

PalArch's Journal of Archaeology of Egypt / Egyptology

INTEGRATING SIX SIGMA WITH QUALITY CONTROL SYSTEM TO BUILD AND CONTINUALLY STRENGTHEN INSTITUTIONS

Bibhuti B Pradhan

Department of Management, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar,
Odisha

Email: - bibhutibhusanpradhan@soa.ac.in

Bibhuti B Pradhan: Integrating Six Sigma With Quality Control System To Build And Continually Strengthen Institutions -- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(6). ISSN 1567-214x

Keywords: Continuous Improvement, Higher Education, Lean Project Management, Quality and Six Sigma.

ABSTRACT

Competitiveness, creativity and success are the key words which better describe the current business environment's goals. Concepts such as quality and continuous improvement are essential players in achieving certain goals under the given circumstances. As a whole, higher education plays a number of functions, such as: educating students and preparing them for the economic world by involving them in teaching-learning and study processes, and setting the example of a program whose outcomes meet the organizational objectives by implementing Six Sigma; The paper focuses on how Six Sigma is applicable to higher education, and how Six Sigma is combined with one of the quality management frameworks, namely the ISO 9000 model, for university growth and continuous improvement. A synergetic approach generated by the study and combined use of the advantages of Six Sigma and ISO 9000 plays a significant role in the growth and progress of an institution of higher education.

1. Introduction

Lean Six Sigma (LSS) has been used as a philosophy in business transformation that combines two distinctive philosophies in management: Lean and Six-sigma complement each other to optimize procedures and outcomes for companies. This integration was accomplished by integrating

their methods and principles using the DMAIC cycle (defining, evaluating, assessing, developing, controlling) as the basis for continuous mutual improvement and joint efforts to minimize manufacturing defects and process variability together with process simplification and standardization and waste reduction.

Some attempts have already been made to extend the DMAIC loop to project management activities and process improvement. Six Sigma initiatives are projects that produce a single result, such as project management, while there is a great potential for convergence between DMAIC and project management activities, in which DMAIC would concentrate on seeking solutions to challenges and opportunities based on data-sustained decisions and projections. Also for Reverse the inclusion of DMAIC measures in each project will allow project managers not only to become more effective but also to achieve creative results, arguing that Six Sigma can be applied to providing project management:

- Sufficient understanding of the statistical processes to better explain and improve future outcomes;
- Solid stage collection and process optimization tools;
- Understanding of uncertainty so as to minimize instinctive reactions;
- Facts-based assessments and practical objective analysis.

From the lean perspective, Williams and Gerber argue that there are usually bottlenecks and conflicts to be attended in project management, making integration into project management a necessary powertrain. The author proposes a corresponding ID value stream map (VSM) of the project system, defining the presence of losses and trouble spots and the root causes of these problems. Once the current value stream map has been established, a potential value stream mapping can be planned, with the enhancements already identified, being tailored to the project management in real time. The most critical aspect of the entire operation is to expose the holes or defects in a business method. Within the technique, there are several Six Sigma methods that first help the Six Sigma practitioners in charge develop the most important processes. One of the most important things to note about the Six Sigma process is that to temporarily mask a business problem it doesn't rely on quick-fix programs [1]–[3]. This is a structured hard work approach, which is combined with a process of controlled, objective, data-based and predictive problem-solving. Therefore it affects almost all facets and levels of an organization or institution that, if not adequately explained, may cause confusion among employees through a process called change management. You will cut the amount of guesswork and product testing to a fraction, saving both time and money. The following are some of the common processes in educational institutions that can be dramatically improved by implementing the Six Sigma methodology: academic achievement, college admission process, teaching and training programs, research plan and process, institutional quality, student learning success, instructional delivery evaluation, accreditation process. While the actual working meaning of the word, Six Sigma, now varies from enterprise to enterprise and country to country, the concept behind it is

clear. The aim is to transform output into a process using statistics, methods, and data to solve problems, rather than using the approach of trial and error [4], [5]. When gathering data and statistics first, any method can be made more cost-effective, more reliable, and less time-consuming and, simply put, 'smarter' all around.

