

Sustainable Quality Culture: Company-Wide Management System (CWMS) and Lean Six Sigma (LSS) as Enablers

Souraj Salah

Faculty of Business Administration
Hamdan Bin Muhammad Smart University
Dubai, UAE
ssalah@hbmsu.ac.ae

Abstract

For any organization aiming to achieve sustainable quality culture of operational excellence, it is important to ensure that a proper foundation for a company-wide quality (CWQ) culture exists. This foundation is a comprehensive company-wide management system (CWMS) which can serve as an infrastructure for improving and controlling the different operation systems of any organization. The CWMS mainly draws on five MSs, strategic management, initiative management, daily management, process management and performance management. It ensures the proper alignment of all people and processes, the optimization of resources and sustainability of high performance. For any organization to succeed in meeting high-quality standards, the existence of quality culture is essential and this requires time and commitment. One key enabler of that is the CWMS and Lean Six Sigma (LSS) Methodology. This paper will explain how their proper implementation will sustain the quality culture and enable it to spread and take over. This paper follows a theoretical review of literature combined with the authors' own experience to discuss CWMS, sustainable quality culture and the LSS culture-related aspects.

Keywords

Company-wide quality (CWQ) culture, management system (MS), Company-Wide Management System (CWMS), continuous improvement (CI) and Lean Six Sigma (LSS).

1. Introduction

One of the key factors to success for any organization is the existence of a company-wide quality (CWQ) culture which serves as a foundation for operational excellence. It is based on a Company-Wide Management System (CWMS) which is a comprehensive MS that has a key goal of achieving alignment across the whole business. The CWMS incorporates continuous improvement (CI) methodologies and draws on management disciplines, such as: strategic management, initiative management, performance management, daily management and process management. Lean Six Sigma (LSS) is a CI methodology that is well known and well proven. In its turn, it can serve a key enabler for enhancing the CWQ culture. This cultural aspect will be discussed further in this paper.

The effectiveness of LSS and its success are directly dependent on the type of culture which is dominant in an organization. Even if the best improvement methodologies are used, various studies reported many cases of failure (e.g., Devane, 2004; Bhasin and Burcher, 2006, Gunasekaran, 2006).

LSS is focused on introducing improvement which is directly linked with change that requires a supportive structure of technical change leadership as well as behavioral change leadership. The next three sections, i.e., section 2, 3 and 4, include a general introduction to CWMS, CWQ and LSS. These topics provide a basis for the discussion to follow later on the CWQ culture, foundation for LSS and the LSS methodology itself as an enabler for that culture in its turn.

2. CWMS

The ultimate target of QM is to setup a MS and a culture, which ensure organization-wide quality (Mellat-Parasat and Digman, 2007). CWMS is a comprehensive MS that encompasses all aspects of management, with QM being as a core component since it does affect all aspects of managing and improving a business.

The CWMS is a comprehensive system, which represents a new evolution in quality management (QM) and encompasses many different aspects of the management disciplines. It mainly draws on five MSs, which are grouped into strategic management, initiative management, operation management, process management (which incorporates TQM and CI methodologies) and performance management (For more details on CWMS, see Salah *et al.*, 2013). The grouping and connection of these components with each other represents the novelty of the CWMS (Salah *et al.*, 2013). It is because of these groupings and connections that the CWMS provides a solid infrastructure for running and improving processes.

3. CWQ

The Japanese built their own MS based on the Total Quality (TQ) teachings of Deming, Juran and other quality experts (see Evans and Lindsay, 2002). Their MS objectives included Quality Control (QC), quality assurance and respect for humanity (Monden, 1983). Ishikawa (1985) indicated that QC and quality assurance are the essence of Total Quality Control (TQC) which originated by Feigenbaum. The Japanese-style TQC is referenced by the phrase 'Company-Wide Quality Control' (CWQC) (Yang, 2004). It is broader in scope than its North American counterpart, i.e., TQC. The Japanese approach differed as it focused on all employees training as well as promoting QC and was later called CWQC in 1968 (Ishikawa, 1985), about ten years after TQC was introduced in the West (Garvin, 1988). Ishikawa (1983) defines CWQC as a system of means to economically produce goods which satisfy the customer's requirements of quality and value for money; it divides the benefits among consumers, employees, and stockholders while improving the quality of people's lives.

There are various differences between the Japanese QC and the western QC. For example, Japanese QC puts more emphasis on employees and suppliers training and education, is stronger in vertical relationships, has lower turnover rates and a pay system based on seniority more than merit (for further understanding, see Ishikawa, 1985).

