

# Process Mapping for Quality Improvement: Findings from Literature Review towards Application in ODL Institutions

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## Abstract

In the human mind, the word 'quality' always brings about an interpretation of non-inferiority or superiority of something. While meeting the needs of the end users, it indicates the suitability for the purpose for which it is intended. In the quest for achieving perfection, quality and its definition has seen a sea change from the times of its evolution. The present paper is an attempt to explore the research on how quality has become an important function in every organisation. The tools and techniques involved in Quality Management have also evolved over time. The paper also throws light on how 'Process Mapping' has evolved into an important Quality Management tool in various sectors. Based on an extensive study of literature, the authors are of the view that Process Mapping along with application of different tools of Quality Management will help understand the purview of Quality Applications in a better way. The paper also attempts to project the application and benefits of Process Mapping in the field of Open and Distance Learning (ODL) mode of education.

*Key words:* ODL, Process mapping, Quality, Quality management.

## 1.0 Introduction

Understanding the concepts of quality and quality improvement have garnered tremendous importance in these times of fast changing consumer preferences. It is well known that any organisation, be it a company, business enterprise or non-profit organisation, is a complex system which primarily strives towards adding value for the benefits of its stakeholders. In order to imbibe

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quality orientation, an organisation is supposed to adopt a management system to determine the needs of each stakeholder, to convert these needs into internal requirements, to provide the required resources to meet the requirements and to monitor performances. There is an increased focus on identifying non-value adding activities and on ways to eliminate them (C, 2015). The constant search for 'something better' has led humankind to look for ways, methods and develop philosophies to improve quality. Philosophies like Total Quality Management, Six Sigma, and Kaizen etc. have revolutionised the way products and services are manufactured and delivered to the customers today. These philosophies demand that organisations move away from 'Management by Control' to 'Management by Commitment'. (Kailas, 2018)

Sustained existence of an organisation depends on its success and success, in turn, depends on a number of factors, such as, people, organisation, market potential, competition, management competence, government support, social and community support, technology, financial strength, responsiveness to customer needs and leadership. (Swain, 2006).

Today, quality is involved in almost every kind of business, from manufacturing, healthcare, food industry, to public utility. Studies in this regard reveal how continuous quality improvement practices have been adopted successfully by Indian organisations, from the beginning of the 21st century (Kaur, 2014). Products and services with superior qualities have resulted in increased success, competitive advantage, increased market share, high customer loyalty and reduction in costs. These have been made possible by adopting models of quality improvement and by being ready for change (V, 2017). Process mapping is another tool through which the journey of quality improvement has been embarked upon by organisations. The core concept of this study has been developed after a review of related literature on quality improvement tools including process mapping and process improvements in different sectors.

## **2.0 Evolution of Quality Movement**

During the first three decades of the 20th century, quality was merely "conforming to the standards and specifications of a product". The commonly adopted quality practices by industries were the standardisation of quality, inspection, and rework.

After W. Edwards Deming, the 'Father of Quality', defined quality as something that meets the requirements of the customer and satisfies him/her, the very concept and essence of quality shifted to a more customer-centric perspective. As humankind entered the new century, several studies began to indicate that quality no longer meant meeting the needs or satisfying a customer, but delighting him with after sales support and providing an overall rich experience. Table 1 gives an insight into the evolution of quality.

**Table 1** Evolution of Quality

<p><b>1920s</b></p>	<p>Some of the first seeds of quality management were planted as the principles of scientific management swept through U.S. industries.</p> <p>Businesses clearly separated the processes of planning and carrying out the organisational plans</p> <p>Unions' opposition arose as workers were deprived of a voice in the conditions and functions of their work.</p> <p>The Hawthorne experiments in the late 1920s showed how worker productivity could be impacted by participation.</p>
<p><b>1930s</b></p>	<p>Walter Shewhart developed the methods for statistical analysis and control of quality.</p>
<p><b>1950s</b></p>	<p>W. Edwards Deming taught methods for statistical analysis and control of quality to Japanese engineers and executives. This can be considered the origin of TQM.</p> <p>Joseph M. Juran taught the concepts of controlling quality breakthrough interventions.</p> <p>Publication of Armand V. Feigenbaum's book Total Quality Control, a forerunner for the present understanding of TQM</p> <p>Philip B. Crosby's promotion of zero defects paved the way for quality improvement in many companies.</p>

