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## Enhancing Operational Excellence: Through use TQM, Lean and 6 Sigma

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**Abstract:** Considering the cutthroat competition organizations are using multiple avenues including operational excellence (OpEx or OE) to enhance processes, improve operational efficiency, and mint products and services with highest quality levels to customers. This study is about use of Quality Tools to achieve the same. This study is also about way these quality tools are used to effectively deliver change of quality levels in the companies. This research also shows that beyond the quality tools there are systematic approaches to improve quality by adopting cluster tools like Total Quality Management (TQM), Six Sigma, Lean Six Sigma, Total Productive Maintenance (TPM), and to some extent Continuous Improvement (CI).

**Keyword:** Quality Tools, Quality Systems, 6 Sigma, TQM, TPM

### INTRODUCTION

Every company works to improve its business by using multiple ways and in the process achieves higher market share, better performance, operational efficiency and finally the much deserved customer satisfaction. Use of quality tools is one way that helps do this.

One of the aim of this study is to have good understanding about how modern organizations improve operational excellence by effectively using quality tools and cluster quality tools. The study also examines operational excellence fundamental with its base elements for organizational benefit. 6 Sigma along with LEAN and Continuous Improvement or CI will be reviewed to understand the applications that drive process efficiency and quality enhancement in this study.

The research – through careful analysis of the tools, the way these are used implemented and exploited - wants to recommend how and which quality tool are to be used for achieving operational excellence and improved quality. At the end the findings want to add to the existing body of knowledge (BoK) related to the operational excellence (OE or OpEx) and provide insights to practitioners and researchers. As companies keep working to remain competitive, the need to achieve OE has become increasingly important. By

exploiting the concept of OE and reviewing the role of quality tools, this study wants to provide companies with the insights and strategies needed to improve the operational levels. Through a comprehensive understanding of OE, companies can grab opportunity for improvement and launch quality tools such as LEAN, 6 Sigma, CI, to push process optimization and quality up-keep-ment. By providing expert views and direction for implementing the tools efficiently, this study intends to help companies in taking care of hurdles and challenges to achieve higher levels of customer satisfaction through operational excellence and product quality.

### **Background**

The study attends to a critical need of the day, where companies are incessantly working to achieve the operational-efficiency, competitiveness and effectiveness. OE is essential for companies to achieve a good market positioning, achieve customer needs and wants, and maintain growth in presence of ever-changing market situations and increased competition. But, achieving OE needs a carefully planned method and the use of Quality Management (QM) tools. In spite of having the allaround recognition of operational excellence, many companies struggle with quality improvement initiatives due to multiple issues like lack of understanding, limited resources, and lack of change management instrument. Historically, there is a gap in the ability to decide and implement the quality strategy, quality tools and the best practices to improve the quality level of the products or services offered by the companies.

The reason for this study is to meet the basic expectation of the company bosses and owners to guide them on the quality tools that they can depend on to bring in quality improvement, optimization of processes leading to the company level operation excellence.

### **Purpose**

The main purpose of this paper is to study the concept of OE and understand how companies make good use of quality tools in improving their operational performance. The paper is committed to:

1. Providing a good understanding of OE, its significance, concepts and principles that gives benefits to the organizations.
2. Highlighting and explaining important quality tools and quality methodologies, such as Six Sigma, TQM, Lean, and their use in driving process improvement and quality enhancement.
3. Offer ingenious methods to implement quality tools effectively in industry environment, including implementation strategies, best practices and how to overcome known challenges.

### **METHOD**

The study is mainly based on secondary data. The researcher has scanned and scrutinized a wide range of OE and QM (Quality Management) related published material including research papers, scholarly articles and books published by various authors. The researcher has combined operational excellence methods with relevant quality and management principles and for consideration in this paper.

At the beginning of the literature review highlights operational excellence's importance in today's competitive marketplace as well as business organizations' constant attempts to enhance their operations. The research follows OE through an assessment of its true meaning along with its value to the users - mainly organizations at the end - foundation principles and advantages of monitoring the use. Quality tools and Quality Management principles and methodologies come forward as main object that the research analysed to show the use for optimizing processes to eventually set up top-quality performance results. With the evolution of the industry well defined practices and Standard Operating Procedures (SoP) are available

for using quality tools, together with the best practices embraced and passed over to the next generation or set of people. Quality tools are known to drive improved quality while generating sizeable impacts on organizational deliverables that help both operational productivity enhancement and improved customer satisfaction levels.