A CWQ culture is an organizational value system that forms an environment which is conducive to quality. Traditionally, there is a difference between the described culture of an organization in terms of its vision, mission, principles or values, and the actual culture in terms of the thoughts, feelings, measures, controls or actions of employees. In a CWQ culture, slogans match with real behaviors or actions. The term is derived from the Japanese CWQC system explained above.

3.1. CWQ: culture change considerations

For successful implementation of LSS, there needs to be an effective management of culture change to transform the culture into CWQ culture. Organization success depends on its implementation of CI initiatives and a major problem has been the failure to lead change as experienced in many initiatives (Gunasekaran, 2006).

Improvement projects can succeed better in environments, where defects are managed as opportunities for improvement (Coronado and Antony, 2002) and where processes are blamed for defects, not people. Deming proposed that 85% of mistakes are due to the system and the rest due to a person or a thing (Walton, 1990). Driving out fear so that people can focus on contribution is one of Deming's fourteen points for management.

To successfully lead change and achieve task alignment, there are six important steps: creating a shared need, sharing a vision of the future, spreading change without forcing, involving people and mobilizing commitment, institutionalizing through formal systems, making change permanent and monitoring the progress (Beer *et al.*, 1990).

Using some dimensions from (Evans and Lindsay, 2002) and other dimensions based on a literature review and authors' own industrial experience, to establish CWMS culture, Salah *et al.* (2011b) presented a list of key differences between CWMS and traditional MSs practices. CWMS promotes a culture of CWQ which is a culture of cooperation, innovation, total quality, strategic alignment, business excellence and CI.

Culture differs by geographical location and has soft and hard dimensions (Hilb, 2006). Sirkin *et al.*, (2005) have concluded that in order for change projects to succeed, it is important to consider not only soft factors such as leadership or culture, but also hard factors such as project time plan and capabilities. In a study of transferring Lean manufacturing techniques to the UK, Herron and Hicks (2008) have concluded that the ability of change agents is a key success factor.

The successful implementation of performance metrics through cultural change can lead to a management style which is more consultative or participative and can drive CI (Bititci *et al.*, 2006). The comparison of performance measurements (i.e. KPIs), before and after improvements, is very vital to objectively assess a change

process (Seen *et al.*, 2001). Incentives are an important part of performance improvement and management. The main goal for incentives is to motivate employees and they should be rewarding them based on their individual and team performance. One of the main obstacles in CI is people's resistance to change. That is why it is important to focus on both human and technical aspects of change. The early participation of the right people is important to be successful and maintain the achievements after the project is done. CWMS greatly depends on the social aspect of human resources as it facilitates cultural change (for more details on the key notes on effective change management, see Salah *et al.*, 2011b). Also, some important features of a CWQ culture (which is promoted by CWMS) (Salah, *et al.*, 2011b) include the following: Top management teams are committed to process improvement changes. They involve, motivate, align, empower, train, guide, engage and encourage all employees to innovate and be responsible towards customers and society. They drive out blame or fear and promote a winning culture of trust, incentives and efforts recognition. Employees are encouraged to seek CI and when positions are threatened to disappear as a result of CI, the freed-up employees are deployed or promoted to do other required jobs.

4. LSS Methodology

TQM can be thought of as the holistic and comprehensive umbrella of CI methodologies, such as Lean Six Sigma (LSS), which reaches to all stakeholders. LSS can be thought of as the extension of TQM, which provides a strong structure for achieving greater and faster rates of process improvements. LSS is an approach that combines both lean and six sigma tools and philosophies to focus on improving quality, reducing process variability, and eliminating non-value-added activities (Salah *et al.*, 2011a). Some key LSS initiatives success factors include owning the characteristics of an effective change program (Martin, 2007). The LSS methodology should be holistic to encompass a wide variety of cultures and enhance them to become a culture of CWQ.

4.1. Requirements and foundations for successful CI

There are many examples of Six Sigma and Lean initiatives, where after being done, the control plan or implementation plan is no longer adhered to. Then, the realized savings and improvements decline back to the way they were prior to the project. A lot has been written about the necessity for QM and CI, however, none has provided a solid foundation for sustainable success (Johnson, 2004).

One enabler and a core component for CI initiatives success, is an effective approach of culture change management, which is a key part of the well-structured CWMS. Some great culture-related advantages of integrating CI methodologies with CWMS are: overcoming the resistance to implement change, increasing the speed and commitment to CI, increasing adaptation to external events, increasing motivation, ensuring that proper alignment and timely information exist, transforming the culture of the organization to a culture of cooperation and innovation, and, defining everyone's roles and responsibilities (Salah, *et al.*, 2011b).