<b>1968</b>	<p>The Japanese adopted the approach of total quality (company wide quality control) leading to emergence of quality management systems.</p> <p>Kaoru Ishikawa's synthesis of the philosophy contributed to Japan's ascendancy as a quality leader.</p>
<b>Today</b>	<p>TQM has become synonymous for the philosophy of a broad and systemic approach to managing organisational quality.</p> <p>Quality standards such as the ISO 9000 series and quality award programs such as the Deming Prize and the Malcolm Baldrige National Quality Award specify principles and processes that comprise TQM.</p>

### 3.0 Process Mapping in Quality Management

A process map provides a bird eye's view of the different processes that make up an organisation's management system and how they interact with each other. Bearing similarities with a flowchart, a process map can be considered a simple graphic tool that documents the flow of series of necessary activities involved in a process. Also called 'process charts', it has become much more prevalent in the business world in recent years. Quality improvement practitioners have noted the fact that the depiction of a process becomes easier to comprehend with the use of graphical descriptions. These can be value stream maps; work flow-charts and diagrams; and detailed work flow-charts.

Indeed, a process map gives us an overview of the entire system at work. The most important purpose it serves is the identification of bottlenecks. Proper treatment and subsequent removal of these bottlenecks is possible with various quality management tools like Lean, Six Sigma, Kaizen, Value Stream Mapping etc. All these tools specialise in improving how the sub-processes ultimately function and contribute to the output concerned. A reference to some of the literary works as indicated in Tables below (Table 2 for studies on TQM, Table 3 for studies on Six Sigma, Table 4 for studies on Kaizen and Table 5 for studies on process mapping) indicate a conspicuous effort towards improvement in quality across sectors and organisations.

**Table 2** Studies on Total Quality Management (TQM)

Year	Author	Title	Focus	Inference
1999	Syd. Aftab Haider Rizvi Rizvi, Syed. A.H.	<i>TQM studies in textile industries.</i>	Study of ISO-9000 QMS related issues and its impact on textile industries, and exploring the status of TQM in textile units.	ISO-9000 QMS was found to be more profitable for textile units due to reduction in waste, time and mismatch of job and machine.
2007	Sioutou, A. Kriemadis, T. Papaioannou, A. Kourtesopoulou, A., & Koronios, K	<i>TQM and Sports.</i>	Examines implementation of TQM and its influence on the performance of a sports organisation.	Organisations that use quality programs demonstrate better teamwork and make better decisions. Significant improvement in performance is observed in quality focused organisations, compared to those organisations that do not use quality programs.

2017	Kumar, S.	<i>Impact of TQM on the status of sports in Haryana.</i>	Study of commitment of coaches towards trainees, process of recruitment, quality improvement of team work and culture of services provided by institutions with regard to Quality Management in Sports.	Successful implementation of TQM philosophy in Bhiwani district of Haryana as compared to other districts. Parameters such as coaching qualities, finance facilities, healthcare, food and nutrition, infrastructure and equipment facilities, administration services were considered.
2018	Kailas, K.P.	<i>A study on the Effect of TQM in Business Performance.</i>	Analysing effect of TQM in business performance with regard to medium scale enterprises such as coir, rubber, manufacturing, sea food and hospitality sectors in Kerala.	In the usage of TQM tools in the medium scale enterprises concern, most of the organisations are using Quality Control followed by ISO certification and Benchmarking. However, potential of TQM implementation has not been utilised fully.
2018	Kamath, N.	<i>Total production management in commercial printing industry: a case study using system dynamics approach.</i>	Developing a model of Total Production Maintenance for a particular printing industry and study of the influence of various parameters to enhance the overall efficiency of the system.	Importance of crucial aspects of innovative management techniques such as 5S, Kaizen, autonomous maintenance, standard operating procedures, Why-Why analysis and Quality management are highlighted.