## **RESULT AND DISCUSSION**

### **Factors associated with the Operational Excellence**

As per Elouarat et al. (2011) in his study done in Morocco on the operational excellence in the universities suggested that operational excellence (OE) has become one of the critical business processes in the recent couple of decades. This methodology has received business focus because it helps organizations to maintain competitive edge in business. The businesses in their history come across an important decision-making related to achievement of best in class quality level with competitive advantage and pursuit of operational excellence (Brown, 2013). Organization's evaluation of strengths and weaknesses offers substantial difficulties to companies during their performance assessment process (Stephen et al., 2019). Organisations look for a comprehensive structure that adapts easily with the current culture of the organisation to have a user-friendly system that can be implemented easily and without backlash. The strategy needs to treat outcomes holistically to be effective while accepting the brutal fact that any change in one element affects the complete system as mentioned in the article Employee engagement and job performance in Lebanon, by Ismail et al. (2019) sending the process in turmoil. The prevailing market conditions along with competitive pressures from the peer companies drive these companies to go for business excellence for long-term success (Wahab et al., 2019). There are examples of many companies that achieve excellence level, many others fail since they do not come in terms with the factors needed to achieve operational excellence, as was shared in the book, Excellence – 25 years evolution by Dahlgard-Park & Dahlgard (2007). The parameters leading toward operational excellence remain uncertain, in the sense that they change with the change in industry, change in culture and the management style according to Mohammad et al. (2011). Organisations that want to go for Business Excellence (OE) need clear guidelines to achieve OE as mentioned by Sharma and Kodali, (2008). Analysis of must-have OE variables for a particular company (it may vary from company to company as already shared) that becomes critically important since it is capable of ensuring business environment competitiveness (Heizer and Render, 2004). OE has captured attention and focus of industrial leaders as per Elouarat et al. (2011) owing to the benefits that come along like organizational efficiency and quality improvement, productivity and surprisingly agility levels as a byproduct (Elouarat et al., 2011). One aspect of operational excellence happens through cost optimization; though the same may not be visible as a standalone entity. It is associated with reduction in rejection and rework (improved quality) and improved production output that shares the fixed expenses reducing overall cost of manufacturing. Strategies directed towards operational excellence achieve their goal by taking care of Muda which is equivalent to all types of waste. The efforts include reducing waiting period, eliminating unwanted procedures, unneeded transportation and movements and also by producing as needed; which maximize energy efficiency throughout the systems (Allan, 2014).

### **Quality management**

The main purpose of quality management is to produce products and deliver services which as a minimum, meet or exceed customer expectations. All Organizations of this era have quality management as an essential part of the strategy. The foundation of the organizations is built around total quality management that delivers customer satisfaction achieved through activities of improvement in all aspects of business. These obviously use multiple quality tools for multiple processes including functions other than production and quality assurance.

TQM fundamentally achieve operational gains through their core activity that combine customer satisfaction with employee empowerment and process enhancement (Rachmawati et al., 2019). Modern companies of all sizes from a conglomerate to a reasonably sized medium scale companies have considered TQM and business excellence as mode of survival (Baporikar, 2020).

TQM or quality management is not new it development, begun from the 1960s and is in evolution till today (Rachmawati et al., 2019). A researcher or student of quality management and business excellence need to thoroughly study the complex nature of quality tools before going ahead with detailed assessment of TQM. Baporikar (2020) has described BE as a must have solution that ensures business success or even to the level of business survival in this modern world. According to Juran through his republished literature (2018) indicates customer satisfaction as the driver to excellence in quality.

