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Determining the Effects of Six Sigma Application in Healthcare Services: A Theoretical Approach

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Abstract: Six-Sigma is a quality improvement strategy i.e. essential to generate nearly perfect products and services. Six Sigma is amongst the best alternative way to confront the weaknesses in Indian healthcare system. The Six Sigma methodology is helpful in reducing queuing time, waiting time, faulty medical records, diagnostic result turnaround times, accounting procedures, patient's staying time, in-patient andout-patient departments, medication errors etc. Six Sigma, along with Lean thinking, can be an operational context for creating methodical efforts in healthcare. By implementing Six Sigma, the organizations can regulate healthcare cost, improve quality and be able to provide better healthcare services.

Keywords: Healthcare, Quality, Service, Patient

Introduction

Healthcare is one of India's largest service sectors. India's flourishing economy is having average income levels, growing urbanization, creating an increasing middle class and responsiveness towards health services. Healthcare is a service industrythat has certain unique features. In healthcare organizations, patients may be considered as customers. The services which are provided by healthcare organizations are very important as it directly involves the human element;this is the reason why government is directly regulating this sector. Patient care meaningfully comprises human component as compared to machine elements, in which the unpredictability is restrained and very difficult to quantify. The challenges which healthcare faces are significant, from the need to decrease mortality rates, develop physical infrastructure, necessity to provide health services, certifying availability of skilled medical people etc. There are significant scarcities of hospital beds and competent medical personnel such as doctors and nurses. At the present time, healthcare organizations are composite systems that tend towards improving quality of care and meeting rigid guidelines. Therefore, re-examining the method of assessing the service performance is becoming more important.

The price of medical care is growing at a distressing and indefensible amount worldwide. Undoubtedly, a noteworthy proportion of these price increases can be credited to an aging population and technological developments. The Six Sigma approach improves service quality and customer satisfaction by decreasing the cost of process and increasing business revenue. Healthcare organizations started using this concept after it was fully developed, tested and implemented successfully in organizations such as Toyota and General Electric. The Six Sigma approach is useful in reducing queuing time, waiting time, faulty medical records, diagnostic result turnaround times, accounting procedures, patient's staying time, in-patient andout-patient

departments, medication errors etc. It also helps the healthcare centre to accomplish continuous improvements in the healthcare service by ensuring accurate results in a well-organized manner. This methodology helps to diagnose and treat patients with a quality of care.

History of Six Sigma

Six Sigma is presently a prevalent and extensively realistic program for quality advancement. It was originally developed to uplift Motorola's in-house quality management practices in 1987, but has since extended its importance after acceptance and implementation by General Electric in the mid-1990s (Harry and Schroeder, 2000; Snee and Hoerl, 2003). Though this concept is the consequence of a series of developments in quality management that started in the early 1930s (Box and Bisgaard, 1987; Garvin, 1988; Snee, 2004), Lean Thinking and Six Sigma have gone through similar developments in recent years. Both the approaches are now widely used in administrative and service areas, although they were previously applied to the manufacturing practices (Snee & Hoerl, 2004).

Six Sigma is positioned by going through the enhancement and improvement projects. Project selection is typically constructed on a conversion of the company's business strategy into operational goals and objectives (Pyzdek, 2004). The platform is categorized by its customer-driven approach, importance on decision making, centred on careful investigation of quantitative data, and a significant cost minimization (Bisgaard & Freiesleben, 2004). Typical Six Sigma projects include improving quality, reducing defectsand variations, and growing output but usually involve organised process innovation (Bisgaard & De Mast, 2005).

Objectives of Work

1. To determine the various effects of Six Sigma methodology on healthcare sector.
2. To find out the constituents which affects the service quality in healthcare sector.
3. To study the importance of Six Sigma methodology in healthcare sector.

Research Methodology

This paper is solely based upon secondary data. As this is a theoretical approach, the data for this work is organized and collected from various research papers, journals, books, magazines etc.

Though it is impossible to classify the various approaches to discipline with rigid discriminations, so the researcher used a broad classification to streamline the things about six sigma methodology; having the terms such as a concept, overview, recombination, simplification, assumption, feasibility, application of theory. By this terms, one can check the applicability of Six Sigma can easily.

What is Six Sigma?