**Table 3** Studies in Six Sigma

Year	Author	Title	Focus	Inference
2013	Narayanamoorthy S	<i>Investigation on the implementation of Six Sigma concept in Indian Engineering Colleges.</i>	Investigation of effectiveness of Six Sigma implementations in Engineering Educational Institutions and exploring its practicality in various domains of engineering colleges.	Huge potential has been discovered in uplifting educational standards through Six Sigma. Increased employability of engineering graduates; increase in quality and competency, and skill development has been seen as immediate results. Training of stakeholders, feedback surveys have been stated to be crucial.
2014	Raju, H. K.	<i>Opportunities and challenges in implementing lean sigma for software development process.</i>	Exploring the current level of knowledge and attitude of software professionals towards lean and Six Sigma and investigating the opportunities and challenges for its implementation.	Dramatic improvement in quality, cost and lead-time has been observed. Although application of lean Six Sigma to software development process is a very recent phenomenon, yet, significant opportunities in eliminating non-value added activities and improving lead and cycle times have been observed.

2015	Selvan, V.	<i>Development of a lean Six Sigma model for hospital industry.</i>	Identification of critical success factors for successful deployment of Lean Six Sigma in Indian hospitals, along with development of a Readiness Assessment Index that would assess commitment, capability and cultural aspects to embark upon the Lean Six Sigma journey in India.	The research questions posed facilitated the understanding of the status of Lean Six Sigma implementation in Indian hospitals and designing a five phase Lean Six Sigma model tailored to their needs.
2015	Anand, K.	<i>Six Sigma in Information Technology manufacturing industry.</i>	Examining procedures of quality management in Information Technology industry in Karnataka along with linking improvement of quality of deliverables to the business outcomes of the industry as a whole.	Alignment of business strategy with output which are critical to customers, can be observed. Providing cost efficient services through Six Sigma has enabled Information Technology companies to compete globally.

2017	Raja Sreedharan	<i>A study and analysis of lean six sigma practices in Indian manufacturing industries.</i>	Analysis of Lean Six Sigma awareness in manufacturing industries along with development of Lean Six Sigma Readiness (LESIRE) evaluation model. Systematic ranking of critical failure factors of Lean Six Sigma has also been done.	Assessment of Lean Six Sigma model has been developed to assess effectiveness of Lean Six Sigma implementation. 44 Critical Failure Factors have been identified and ranked, which has helped in enabling the focus of management on Lean Six Sigma project failures via TOPSIS SIMOS approach.
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Table 4 Studies on Kaizen

Year	Author	Title	Focus	Inference
2013	Senthil, Kumar B.	<i>An investigation of manufacturing performance improvement through lean tools in garment industry.</i>	Understanding lean manufacturing principles, identifying suitable lean manufacturing tools which minimises process wastages, and consequent measurement of process improvement.	Value Stream Mapping (VSM), 5S and Kaizen are recognised as universal tools for quality improvement. process improvement due to implementation of lean tools in the value chain of selected four product lines has been observed.

2014	Kaur, M.	<i>Adoption and implications of Kaizen and Target Costing techniques- a study of selected automobile companies.</i>	Adoption of Kaizen and Target Costing techniques in sample companies and study of stakeholders on different parameters.	Having its origin in Japanese companies, Kaizen and Target Costing techniques have been successfully adopted and implemented by automobile manufacturing firms. Significant improvements in cost and quality have been observed.
2015	Ganesh, R.	<i>A study of lean philosophy in plant maintenance function for improving internal customer satisfaction.</i>	Study of plant maintenance practices and correlation between identified lean tools and techniques with common plant maintenance practices.	Development of Lean Maintenance Model with common maintenance practices of People Management, Equipment Management, Inventory Management and EHS Management.
2018	Kumar, S.	<i>Lean- Kaizen concept application in Small and Medium sized manufacturing enterprises.</i>	Development of theoretical framework for application of Lean-Kaizen concept across manufacturing Small and Medium Enterprises for their sustainable performance. Value Stream Mapping and DEA (Data Envelopment Analysis) CCR model implementations as case studies.	Waste elimination techniques like VSM, Poka-Yoke, Six Sigma, standardisation, Kaizen brought about significant quality improvements. Integration of Lean-Kaizen concept with VSM and DEA CCR model is found to be effective.