### **Defining Quality**

Explaining the term quality is not simple it is subjective and might be interpreted by individuals as per their view point and experience and may also have a cocnclusive impact of the context of the product, project or process in consideration. Thus thee criteria for selecting what quality is, are shaped by personal beliefs and judgements (Ovbiagele and Mgbonyebi, 2018). Phan et al., (2019) in their study have different explanations of quality to describe the concept from various professional perspectives. Quality has been defined in multiple ways by many, but Evans and Lindsay (2013) has defined quality in four different ways that integrate value, excellence, meeting needs of the standard and an obvious dimension of meeting customer expectation. Standards help in high-quality precision measurement as they provide dependable and reliable definitions, while value-based measurement juggles with conceptual clarity. As the quality definition kept on changing throughout the history of industrialization, and was getting matured, Parasuraman et al. (1993) defined future definition of quality that he says would consist of customer expectation fulfillment. Scharager (2018) understands the changing needs and hence he suggested that the challenge of defining quality is intricate, as it covers both personal and social aspects. At the end the long standing definition of quality, Fitness for use still persists. The ISO definition of quality which says, "Totality of characteristic of product or process that bears in its ability to meet stated and implied needs", is the one that stands all criterial of defining quality.

### **The way to improve Operational Excellence using Quality Tools and fundamentals**

Chasing operational excellence with quality tools gives double the benefits hence many organizations take this approach achieving improved efficiency, reduced waste, and superior quality products and services, that multiply in the form of better business returns. Under such endeavors, culture of excellence and operational gains are supported by use of quality tools. There are many ways where in adopting quality methodologies rather than singular tool help achieve better results. For example 6 Sigma, by its fundamental structure or method, reduces variation and defects in process, leading to improved quality and efficiency (Pyzdek & Keller, 2014). LEAN or Lean 6-Sigma on the other hand, aims to align processes, reduce if not eliminate waste, and maximize value for customers and profits for the comapnies (Womack et al., 1990). Then there is another cluster of tools in the form of TQM, that totally changes the perspective of quality that was flowing through the by lanes of production and quality department. It insists on the involvement of all employees beyond the production and quality functions, in improvement efforts, leading to better quality and highest customer satisfaction (Dale et al., 2015). Continuous Improvement techniques, like Kaizen, PDCA, QC Stories, One point lessons together generate a systematic approach to problem resolution and process optimization (Imai, 1986). All these tools are very useful that eventually lead to customer happiness.

### **1) Significance of Operational Excellence (OE)**

Operational excellence stands as a key factor for multiple sectors because of its vital and crucial elements. Organizations achieve a competitive edge by improving their processes alongside cost reduction and better customer value delivery as suggested by Nakamura et al. (2019). Operational excellence also provides benefits through organizational flexibility that helps quick market adaptation as well as technological upgradation and meeting consumer needs (Scherrer-Rathje et al., 2009). As suggested by Bhasin (2018) organizations get success through OE framework because the model cultivates an important aspect of the growth in the form of innovation along with continuous improvement and involvement of the team members from various echelons of the hierarchy. Organizations must pursue operational excellence for achieving efficiency along with other objectives including customer needs fulfillment leading to satisfaction or even delight and gains in the profitability.

### **2) Key factors related to Operational Excellence**

Strategic thinking supported by dedication to achieve continuous improvement makes firms capable of achieving operational efficiency and performance improvement in their business processes. These are the factors that in fact define the Operational Excellence. Organizations need to follow certain essential fundamentals to reach the defined objectives under this system. Good organization's value customer focus, continual improvement (CI) and support employees while making fact and data based business decisions aligning with core TQM principles. The purpose of operational excellence though not well connected, but actually exists in satisfying customer needs and providing delight as much as possible. Organizations that succeed with operational excellence prioritize delivering products and services which exceed or fulfil all requirements of their customers. Organizations that exhibit customer focus achieve operations linked to the customer needs which enhances possibility of keeping customers hooked to the companies products and services (Singh et al., 2017). As per Kumar & Suresh, (2009), operational excellence follows step-by-step improvements to create a culture where development continues for both products & services and processes & systems. Companies that plan to achieve higher market share or market leadership build their position through a path of innovation and strategies adaptable and flexible to meet changing market dynamics. The meaningful implementation of OE depends on sharing platforms and control systems that assist workers to drive business process enhancement. Good organizations consider their employees as change agents since their creativity, skills and intelligence lead to improvements through different projects. Empowerment of such employees generate better performance in team-driven setup together with worker motivation (Davies & Kochhar, 2002). Standard Operating Procedures (SOP) together with data management and analysis need to be established by companies during their implementation of operational excellence frameworks. The TQM utilizes a data based approach to track root cause and check system performance as well as specified checks for measuring status of the goal till achieved. The same message was derived by Roth & Menor (2003) in their study found operation efficiency and better quality emerge from data centered decision making over choices based on intuition.