Six Sigma is the amount of quality which brings the excellence in all departmental practices in an organization. It is a technique or method of reducing defects using disciplined, data focused and driven methodology. In Six Sigma, all the procedures are led for six standard deviations between the mean and nearest measurement limit, in any progression related to various activities like manufacturing, services, health care. Six Sigma demonstrates the statistical representation of a process and its execution. To attain Six Sigma, a method or a process should not produce more than 3.4 defects per million opportunities. Anything which is exterior and not meeting the customer expectations is called as Six Sigma defect. Six Sigma defects can be reduced by implementing the standard and well organized practices.

Six Sigma in Healthcare

By analysing patients' needs and wants along with their expectations for quality, healthcare organizations may deliver better services to improve patient care. There are many scholars who say that Six Sigma is made known to meaningfully impact healthcare management, practices, and direct patient care, resulting in both cost reductions and quality improvement.

Although the need is to transfer patients more rapidly from one department to another, such as the emergency department to a hospital room, or improve turnaround times for laboratory procedures, Six Sigma can be helpful for healthcare organizations to maximize resource utilization, eliminate waste and get the benefits, like reducing costs and increasing patient satisfaction.

Wastage in Healthcare Sector according to Six Sigma

Any activity which does not directly add value to customer is called as waste by Six Sigma:

Table 1

Waste	Definition	Example in Healthcare
Over production	Creating more than the customer needs	Pills given early without disturbing staff schedules,
Transportation	Movement of Goods, equipment or anything which does not add value	Moving samples, transferring patients for testing, treatment, etc.
Motion	Movement of people that does not add value	Searching for patients, physicians, documentation, supplies, equipment, etc.
Waiting	Idle time produced when any material, information, personnel or equipment is not ready	Patients waiting for bed allotments, admission to emergency departments, testing and treatment, discharge, lab tests results
Over processing	The process which does not add value from the customer's viewpoint	Retesting, Unnecessary documentation, procedures
Inventory	Goods, equipment parts, or products on hand thatthe customer wants	Bed allotments, Stock of pharmacy, supplies from laboratory, analysis of samples

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Six Sigma in Practice

At its fundamental, the six sigma approach focusses on customer perspectives by refining procedures to eliminate waste and inefficiencies. The application of Six Sigma is based on the following five important principles:

1. ***Required Value***: Explain the value from a customer's standpoint.
2. ***Categorise Value Chain***: Evaluate the procedural steps; eliminate any step that does not directly add value and leads to attaining a specific goal.
3. ***Movement without Disturbances***: Each and every time possible, eliminate waste.
4. ***Customer "pulls" Services***: Permit the consumer to receive or demand products or services whenever they need; if a customer is not ready to accept a product or service then one should not force them for the same.
5. ***Follow the Excellence***: Adapt the changing environment and analyse the customer's perspectives to fulfil the required product or service which have utmost prospective improved quality.

Success Ingredients of Lean Six Sigma

For so many years, the success of Six Sigma is discussed and reviewed in literature world. However, the Six Sigma program to be nurtured by some assured success ingredients. From this intuition, the literature world has done a systematic review to bring into notice the essential critical success ingredients of Six Sigma. These success ingredients and methodologies of Six Sigma are listed below (Byrne *et al.*, 2007; Delgado *et al.*, 2010; Naslund, 2008; Nonthaleerak and Hendry, 2008; Snee, 2010):

Deployment Process of Six-Sigma Projects

In practice, Six Sigma assignments are executed in five phases usually comprising of 'Define–Measure–Analyse– Improve–Control (DMAIC)', where DMAIC focuses on eliminating defects by reducing variability in operation.

- ***Define***: the customer, their quality problems/issues and project objectives.
- ***Measure***: the performance of steps and procedures involved
- ***Analyse***: the collected data and process map. Identify causes and effects, if anything goes wrong find solution to minimize it.
- ***Improve***: the process by scheming innovative solutions
- ***Control***: the processes by continue quality improvements practices

DMAIC Methodology

However, there are various tools and techniques which are used in different types of methodologies in a Six Sigma program. Thus, it seems that DMAIC approach adopted some of these tools and methods in order to be implemented effectively. For this reason, the basic tools in each stage are listed below:

1. ***D = Define:*** Pareto analysis, map program
2. ***M = Measure:*** Descriptive statistics, process capability analysis, Six Sigma metrics, MSA, FMEA, and QFD
3. ***A = Analyse:*** Detailed process map, fishbone diagram, test cases, correlation analysis and regression
4. ***I = Improve:*** Design of experiments, probability plot, and scatter diagram
5. ***C = Control:*** Statistical process control, check sheets, hypothesis tests

Other Six Sigma Tools and Techniques

These are various practical methods and skills developed by Six Sigma project teams to cope up with quality related issues for getting performance improvement (Aboelmaged 2010). While Six Sigma tools always have particular roles which are often focussed, Six Sigma technique has a broader application and needsprecise skills, creativity and training (Antony, 2004). Six Sigma tools comprises of Pareto analysis, process mapping or process flow chart, Gantt chart, root cause analysis, affinity diagrams, histograms, run charts, quality function deployment (QFD), brainstorming, etc. Six Sigma techniques include statistical process control (SPC), suppliers-input-process-output-customer (SIPOC), process capability analysis, benchmarking, etc. Furthermore, a Six Sigma technique can employ numerous tools. For example, statistical process control (SPC) is a technique that employs different tools such as control charts, histograms, and root cause analysis, etc. (Antony &Desai, 2009):

Some Statistical Tools (Antony & Desai, 2009)

- Histogram
- Run charts
- Scatter Diagram
- Measurement of system analysis
- ANOVA
- Design of experiments
- Process capability analysis
- Taguchi methods

Effects of Six Sigma on Healthcare Sector Services

- Decreasing the number of mistakes done by physicians, nurses and operators/technicians
- Improving lab turnaround times
- Reducing waiting times for appointments
- Decreasing the steps in the value and supply chain
- Increasing the speed of reimbursement and settlement of insurance claims

But Six Sigma initiatives in healthcare can also bring important organizational benefits for healthcare institutions, comprising the following benefits:

- Better patient outcomes: Increase value aimed at patients by providing improved healthcare services that more precisely treat medical conditions and decrease the rates of recurrence.
- Increased patient satisfaction: Patients who are satisfied, probably remain loyal with healthcare suppliers who provides quality services in an appropriate manner and are less likely to change healthcare suppliers.
- Decreased operational costs: These initiatives characteristically lead to improved operating efficiencies that result into reduced staffing and facilities supplies. Personnel can be organised to perform additional value-added purposes and can be transformed to provide new or extended services.
- Robust financial performance: By improving efficiency and decreasing expenses, healthcare organizations can accomplish stronger financial results.
- Better employee engagement: Empowered personnel are more engaged, and are likely to display higher levels of job satisfaction. These efforts can result into improved employee retention and condensed turnover rates.

Implementation Challenges of Six Sigma in Health Care

Six Sigmain healthcare sector can come across many challenges as health care sector work in a different way than other manufacturing sectors. Key challenges of this sector are discussed here. (Fawaz Abdullah, 2003)

Customer Satisfaction

Six Sigma implementation needs different mindset from higher management and also from the employees of organization. Customer satisfaction is a very important criteria in healthcare sector as it includes focus on numerous customer supplies and the services delivered.

Changing Customer Desires

There are lots of variations in customer's wants to obtain healthcare services. These desires are not predictive and incline to change according to condition.

Different Types of Services

Healthcare sector often provides different types of services to customers and they vary from customer-to-customer. It becomes extremely challenging to maintain record and insufficiencies in these many service offerings.

Lack of Information

Healthcare industry has diverse types of challenges. Most of these challenges come from:

1. Less consideration of quality
2. Ever changing and flexible customer desires
3. Improper data management system
4. Lack of personnel and other resources management practices
5. Unskilled middle level and lower level management

Conclusion

Healthcare service industry is facing a lot of challenges and competition. Implementing Six Sigma is very significant to improve the quality practices of these services. Six Sigma can definitely be used to categorise and reduce many wastes and mistakes in patient carefulness and increase patient satisfaction.