Some culture change management related requirements and foundations needed for successful operation of CI, as found in the literature include: human integration and employee participation (Kaye and Anderson, 1999; Hines *et al.*, 2004; Anderson *et al.*, 2006; Antony, 2006), a stable and supportive infrastructure (Chapman and Hyland, 1997; Anderson *et al.*, 2006), an enabling organizational culture of innovation, lesson sharing and empowerment (Chapman and Hyland, 1997; Kaye and Anderson, 1999; Antony, 2004; Anderson *et al.*, 2006; Antony, 2006; Bhasin and Burcher, 2006; Dahlgaard and Dahlgaard-Park, 2006), training, incentives and project management approach (McAdam and Evans, 2004; Basu, 2004), trust and cooperative learning (Mellat-Parasat and Digman, 2007), an initiative management system linking projects to customers and financial impact for accountability and including proper project selection and prioritization (Antony, 2004; Antony, 2006), leadership commitment, behavior and awareness, communication and culture, reward and recognition, effective training and competency (Hilton and Sohal, 2012 and Jayaraman *et al.*, 2012; and Jeyaraman and Teo, 2010).

5. CWQ and LSS

LSS methodology can be embraced to create efficient and effective processes to provide enhanced customer experience and value at reduced operational costs (Antony *et al.*, 2017a). A comprehensive study done by (Antony *et al.*, 2017b) for large manufacturing companies, listed benefits related to LSS implementation, such as improved savings, customer satisfaction, cost, time, and inventory. According to Albliwi *et al.* (2015), the top LSS benefits cited in the manufacturing sector included improvement in profits, savings, customer satisfaction, cost, cycle time, KPIs, defects, machine breakdown time, inventory, quality and production capacity. Also, the research done by Galdino de Freitas and Costa (2017) identified many impacts of LSS over organizational sustainability such as

improved quality, waste, cost, employee satisfaction, inventory, innovation, and flexibility. The critical success factors for LSS are consistent with the qualifications of successful organizational change in terms of commitment, involvement, communication and teamwork (Pinedo-Cuenca et al., 2012). In their study, Brkic and Tomic (2016) found that LSS dimensions, such DMAIC and Kanban positively influenced employees' performance in terms of satisfaction, commitment and employee turnover rate.

LSS can highly contribute to various criteria for performance excellence such as management commitment, problem solving, measurable improvement, people involvement and engagement, and training of dedicated resources (Corbett, 2011).

Cultural changes require time and commitment to be implanted into the organization. CI initiatives are more likely to succeed by refining the organizational culture continuously (Kwak and Anbari, 2004). Refining the culture can be enabled by the continuous improvement based on the lessons learned from LSS projects. In what follows, Table 1 below, shows the CWQ culture aspects and how LSS practices enable them to be fulfilled. The corresponding practices are listed based on the author's own practical Lean Six Sigma Master Black Belt experience and LSS previous research.

Table 1. CWQ culture aspects and corresponding LSS practices

	CWQ cultural aspect	How LSS enables it?
1	Pride	LSS practitioners gain a sense of pride in own work quality, contribution and confidence upon successful completion of their projects where the results get approved by management and financial controllers and are reported in monetary value
2	Trust	LSS enables a culture of trust through the firm dependence on management by facts and data, not by feelings. Structured approach with transparency in progress reporting and performance monitoring also lead to trust. Practitioners focus more on team work and celebration as well as change management aspects. LSS focuses on trusting data to elevate arguments from personal level to professional. One type of waste is about waste of human resources due to lack of trust in their ability.
3	Passion	LSS focus on quality and customer satisfaction as well as employee satisfaction and thus instills the passion to quality and CI in all practitioners as they realize the contribution value of their work and through its proven success and structured approach.
4	Engagement	The change management aspects of LSS projects focus on the human aspect of change, effective communication and leadership commitment. The quick wins gained initially by successful Kaizen events or incremental improvements have huge impact on people mobilization. Lessons learned are shared to engage employees across the organization
5	Motivation	LSS is about improvement and focuses on the selection of the right candidates to lead the projects and spread motivation through the celebration of wins among teams, and the focus on the meaning of work quality as well as waste and their impact on society. LSS promotes a culture of encouragement not blame. It is both financial and spiritual.
6	Positive attitude	LSS practitioners view problems as opportunities. LSS fosters the right attitude by blaming the processes not the people and using data to drive discussions and decisions
7	Empowerment	LSS promotes reduction of waste and inspection or approvals as they do not add value and encourages the empowerment of people so that they and their managers can focus on adding value and advance in their careers
8	Alignment	LSS focuses on project selection and people efforts being aligned to Strategic