### **3) Operational Excellence – benefits**

There are many tangible and intangible benefits coming out of Operational excellence. The obvious benefit is in the form of productivity gains by reducing complexity of the processes and optimizing resource requirements, and by reducing waste (Ahire & Dreyfus 2000). The OE structure helps firms to increase their product and service quality deliverables which creates better customer delight and stronger customer loyalty (Flynn et al., 2010). The financial performance gains lead to profitability by removing various types of waste leading to process optimization and to achieve maximum resource efficiency (Bhasin, 2018). OE eventually leads to innovative and dynamic organization, which further gives rise to business

survival resilience for ever changing business environment according to Nakamura et al (2019).

Implementation of TQM enables organizations to receive multiple benefits. Companies can use TQM principles effectively with the help of OE, through continuous improvement (CI) and OE. Such organizations use OE principles to build well defined processes that enhance resource optimization to apply TQM principles (Ahire & Dreyfus, 2000). The methods of LEAN coupled with Six Sigma gives benefit of two giant philosophies by having synergy of the two tools to be used as operational excellence, which help improve processes and enhance product and process quality (Pyzdek& Keller, 2014). Operation excellence supports the evolution of work practices that promote employees’ accountability and team-oriented structures for Total Quality Management implementation success (Bhasin, 2018). Organizations align OE with TQM to deliver high quality and operational efficiency and that as byproduct delivers customer satisfaction.

**4) How Quality Tools help in Operational Improvements leading to Excellence**

Operational improvement leading to operational excellence has multiple dimensions and use of right tools more so right quality tools are found to have given advantage as, Quality is cut across organization and adoption of quality too improves the overall way of working leading to OE improvement. According to Oakland (2019) 6 Sigma combined with Lean Management in the form of LEAN-6 Sigma, as well as TQM and Continuous Improvement (CI) can work as fundamental operational and improvement tool. Organizations are always in need of right quality tools to build the improvement culture during operational improvement or OE initiatives. These tools help organizations to detect defects diagnostically which also include capabilities for identifying chances of failure and their causes and resolving complex issues and process & system faults (Oakland, 2019).

Current industrial scenario is such that the companies depend on these Quality tools because these tools have been proved their worth and they fulfill their technical requirements. The research analyzed the actual use of the quality tools mentioned in Table 1. The tools establish practices in automobile industry OEMs and suppliers.

**Table 1. Use of TQM, LEAN and Six Sigma in Auto Industry**

Type of industry	Companies	TQM	Six Sigma	Lean
Automobile Industry (OEM)	16	16	16	16
Automobile Suppliers	40	18#	28*	16*

\* - Some or tools tools used

# - TQM philosophy followed to generate quality improvement (May not be available as a visible implementation)

Quality tools not only improve quality of the products but they play pivotal role role in delivering operational improvement in the organizations. These tools are important in identifying gaps, analysing processes constraints, and implementing changes to improve overall operational performance. For example 6 Sigma, effectively helps in reducing variation and failures in the processes, providing distinctively better quality (Pyzdek& Keller, 2014). As studied by Womack et al., (1990), Lean management principally works to reduce waste and deculturize operations, which improves productivity and reduces costs. Dale et al. (2015) in their study on TQM found that this philosophy supports culture of quality and BE by involvement of all staff members in improvement drive. Simple tools similar to Kaizen and PDCA or Plan Do Check Act support systematic approach towards process optimization and problem resolution (Imai, 1986). Organizations have demonstrated improved efficiency,

operational improvement, and customer delight by using these high end quality methodologies.