2014	Kregel, I.	<i>Kaizen in University teaching: continuous course improvement.</i>	Critical evaluation of Kaizen in improving quality of teaching.	Successful implementation of Kaizen to University teaching. Continuous improvement of evaluation method observed via student feedback, interaction, participation and innovative methods.
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**Table 5** Studies on Process Mapping

Year	Author	Title	Focus	Inference
2006	Swain, D. K.	<i>A Study of Product and Process Improvement Capabilities and their Impact on Successes and Failures of Organisations.</i>	Highlights the various methods of product and process improvement used by small and medium scale organizations along with the variables and the magnitude, which led to such improvements.	Among the small and medium scale enterprises, wide variety has been observed in efforts put on variables to achieve product and process improvement capabilities. Variables like Concentration of R&D specialists and qualified people, external linkages, training and skill development have been considered.
2007	Lassiter, V. C.	<i>The role of process improvement in a non-profit organisation.</i>	Optimisation of performance of the organisation through implementation of process improvement. Challenges to overcome and importance of monitoring process improvement initiatives has also been focused on.	To support non-profit sector to achieve its potential, greater awareness of different approaches and tools for implementing process improvement is needed. Maintenance of continuity between existing and evolving organisation cultures and management processes is required.

2017	Heher, Y. K. & Chen, Y.	<i>Process Mapping: a corner stone of quality improvement</i>	Improving health care quality and operational efficiency by embracing various process improvement methods such as Lean, Six Sigma and rapid cycle improvement from manufacturing and Information Technology industries.	Digesting complex workflow information, understanding status quo and identifying opportunities for improvement is made simpler by process mapping.
2018	Dronamraju, D.	<i>Process Improvement Strategy for Public Sector Organisations.</i>	Suggestion of Process Improvement strategy for increased customer satisfaction using tools from Six Sigma and Lean for public sector organisations. Case study on customer request handling process has been conducted to look for scope of improvement.	Quality Management methodologies like Six Sigma and Lean are very much adoptable for the public sector, but subject to customisations according to the environment in which they are implemented. Customer focus should be the key and concept of process improvement should be a part of management culture, inviting continuous efforts from management and employees.

#### **4.0 Future Implications**

Quality management and its techniques including process mapping more recently, have played a revolutionary role in uplifting quality standards across sectors. From sports (Kumar, 2017) to textile industries (Rizvi, 1999); from healthcare to software development industry; and from manufacturing to automobile companies; improvements have become visible.

There is substantial scope of deploying tools of quality management like process mapping in the field of higher education, more specifically in open and distance learning mode of education. The prowess of application of Six Sigma has already been seen in Indian Engineering Educational Institutes (Narayanamoorthy, 2013). Dramatic improvements have been made possible by focusing on efficiency (Raju, 2014). Dr. Otto Peters has famously put emphasis on the industrial nature of distance education. He has characterised distance teaching as a standardised mass system of education in contrast to face-to-face education. Initial studies on similar tools of quality management have revealed their successful application in university teaching (Kregel, 2019). The authors are of the view that characteristics of successful implementation of process mapping in the aforementioned sectors can be benchmarked and applied in the field of higher education through ODL mode.

#### **5.0 Conclusions**

Tools of quality improvement have produced visible differences in results and output. Studies have indicated that with suitable customisations, process improvement methodologies can also be adapted in public sector organisations. An organisation consists of symbiotic relationships between its different constituent sub units or sub systems. Each such unit has its own functioning. In other words, there is a process unique to each unit in an organisation. In our march towards continuous improvement, it is the refining and redefinition of such units at a microscopic level that would produce effective results. It can be observed that tools like process mapping have the potential to revolutionise the field of higher education, more specially education through ODL mode, as it has a scalability component in an industrialised setting.

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