

Lean Six Sigma in Healthcare Sectors

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Abstract - Healthcare is a very important sector as our lives depend on it. This paper examines Six Sigma's feasibility in the healthcare sector. A hospital or healthcare industry with flaws and loopholes may mean the difference between life and death. As a means of reducing variation in service quality using the quality management tool Lean Six Sigma (LSS) in hospitals, this research aims to mitigate mishaps and increase patient experiences during hospital visits. By reducing defects and wastes, Lean Six Sigma (LSS) is an organizational methodology that increases process capability and efficiency.

Key Words: Healthcare, Six Sigma, service quality, Lean Six Sigma

1. INTRODUCTION

Recently, there has been much interest in applying Six Sigma statistical techniques to improve processes. The application of Six Sigma is vital to process improvement in traditional manufacturing firms. Many service-focused companies achieve similar improvements by applying Six Sigma concepts, including reducing waste in internal processes and improving customer-facing metrics. The Six Sigma methodology can be applied to improve the financial and operational performance of healthcare organizations. When it comes to healthcare, there is little margin for error. Simple mistakes can impact hundreds of people and can lead to fatalities. These preventable deaths can be reduced dramatically with Lean Six Sigma.

Six sigma is simply a tool for quality measurement that aims to be as close to perfection as possible. It is a disciplined approach and methodology to remove defects from all processes and products, from manufacturing to service. The statistic measures how close the process or product is to the target value. In order to achieve six sigma levels, 3.4 defects per million must not be produced by the process. Using the six-sigma tool, you can drastically reduce process variability and assignable causes. Lean means speed, and it applies to all processes. In lean metrics, process cycle efficiency is used to identify unnecessary operations or activities.

2. Philosophy

In most cases, management issues can be identified and eliminated with the use of management tools. Six Sigma has demonstrated its value in this area. Not only is it a systematic data-driven approach, but it can also be used as a cost-effective tool. Management's primary goal is to develop an operational system that will completely eliminate medical errors. In theory, if six sigma is implemented in healthcare services, particularly at the hospital's reception desk, it shows that 9,999,966 patients out of 1,000,000 will be

satisfied. These expected results motivate hospital management and administration to implement Six Sigma. Also, unnecessary processes and movements of hospital staff can be seen that are not necessary. The lean philosophy may provide an opportunity to mitigate these issues. By eliminating inefficient processes, it believes errors can be eliminated. In the context of the competition over resources and capital, a result of the Second World War, Taiichi Ohno and his associates developed the lean philosophy at Toyota Production System. It is also credited with being the originator of just-in-time (JIT) production strategies, a component of lean philosophy, and so the Toyota production system remains a model of brilliance for a proponent of lean philosophy. Based on the Lean philosophy, defects are the result of irrelevant processes or unnecessary activities. Six Sigma, on the other hand, emphasizes process incapability.

3. Methodology

Each problem has two phases. In the first phase, the root cause is identified, and in the second phase, Six Sigma tools are applied, e.g., DMAIC or DMADV based on the data and information gathered. Analyzing and solving problems constitute the second phase. Both are useful and essential. But DMAIC is used more frequently than DMADV due to the fact that it uses existing resources to provide a solution. Instead, DMADV uses a new method to solve the problem. Below are the steps involved in DMAIC and DMADV.

DMAIC	DMADV
D—Define Includes identification and determination of problem to conduct business process to define we can use a cause-effect diagram, interview and survey and method study. This is a Foremost critical step	
M—Measure Suitable measurement should be taken to identify the culprit and compare different processes. Stopwatch and work measurement method can be used for measurement	
A—Analysis Includes critically examine the steps involved in each process from demand's perspective to approach the goal	
I—Improve Include attempt to make changes for reducing error and improve existing process. Change management is a management tool to improve an existing process	D—Design Includes adaptation of a new process or idea to achieve a goal and eliminate error or defects. Brainstorming and BPR can be an effective tool
C—Control If the improved process works properly and satisfied then Next step is to maintain it	V—Verify Includes testing of new process or idea and verify it up to enormity

Fig 1. Steps involved in DMAIC and DMADV

4. Six Sigma in Healthcare

4.1 Hesitant entry

Healthcare embraced six sigma slowly, and initially a lot of skepticism surrounded it. Hesitancy resulted from disparities between processes that are driven by humans versus processes that are automated or engineered. The automation of manufacturing can eliminate most of the human variability, resulting in precise measurements of assignable causes of variation. In healthcare, however, the process of delivering care is mostly human and the causes of variability are often far more subtle and difficult to quantify.