LEAN: By virtue of the meaning of the word Lean, the process needs to eliminate all fat that just makes it lethargic. Naturally the goal of lean principles is to minimize waste, streamline operation and maximize customer value. Organizations use lean to find process inefficiencies, reduce operation cycle time, and optimize if not maximize resource usage by using some of all of tools like 5S, Value-Stream-Mapping (VSM), kanban (Womack et al., 1990). The Lean is the evolution of Toyota Production System (TPS) that earned Toyota a ubiquitous standing in the auto industry and then it graduated to Lean Business.

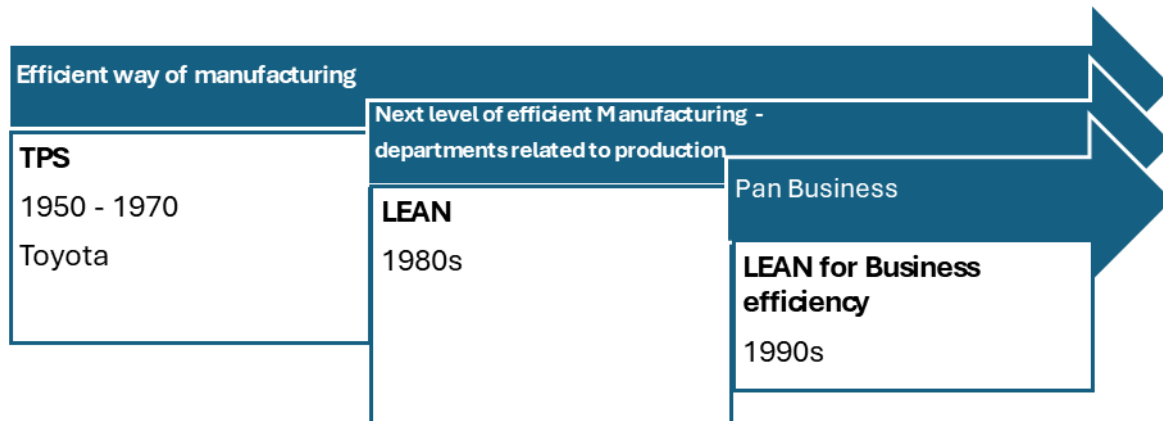


Figure 1. LEAN development to become an OE tool

6 Sigma: Six Sigma by virtue of the definition is about reducing the variation and in the process it eliminates process gaps and help to to increase quality and efficiency. By using 6 sigma and other statistically oriented tools, organizations can pick up and eliminate defects, reduce variation, and bring about customer satisfaction (Pyzdek& Keller, 2014). Six Sigma took industry by storm in 1980s and 90s and is thereafter used very effectively till today. Keki Bhote and Michael Harry implemented this in Motorola in later half of 1980s for quality improvement by a big margin. It was them made even more popular and simpler by General Electric (GE) making it quality improvement and cost reduction tool. GE a conglomerate with presence in many sectors right from jet engines to platics to medical equipment used this tool to its benefit and using it as a business processes improvement tools rather than simple quality improvement tool. This later caused fancy of process industry and later, around early 2000s it got recognition as business excellence tool because of its all-encompassing nature. Picture below shows how this tool went from a problem resolution to Business Excellence:

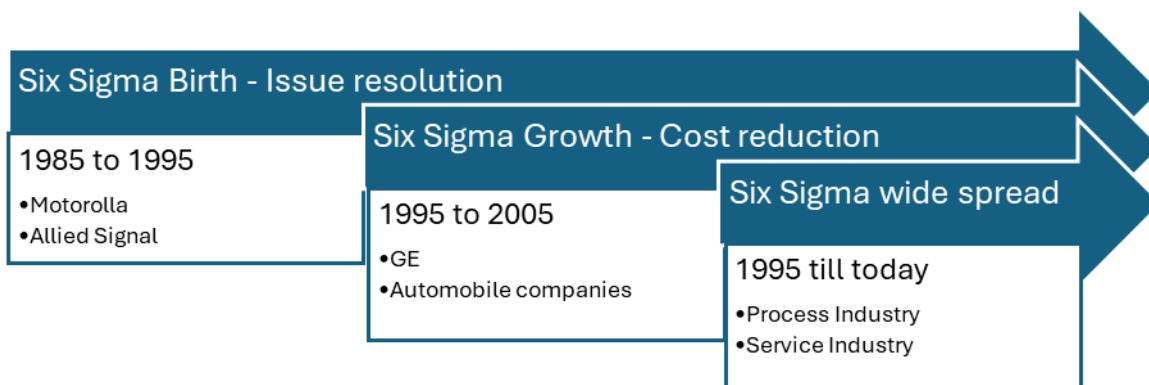


Figure 2. Six Sigma development from an issue resolution tool to OE tool over period