Nonetheless, little attempt has been made to tackle the LSS – DMAIC-based approach to improving project management processes that would support ongoing outcomes and enhancing business processes as suggested by the current integration.

2. Discussion

1. An overview of ISO 9000:

ISO 9000 is a well-established universal standard for quality management systems for all forms of companies in almost every industry. Developed by the International Organization for Standardization (ISO) Technical Committee 176, it has developed from a theoretical set of criteria in 1987 – based on input from businesses and organizations – to a realistic and process-oriented approach to evaluating the quality control system in 2000. Some of the most well-known models belonging to the quality management systems are the ISO 9000 standards set (Figure 1)

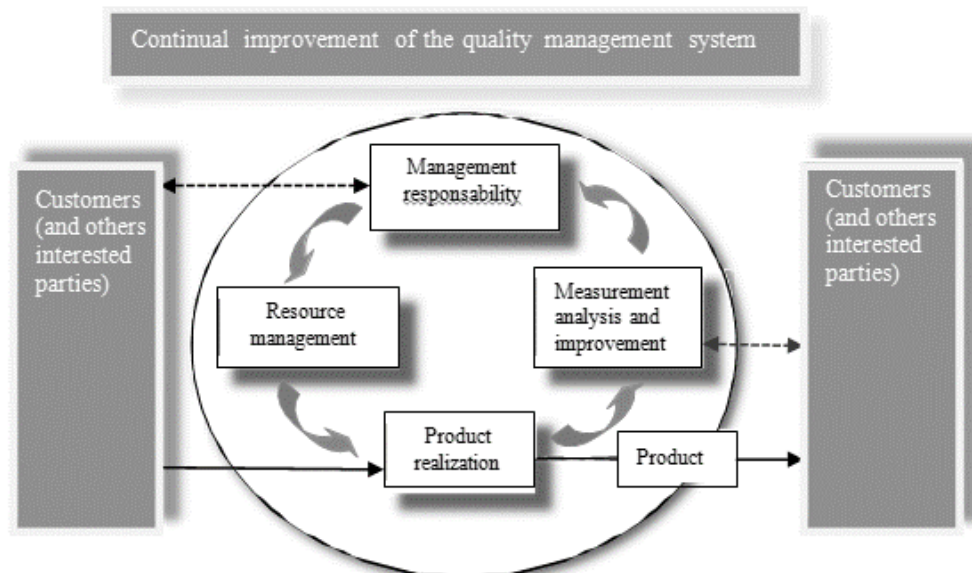


Figure 1. The ISO 9000 Process Approach

Source: International Organization for Standardization, 2011. The ISO 9000 family – core standards.

Moving on, how these concepts can be implemented within an institution of higher education is discussed.

1.1. Emphasis on customers:

To order to recognize their needs and desires, it is very important that every higher education institution recognizes its clients and stakeholders (students, teachers, parents, staff, etc.)- Following these steps, the institution of higher education aims at fulfilling its needs and satisfying its requirements in the best

possible way. The connection with Six Sigma is based on the consumer orientation concept being regarded as a requirement for an organization's performance.

1.2. People's Engagement:

This theory encourages the active involvement of individuals in diverse events, optimistic attitudes towards their innovative position and constructive attitudes towards seeking solutions. In a higher education institution, people's involvement in various activities and processes should be increased as knowledge creation, dissemination, and utilization are very important.

1.3. Management:

According to this concept, an institution of higher education must determine the direction to which it travels the purpose, the vision and the objectives to be achieved. In the other hand, it is important for the world in which people work, to give them the chance to grow. A further connection with Six Sigma can be highlighted from the point of view of developing an internal atmosphere responsive to the needs of the people.

1.4. Approaching Method:

The quality control system based on the updated edition of ISO 9000 is method based. The inputs and outputs of the teaching-learning, respectively the testing methods, are process elements that must be taken into account [6]. There is to be a fair evaluation of the risks and consequences of the implemented procedures on the different stakeholders. Higher education is seen as a network of processes where the presence of resources and their efficient usage play an significant role in achieving quality outcomes and quality educational services. The Deming cycle or PDCA (plan-do-check-act) approach can be extended to all processes under ISO 9000, while Six Sigma uses a specific methodology called SIPOC (supplier-input-process-output cus).