Commonwealth Health Corp, in partnership with G.E., was the first health care organization to fully incorporate Six Sigma into its culture. Their efforts resulted in improvements of more than \$1.2 million, a 33% improvement in radiology throughout, and a 21.5% decrease in cost per radiology procedure. While adopting Six Sigma, health care organizations faced the challenge of finding ways to use data to influence human behavior. It appears to be most successful when providers combine a strong technical strategy with a sound cultural strategy, such as a change acceleration process and a sound operational mechanism.

4.2 Application in health care

Any process or service line that can provide measurable response variables can benefit from the DMAIC (define, measure, analyze, improve and control) approach. There are four categories of metrics that may define the performance of a health care delivery system:

1. **Service Level:** In terms of service level metrics, they indicate whether the system is capable of meeting the expectations of patients, referring physicians, and other stakeholders, which are critical to quality parameters (CTQs).
2. **Service cost:** An organization's service cost metrics show how much it costs for its services to meet patients' expectations. These indicators include the cost per unit of service, labor productivity, and other costs associated with providing services.
3. **Customer Satisfaction:** It is possible to segment indicators into specific groups, including patient and family, referring physician, staff, and payer.
4. **Clinical Excellence:** There are a number of indicators related to specific treatment pathways or departments, such as adherence to the guidelines for prescribing aspirin to patients with myocardial infarctions or the reduction of hospital-acquired infections.

The majority of health-care organizations use some combination of these four metrics to measure performance, but this can be misleading since they often represent an average. It is rare for customers to experience average

performance from a system; the customers experience the variability instead. Below are the advantages of using six sigma

Examples of Six Sigma project initiatives in health-care organizations

Supply chain management	Billing accuracy	Insurance denials
Documentation	Human resources	Inventory control
Patient satisfaction	Care coordination	End of life care
Speed and accuracy of admissions	Accuracy of lab results	Surgery scheduling
Emergency department patient flow and cycle time	Laboratory and radiology cycle time	Antibiotic administration
Referral authorization	Billing, coding and reimbursement	Bed availability

Fig.2 Advantages of Six Sigma

5. Challenges

Even though Six Sigma initiatives have demonstrated benefits in service-oriented environments, manufacturing continues to be the focus of Six Sigma programs. There are many challenges associated with Six Sigma implementation in service industries. Companies implementing Six Sigma in a service-oriented environment face three major challenges:

1. **Metric identification is difficult in service-oriented (non-production) environments.** The selection of appropriate metrics by companies in service industries is hampered by two main challenges:
 - **Creating a measurement of a process.** In Six Sigma projects focused on production, companies are able to measure product defects. It can be challenging for firms to identify processes which can be measured in defects per million in a service environment.
 - **Dealing with customer variability.** Six Sigma is often applied to customer service metrics in service companies. Due to this greater variability of responses, response differences (and defects) cannot be segmented individually.
2. **Cultural changes and the development of Six Sigma leaders are challenging for non-manufacturing firms.** Creating new behaviors that help achieve new goals and missions is what shapes the vision of the Six Sigma culture. Resistance begins when new behaviors are created.
3. **Non-production environments are unable to reap the benefits of Six Sigma applications.** Six Sigma projects must demonstrate cost savings. In the past, companies had difficulty proving the value of other quality improvement strategies. Six Sigma projects often require patience and time before results can be demonstrated and employees can see their progress. Those companies that fail to set and achieve financial goals may abandon Six Sigma projects within a short timeframe.

6. Conclusion

Healthcare is a very important and complex field, since it involves many departments, and a failure in one department may negatively affect patient care. Through successful implementation of Six Sigma throughout the health care sector, this methodology has proven its benefits. Implemented properly, Six Sigma delivers significant benefits in terms of operational efficiency, cost-effectiveness, and process quality. While Six Sigma initiatives in health-care organizations may start as a way to improve internal processes, eventually they become an indicator of future performance and growth. In conclusion, the application of Six Sigma is extremely effective in producing benefits for health-care organizations. The commitment and extensive training of healthcare organizations' employees in Six Sigma will continue to reap short and long term benefits.

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