Total Quality Management (TQM): TQM as the word may sound, is about things beyond quality. It originates as a quality thing but applies to all business processes. Which means there is quality of product that one may always expect to relate to, then there is quality of procurement, Quality of marketing and Sales, quality of HR and what not. It demands inclusion of all employees in improvement efforts in what ever they do leading to customer delight. To get operational excellence, organizations strongly require TQM principles, employee empowerment, CI, and customer focus (Dale et al., 2015).

TQM unlike any other tool, was a business excellence tool fight from the beginning as it covers all the business processes as it's fundamental requirement.

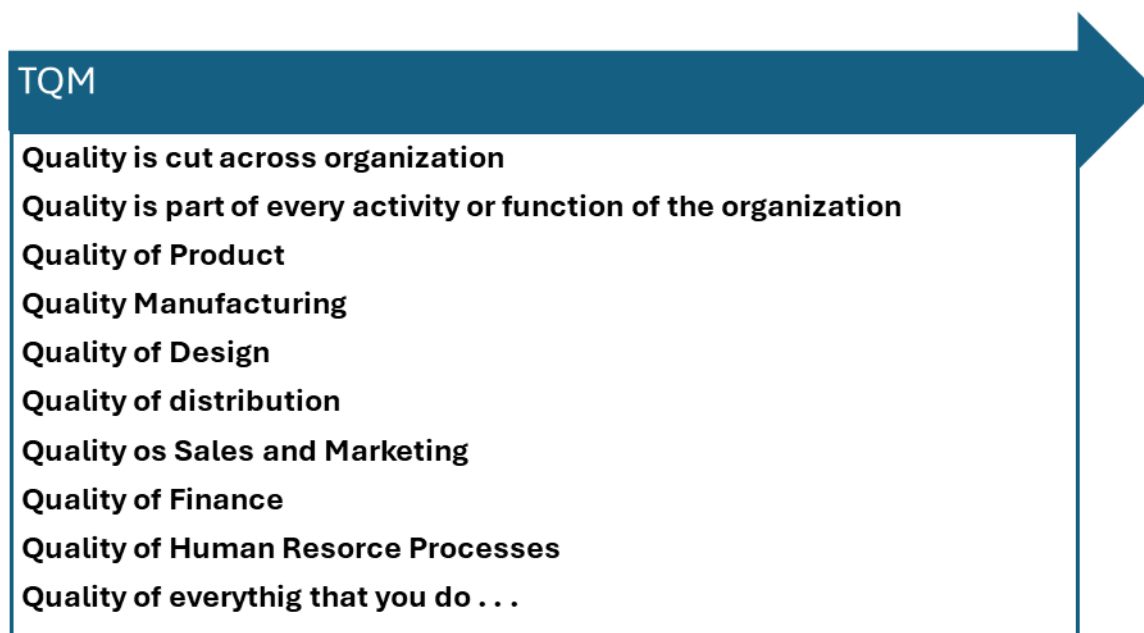


Figure 3. TQM as an OE tool

Continuous Improvement CI): Kaizen and Plan-Do-Check-Act (PDCA) that makes CI possible, use step by step approach for process improvement and issue solutions. By following trials and experimentation and learning, companies can drive small or incremental improvements in their business processes (Imai, 1986).

### 5) Quality Tools and Organizational Performance

Quality tools have proven themselves to have lasting impact on the business processes and hence the organisations' performance in multiple deliverables. Study by Antony et al. (2016) found that organizations following 6 Sigma experience with rigour improves process efficiency, value engineering, and customer delight. In the same manner Shah & Ward (2007) found that Lean Management is associated with considerable gains in productivity, through put time and inventory.