1.5. Management approach to the Process:

Higher education can be described as a network of interconnected processes that connect and communicate with each other under the guidance and control of the top management and the other sections responsible. Management systems are able to monitor and enhance the efficiency of the educational processes and results better.

1.6. Continuous amelioration:

This idea is fulfilled within higher education institutions by evaluating the efficiency of the processes and outcomes. Quantitative and qualitative metrics must be adopted and used, and contrasted to the satisfaction of the stakeholders. To continuously develop both research and educational products and services, the reliability and efficacy of the quality of the university processes should be improved, and the process outcomes and parameters used to assess the outcomes should be reviewed on a permanent basis. Another

potential way to test is by evaluations and/or benchmarking procedures Factual approach to decision-making. Once data is available and accurate a realistic approach is possible. An institution of higher education should develop a system specifically designed to gather and evaluate the necessary data [7], [8]. The data and the information should be transparent and available and should be evaluated first in order to make appropriate and sound decisions. In decision-making, the empirical approach is critical within Six Sigma, as all decisions are based on evidence rather than mere assumptions.

1.7. Relationships between suppliers mutually beneficial:

Lasting supplier partnerships may be accomplished and strengthened if both parties are committed to quality-based practices and results. One of the strengths of ISO 9000 has also been the criteria that make a company evaluate itself, beginning with internal audits once or twice a year and continuing with regular external audits by approved certification bodies. Such standards keep the quality management program ISO 9000 alive and up-to - date, rejecting the misconception that ISO certification is a one-time occurrence, a job only to achieve certification and display the paperwork.

2. A LSS model to project management improvement:

The key steps of each DMAIC phase are sequential according to the design of the project management cycle, and the determination of the performance of each stage is assisted by different tools and methods chosen according to the processes shown in Figure 2.

The defining phase is the beginning of a classic DMAIC approach that defines the main problem detected, as well as the initial goals, based on knowledge and organizational history of the related problem, including the view of the customer, and also identifies the related main process team structure and project main charter to be implemented to solve the identified problem [9], [10]. Therefore, as in project management practices that begin the project with the development of the project charter, the final output in the first phase of a DMAIC project is the Project Charter which contains all the required details for the next step, specifying the Critical-to-Quality specifications (CTQs), the actual process mapping as well as the problem and target definition.

