations: Various Advantages	
	Cost Efficiency	Customer Effectiveness
1	Reduced inventory obsolescence	Better product availability
2	Low carrying cost of inventory with better inventory control	Order completeness and correctness
3	Reduced third-party storage	Low stock out level
4	Reduced process wastes and resultant cost benefits	Quick checkout/delivery (less waiting time)
5	Reduced cost of poor quality	Enhanced competitiveness
6	Administrative saving with efficient order management, purchasing, merchandise labor, process cycle time, etc.	High customer service level with quick response to customer needs. Increased customer satisfaction and better customer experience

Table 2: Retail Lean Six Sigma Deployment: A Financial Evaluation Metric

Sr. No	Financial Evaluation Metric		
	Methodology for Gross Profit, Operating Profit, and Net Profit Calculation	Impact of Lean and Six Sigma Synergy	Overall Financial Impact
(A)	Total Revenue	<ul style="list-style-type: none"> • Quick response to retail customers' needs • Desired products a readily available • Less customer churns 	Increase
(B)	Cost of Goods Sold (COGS)	<ul style="list-style-type: none"> • Better control of material & labor costs • Optimized inventory • Reduced wastes 	Decrease
(C)	Gross Profit (GP) = (A) - (B)	<ul style="list-style-type: none"> • Higher gross profit 	Increase
(D)	Depreciation Expense	<ul style="list-style-type: none"> • Better asset utilization 	Decrease
(E)	Selling, General & Administrative (SG&A) Expense		
(E1)	Selling Expense	<ul style="list-style-type: none"> • Customer acquisition cost reduced 	Decrease

(E2)	G & A (General & Administrative) Expense	<ul style="list-style-type: none"> • Lower transaction expenses • Increased transparency and visibility • Better resource utilization 	Decrease
(F)	Logistics Expense	<ul style="list-style-type: none"> • Better transparency and visibility across the supply chain • Optimized transportation expenses • Lower freight expenses 	Decrease
(G)	Operating Profit (OP) = (C) - (D) - (E1) - (E2) - (F)	<ul style="list-style-type: none"> • Increase in operating profit 	Increase
(H)	Interest Expense	<ul style="list-style-type: none"> • Less requirement of working capital needs with better management of operating cycle (i.e., decrease in seasonality, cyclicity, and volatility) 	Decrease
(I)	Net Profit (NP) = (G) - (H)	<ul style="list-style-type: none"> • Higher net profit 	Increase

**Table 3: Illustration of Retail Lean Six Sigma Deployment:
Financial Evaluation Metric**

Sr. No.	Methodology for Gross Profit, Operating Profit and Net Profit Calculation	Impact of Lean and Six Sigma Synergy	Initial Case *	Final Case	Net Financial Impact
(a)	Sales Revenue (\$)	Higher Customer Effectiveness	100	101	1
(b)	Cost of Goods Sold (COGS) (\$)	Higher Cost Efficiency	70	69.99	-0.01
(c)	Gross Profit (\$) = (a) - (b)		30	31.01	1.01
(d)	Depreciation Expense (\$)	Higher Cost Efficiency	3	2.97	-0.03
(e)	Selling Expense (\$)	Higher Customer Effectiveness	6	5.94	-0.06

(f)	G & A (General & Administrative) Expense (\$)	Higher Cost Efficiency	4	3.96	-0.04
(g)	Logistics Expense (\$)	Higher Cost Efficiency	2	1.98	-0.02
(h)	"Operating Profit(\$)	15	16.16	1.16	
(i)	Interest Expense (\$)	Higher Cost Efficiency	6	5.94	-0.06
(j)	Net Profit(\$) = (h) – (i)		9	10.22	1.22
(k)	Increase in Net Profit (%)				13.55