Similarly, TQM has been found to get benefits related to product quality as a must have, customer loyalty, and boosts morale of employees (Kuei & Madu, 2001). Where as CI contribute to a culture of applying oneself to the path of change and gain, bring about innovation, develop agility and adaptability, helping organizations to quickly respond to changing market dynamics and customer needs (Bessant & Caffyn, 1997).

OE is an essential part of organizations to generate steady growth and competitive business model in today's cut throat environment. By maximizing the benefits of quality tools such as TQM, 6-Sigma, LEAN and CI, organizations can push operational improvements, increase efficiency, and provide superior value to customers. These technologies can

considerably improve performance of the companies and help them achieve new heights in all their business goals.

#### **6) LEAN - efficiency and quality**

According to Shah and Ward (2007), LEAN is socio-technical (need people connect and technical know how) tool that eliminates multiple types of waste and reduce variation or unpredictability generated by suppliers, internal participants and even customers. This seemingly weird explanation of lean highlights how crucial it is to maintain the socio-technical weaving within the service and manufacturing companies. Womack and Jones (1996) in their research have shared the characteristics of lean approach. The disciplined implementation of lean principles showed reasonably high influence in many industries, like service industries, continuous process industries like oil and gas manufacturing and electronics industries. The idea of standardization to avoid multiple ways of doing things that lead to waste in some of those ways is associated with the LEAN. The clinics, hospices and hospitals that followed LEAN have gained a clear idea on how the variation in non-standardized treatment is important when dealing with patients' requirements and patient-centered treatment. The variation in approach followed in surgery in cardiothoracic treatment is evident, as no two approaches are identical as per Joosten et al. (2009). New ways and technology in information management, are becoming more widely and cheaply available due to technological breakthroughs. This has resulted in noticeable changes in lean operations systems as found by Cheng et al., (2010) in their research. The LEAN has its objective aligned with efficient utilisation of resources to achieve improved efficiency and productivity. The Lean methodology additionally promotes decrease in rework, scrap leading to the quality improvement as observed by Simpson and Power (2005) in their study.

#### **Recommendations for Quality Tools' implementation**

Introduction: Quality tools implementation in industry setting is critical for process optimization and quality improvement. This section uses careful analysis of information coming from literature review to explain what organizations need to do for achieving business excellence by implementation of quality tools. The chapter explains best practices and along with ways to take care of the difficulties commonly come across by organizations.

#### **Best Practices:**

- a. **Committed Management team:** Organizations get success in their endeavour related to the quality initiatives when entire top management is fully committed to the initiative. The commitment should come in the form of personal involvement as well as financial backing as per Shah and Ward (2003). All employees of organization need to follow a structural model that comes into being from genuine commitment to quality.
- b. **Employee Involvement:** Having committed management is half the story of the people aspect of the quality improvement and BE deployment, The doers, the employees who are the core part of the action need to be involvement wholeheartedly to ensures success with the quality initiative. Shah and Ward (2003) has similar observations based on his research where in they suggested that leaders must supply funding and take active part in enhancement projects during quality related efforts. Organization-wide quality gain should emerge from leaders' commitment because this generates pressure for other employees including peer leaders and next level to emulate.
- c. **Data driven or data based Decisions:** This aspect of the improvement is keeping in line with the latest fact of non-availability of genius scientific minds abundantly available in the companies. In earlier days looking at the situation, based on the experience these intelligent minds would suggest solutions. However, the need of the day is to use all and every type of data and analyse it, conduct some trials based on the data and analysis and generate solution. In short business choices must be derived from validated information (data) rather than on emotional or intuition-based decisions. Organizations are able to

develop capability to find the real cause of the problem and select solution only through the data analysis (Antony et al., 2006).