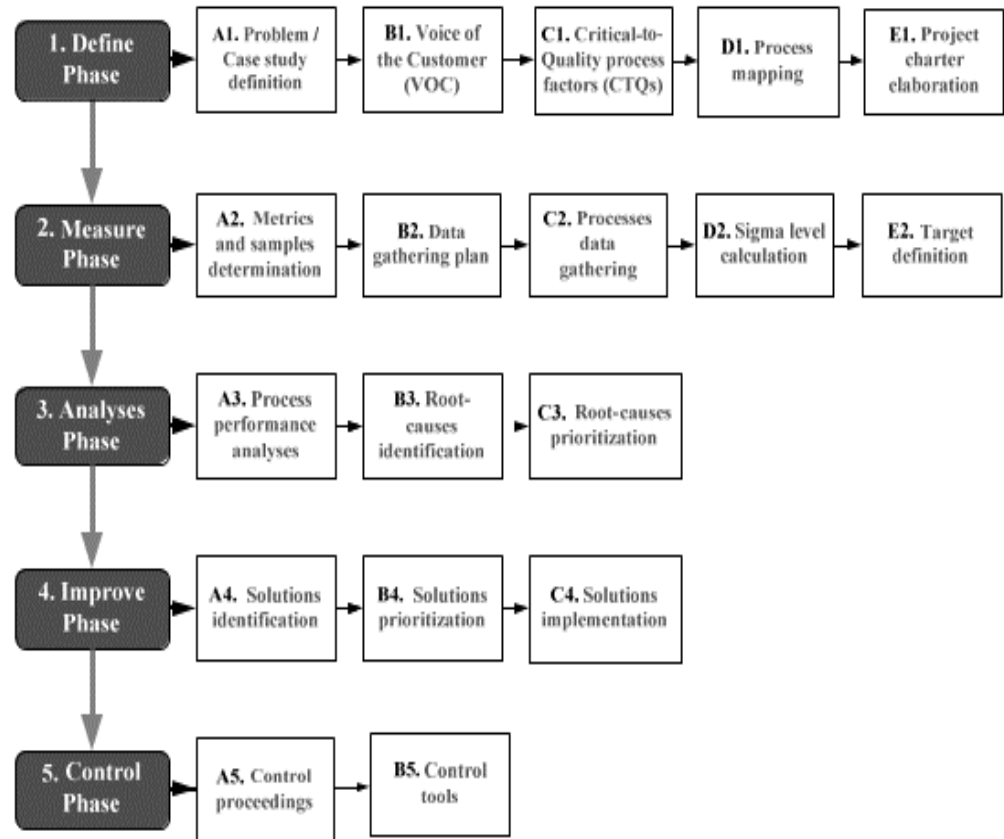


Figure 2. The Lean Six Sigma Project Management Approach Improvement Main Steps.

Classical approaches in LSS are usually achieved through statistical parametric descriptive analysis. However, due to the complexity of the data projects and the reduced levels of reproducibility and/or the special existence by design of the projects, non-parametric statistical methods must be implemented and used in classical approaches to LSS. One of the most common problems in the development processes of project management is what management process needs to be enhanced where, as the knowledge available is typically limited, dependent and discrete, classical statistical six-sigma parametric methods need to turn or incorporate non-parametric descriptive and inference alternative approaches.

One of the LSS project's most important phase is to identify the Critical-to-Quality process factors (CTQs), taking into account the Customers' opinion. The emphasis on consumers is in reality a pillar of the theory of the LSS [11], [12]. So, the final product or service to be created must represent their opinions and needs. In project management activities, customer satisfaction surveys are typically carried out in the closing process of each project that is handled. In order to detect the Voice of the Customer (VOC) on the DMAIC approach, this standard method in project management can then be used to identify the Client's principal requirements.

Another popular survey method choice is the use of free-response questions on costumers surveys that can be systematically and critically evaluated with data

/ text mining approaches to discover what would be the key improvement variables to proceed from the customer's perspective.

3. Bringing the two concepts together for the development and improvement of higher education institutions:

The advantages of Six Sigma and ISO 9000 establish a synergetic strategy that plays a significant role in the higher education institutions' growth and performance. The congruence of Six Sigma's project goals with ISO 9000 process goals is a requirement for the success of this synergetic strategy. A certain connection of target between the two models needs to be established. This condition is difficult to fulfill for complex projects. Whereas Six Sigma is based on projects that deliver financial results through customer focus, ISO 9000 is connected to projects that aim to enhance current processes and practices, achieving the same purpose, namely customer satisfaction. Such two approaches are compatible and complementary, and are used in research processes or collaborations for example. In addition to ISO 9000, Six Sigma promotes a systematic approach, using statistical approaches to evaluate and improve learning procedures and results by reducing errors and failures. Throughout the ISO 9000 manual, the preparation of a Six Sigma project and the recruiting of workers to participate are closely linked to the processes already defined and evaluated. The different levels of management that exist in a quality management system (senate chairmen, rectors, deputy rectors, Deans, tables, etc., such as ISO 9000, align with the systems defined by Six Sigma: green belts – representing professionals, black belts – representing the experts responsible for problem solving, master black belts – supporting the workers involved in the project and champions or managers (senior management) – responsible for project leadership and monitoring and execution. While several higher education institutions are struggling to resolve the problem created by the so-called "funding gap," Six Sigma programs within these organizations may provide an response to this by generating monetary benefits and potential funding opportunities through a continuous emphasis on the needs and desires of customers. A complete Six Sigma plan will have an effect on quite a few corporate structures, requiring the ISO 9000 framework to keep up with the changes. It's a strong control strategy that connects the two. Because of a few key differences, the fusion of the two methods is made possible: both process-based aspects suggest the presence of inefficient and disruptions that arise during the various processes and operations, and the issues and extreme steps taken to enhance the quality of services and goods by removing the triggers at the edge.