Healthcare service providers are going through the transformation and the management of these organizations are pursued to create and implement advanced techniques to increase the quality of service and reduce costs. Traditionally applied in production and manufacturing, these practices are currently being implemented in non-manufacturing and production interrelated settings containing healthcare environments. Six Sigma provides substantial benefits over quality improvement simulations by improving efficiency and reducing waste while instantaneously refining quality of patient care. Six Sigma specifically focuses on increasing value and has the potential to provide balanced effect in healthcare, increase the job satisfaction of healthcare professionals, and essentially improve the health of our societies.

References

[1] Aboelmaged, M.G. (2010), Six Sigma Quality: A Structured Review and Implications for Future Research", *International Journal of Quality & Reliability Management*, Vol. 27(3), pp. 268–317.

[2] Antony, J. (2004), Some Pros and Cons of Six Sigma: An Academic Perspective", *The TQM Magazine*, Vol. 16(4), pp. 303–306.

[3] Antony, J. and Desai, D.A. (2009). "Assessing the Status of Six Sigma Implementation in the Indian Industry: Results from an Exploratory Empirical Study", *Management Research News*, Vol. 32(5), p. 413.
[4] Antony, J., Kumar, M. and Madu, C.N. (2005), "Six Sigma in Small and Medium Sized UK Manufacturing Enterprises", *International Journal of Quality & Reliability Management*, Vol. 22(8), pp. 860–74.
[5] Bisgaard, S. and Freiesleben, J. (2004), "Six Sigma and the Bottom Line", *Quality Progress, September*, Vol. 37, pp. 57–62.
[6] Byrne, G., Lubowe, D. and Blitz, A. (2007), "Using a Lean Six Sigma approach to Drive Innovation", *Strategy & Leadership*, Vol. 35(2), pp. 5–10.
[7] Abdullah, Fawaz (2003), "Lean Manufacturing Tools and Techniques in the Process Industry with a Focus on Steel", *PhD Thesis*, University of Pittsburgh.
[8] Garvin, D.A. (1988), Managing Quality: The Strategic and Competitive Edge, New York: Free Press.
[9] Harry, M.J. (1997), *The Vision of Six Sigma*, 5th ed., Tri Star, Phoenix, Arizona.
[10] *India's Healthcare System–Overview and Quality Improvements*, Reg. no. 2013/012 Swedish Agency for Growth Policy Analysis Student Plan 3, SE-831 40 Östersund, Sweden.
[11] Naslund, D. (2008), "Lean, Six Sigma and Lean Sigma: Fads or Real Process Improvement Methods", *Business Process Management*, Vol. 14(3), pp. 269–287.
[12] Fursule, Nilesh V. and Bansod, Satish V. (2012), "Understanding the Benefits & Limitations of Six Sigma Methodology", *International Journal of Scientific & Research Publications*, Vol. 2, Issue 1, January 2012, ISSN: 2250-3153, pp. 1–8.
[13] Nonthaleerak, P. and Hendry, L. (2008), "Exploring the Six Sigma Phenomenon using Multiple Case Study Evidence", *International Journal of Operations and Production Management*, Vol. 28(3), pp. 279–303.
[14] Pyzdek, T. (2004), "Strategy Deployment using Balanced Scorecards", *International Journal of Six Sigma and Competitive Advantage,* Vol. 1(1), pp. 21–28.
[15] Snee, R.D. (2004), "Six Sigma: The Evolution of 100 Years of Business Improvement Methodology", *International Journalof Six Sigma and Competitive Advantage*, Vol. 1(1), pp. 4–20.
[16] Snee, R.D. and Hoerl, R.W. (2004), *Six Sigma Beyond the Factory Floor,* Upper Saddle River, NJ: Pearson Education.
[17] Kulkarni Sumant, Attarwala, Pinkesh Kumar and Dwivedi, Suren N. (2011), "Application of Lean-Six Sigma to Improve Quality in Healthcare Industry", p. 5.
[18] Desai, Tushar N. and Shrivastava, R.L. (2008), Six Sigma–A New Direction to Quality and Productivity Management, WCECS 2008, October 22-24, 2008, pp. 1047–1052.
[19] Final_Applying-Lean-Principles-to-Improve-Healthcare-Quality-and-Safety retrieved from https://library.ul.com/wpcontent/uploads/sites/40/2015/02/UL_WP_ _v11_HR.pdf
[20] six-sigma/six-sigma-improving-healthcare Retrieved from https://www.villanovau.com/resources/ /#.WfwT64-CwdU