		vision and direction with strong focus on team work and organization improvement
9	Happiness	LSS promotes customer and employee satisfaction, practitioners success and happiness to society by reduction of waste and loss and preservation of resources (sustainability)
10	Accountability	LSS holds people accountable by measurement of performance (KPIs) and COPQ. Management commitment for efforts and resources is stressed for LSS success. The DMAIC approach itself is emphasizing “Control” which matches with Deming’s PDCA cycle.
11	Communication	LSS is about change management, teams awareness, management involvement (Gemba, projects progress, etc.). LSS focuses more on soft skills of facilitation for project leaders and impact awareness. Root cause to many opportunities lies in miscommunication. LSS focuses on standardization
12	Transparency	Structured approach and road map provides clarity for quality improvement journey utilizing DMAIC and Value Stream Mapping (VSM) approach
13	No Silos	VSM approach within LSS ensures cross functional team structure and removes barriers
14	Empathy	Customer focus (internal and external). No defect is allowed to pass from one stage to another.
15	Win-Win	Success is celebrated by the LSS Green Belt as well as the team as a whole. Celebration, certification for participation, effective training (not one or three days for Green Belt) for the team and recognition of efforts. For the stakeholders, high return on investment is well proven in many companies. Also, suppliers and customers benefit from the results of LSS projects.
16	Value Add	LSS focus on adding value and elimination of waste. Waste in all of its types is a loss to society
17	Excellence	LSS promotes CI as a way of life. Quality improvement is about totality and comprehensiveness as it affects people, processes and products. LSS focuses on choosing the right people and the right tools to achieve excellence.
18	Flexibility	LSS is flexible and applicable to manufacturing, transactional, service, government sectors, etc. Also, LSS promote change acceptance and continuous pursuit of perfection and new best practices and the acceptance of possible failure when trying new ideas for improvement.
19	Innovation	LSS promotes experimentation and improvement whether incremental or radical and thus enhances innovation with its project selection approach and design for Six Sigma and waste reduction.
20	Responsibility	LSS promotes clear commitment at all levels of an organization towards all stakeholders and society. It focuses on waste elimination, sustainability and the awareness not to pass defects downstream

6. Conclusion

CWQ presents a new quality culture evolution, which provides a solid foundation for continuous improvement activities in an organization, to ensure that proper alignment and communication exist, to optimize the resources and enhance the performance of an organization.

Culture change management is an essential part any LSS initiative. In this work, some key notes were presented on the effective culture change management which is a key requirement for successful deployment of LSS initiatives. In addition, a description was provided of CWMS and CWQ culture related practices.

In its turn, LSS can enable a CWQ culture to become engrained in the DNA of any organization by promoting various cultural aspects and fostering the right attitude through many practices of LSS methodology.

CWQ culture is a culture of alignment for people and projects to the strategic objectives. Various aspects of this culture were discussed to demonstrate the comprehensiveness of this culture and its benefits to any organization.

Finally, it is suggested to perform a practical case study in the future, which can be used to verify and quantify the LSS impact on CWQ culture. KPIs can be selected and monitored to be used in the benchmarking process and in the comparison of the standing prior and after the implementation. Like many methodologies, for LSS to prevail, it has to be implemented properly. The increase in global competition and the fast advancements in technology make it more decisive for organizations to seek successful implementation of LSS. This requires further evolution of LSS including effective training and international certification standards to shape a more robust and innovative CWQ culture. More effort is needed in the future to explore this critical area and more LSS practitioners need to share their lessons learned, in failure and success.

Abbreviations

Continuous Improvement (CI)
Key Performance Indicator (KPI)
Lean Six Sigma (LSS)
Management System (MS)
Quality Management (QM)
Quality Management System (QMS)
Company-Wide Management System (CWMS)
Total Quality Management (TQM)
Company-Wide Quality (CWQ)
Define-Measure-Analyze-Improve-Control (DMAIC)
Plan-Do-Check-Act (PDCA)

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Biography

Souraj Salah is currently a full-time Process Improvement Manager at Abu Dhabi Ports and an adjunct professor at Hamdan Bin Muhammad Smart University (Teaching courses like Quality Tools and Techniques, TQM Sustainability and Operations Management). He has over twenty years of industrial engineering experience in the logistics, contracting, services and manufacturing sectors. He earned his PhD from the University of New Brunswick in Canada. He published one book on integrated company-wide management system and thirty papers in various international journals and conference proceedings. He is also certified as a Black Belt by the Juran Institute and Lean Six Sigma Master Black Belt by Johnson Controls International in the USA. He is also certified as a Quality, Health, Safety and Environment Management Systems (ISO 9001, ISO 14001, OHSAS 18001) Lead-Auditor by Bureau Veritas. Dr. Souraj won the UAE Quality-professional-Award by the American Society for Quality (ASQ) in 2015.