Much like ISO 9000, Six Sigma focuses on improving quality by reducing the shortcomings and weaknesses in the educational service delivery processes. Continuous attempts are being made to improve customer satisfaction by reducing the amount of errors that lead to disappointment from customers. The success of Six Sigma's synergetic approach depends on the development of a well-structured documentation, explicit procedures, clearly defined tasks, activities, indicators and achievable goals, such as ISO 9000.

3. Conclusion

Higher education institutions will more frequently recognize and refer to Six Sigma as a effective method in sustaining high standards of academic quality, continually enhancing it and attaining a higher level of results. Six Sigma and quality management systems are common today as a method for improving their performance among hospitals, toy manufacturers, clothing retailers, financial services, banks, educational services and universities and the military. If a process is involved, it can be simplified with Six Sigma, or with both, a quality control system.

Tomorrow's University will undoubtedly serve in the information society, this irrefutable fact has important consequences for the approaches that each institution will follow because of the substantial effect that the information society would have on higher education in general, and in particular on each University. It is crucial that each university is fully aware of changes in the information society and faces one of the most complex of all campus planning operations related to obtaining, distributing and managing computing and related technologies. Consequently, each institution must prepare and establish its strategies in order to be adaptive in the context of the environment, and must not fall behind society in general and other educational institutions in particular.

Six Sigma's dynamic character is characterized by the presence of a consumer focus, a management network (the multiple levels of belts), a process-based viewpoint, a system approach and improvement in quality. It shows its compliance with ISO 9000, a quality management framework, and it will be a success to incorporate Six Sigma into every higher education institution's quality culture.

References

- A. Chiarini, "Japanese total quality control, TQM, deming's system of profound knowledge, BPR, lean and six sigma: Comparison and discussion," *Int. J. Lean Six Sigma*, 2011, doi: 10.1108/20401461111189425.
- M. Swink and B. W. Jacobs, "Six Sigma adoption: Operating performance impacts and contextual drivers of success," *J. Oper. Manag.*, 2012, doi: 10.1016/j.jom.2012.05.001.
- D. D. Ratnaningtyas and K. Surendro, "Information Quality Improvement Model on Hospital Information System Using Six Sigma," *Procedia Technol.*, 2013, doi: 10.1016/j.protcy.2013.12.130.
- M. T. Taner, "Application of Six Sigma methodology to a cataract surgery unit," *Int. J. Health Care Qual. Assur.*, 2013, doi: 10.1108/IJHCQA-02-2012-0022.
- J. O. Westgard and S. A. Westgard, "Six Sigma Quality Management System and Design of Risk-based Statistical Quality Control," *Clinics in Laboratory Medicine*. 2017, doi: 10.1016/j.cll.2016.09.008.

- D. L. Goetsch and S. B. Davis, "Quality Management for Organizational Excellence: Introduction to Total Quality," Pearson, 2016, doi: British Library Cataloguing- In Publication data.
- G. Atti, "Lean management," in *Quality Management: Tools, Methods and Standards*, 2019.
- G. Ballard and G. A. Howell, "Lean project management," *Build. Res. Inf.*, 2003, doi: 10.1080/09613210301997.
- P. Stanton, R. Gough, R. Ballardie, T. Bartram, G. J. Bamber, and A. Sohal, "Implementing lean management/Six Sigma in hospitals: beyond empowerment or work intensification?," *Int. J. Hum. Resour. Manag.*, 2014, doi: 10.1080/09585192.2014.963138.
- J. Antony, S. Gupta, V. Sunder M, and E. V. Gijo, "Ten commandments of Lean Six Sigma: a practitioners' perspective," *Int. J. Product. Perform. Manag.*, 2018, doi: 10.1108/IJPPM-07-2017-0170.
- N. O. Erdil, C. B. Aktas, and O. M. Arani, "Embedding sustainability in lean six sigma efforts," *J. Clean. Prod.*, 2018, doi: 10.1016/j.jclepro.2018.07.048.
- L. G. Wallace and S. D. Sheetz, "The adoption of software measures: A technology acceptance model (TAM) perspective," *Inf. Manag.*, 2014, doi: 10.1016/j.im.2013.12.003.