- d. Continuous Learning: Learning needs to be integral part of the DNA of the organization that considers investment in training as a catalyst for business enhancement projects (Dale et al., 2001). It is a well known fact that the team members with knowledge and expertise can perform better in demanding situations than those who have not gone through enough of training and skill.
- e. Customer Focus: Customer centricity in whatever you do is sure to provide better inroads in the ensuring success at minimal investment. The same was found by Prajogo & Sohal, (2004). They suggested to align quality initiatives with customer needs and to ensure customer delight. Organizations can manufacture goods and services that exceed expectations by understanding customer needs and preferences, that boosts success.

### **7) Implementation Strategies**

- a. Scaling : The idea is simple. Try, build confidence and go for a big shot. This is what Collins and Hansen (2011) shared in his book titled *Great By Choice*. He called this “Fire bullets and then Canon ball”. This means to begin with pilot project or small-scale launch or launch in a limited area to get success and build momentum before scaling up to big level (Womack et al., 1990). Starting small allows organizations to validate the ideas, identify issues and hurdles, and refine approaches before launching out initiatives in big way.
- b. Cross-Functional Collaboration: Saraph et al. (1989) recommended teamwork and collaborative efforts across all the business functions to leverage diverse views and expertise in issue resolution process. Cross-functional-teams (CFT) bring team dynamics that align members with various backgrounds, experience and skills, enhancing innovation and creativity in addressing quality concerns.
- c. Clear Communication: Communication is key to success. Ensure clear and concise communication of quality goals, method to follow, ups and downs in the progress to all stakeholders (Oakland, 2003). This fosters alignment, leads to buy-in, takes care of rather avoid misunderstandings, and creates accountability in the organization.
- d. Keep tab: The best way of ensuring things are falling in place is to out review mechanism in place. This ensures the things are always fresh in the minds of people, actions are checked against plan and progress is compared with the plan, hurdles if any are captured early and finetuning can be done just as when needed (Prajogo & Sohal, 2004). Planned periodic reviews help companies to be on track, attend issues at budding stage, and make course correction as per changes in circumstances.
- e. Appreciation and celebration: One of the most variability seen in implementation of program is in celebration. Quite often leaders feel the achievement is part of the work and they forget to appreciate. It is necessary to appreciate and celebrate successes and achievements to motivate the hard-working team members and, in the process, give a message that quality improvement efforts are important for the organization (Antony et al., 2006). Such celebration boosts morale, encourages a positive work culture, and supports wholehearted participation in quality improvement programs.

### **8) Common Challenges**

- a. Reluctance to Change: Shah & Ward, (2003) in their paper related to the LEAN manufacturing in sewing line observed that the improvement initiatives too face daunting tasks of change management. They suggested the opposition to the quality tool implementation should be attended immediately through training, information about tools’. It is necessary to involve their team members early in the change processes, listen to their grievances and resolve the valid ones and counsel on the ones that are in grey

zone. Once done the program becomes more compatible and employees are open to the changes, evolution and innovation.

- b. Lack of Manpower assigned to the program: Agreeing to make changes and supporting with actions are two different things. Funding and manning are two important supports that are needed. The companies must put funding and expert advice as top requirements for successful change initiative (Imai, 1986). Quality improvement initiative needs both manpower and funding as these elements help remove barriers and support continuous march forward.
- c. Siloed Thinking: The departmental silos was the scenario in Indian Industries till around 1990s, that marred the growth to a great extent. The companies must remove the partitions between the departments through collaboration because this generates collaborative and comprehensive quality change as mentioned by Saraph et al., (1989) in their study, title, An instrument of measuring critical factor of quality management. The very thought that each function is different than each other leads to lack of team work leading to and inferior quality improvement. A better alignment of all functions at the beginning of the program that continew till end is

By following the best practices and taking care of the commonly observed challenges, the program can be implemented with ease. And then what remains is to keep in synch with the plan and keep fine tuning to not deviate from the course to achieve the goal.

### **Implication of the study**

The study " Enhancing Operational Excellence: Through use TQM, Lean and 6 Sigma" offers valuable inputs to stakeholders involved in management, policymaking and for academic research. The whose who in the organization, can use this study to decide right investments in quality improvement efforts, streamline processes, enhance efficiency that ultimately leads to competitiveness and better financial results. The study also highlights employee engagement needed for operational-excellence and to successful use of high-end quality tools. The management board or policymakers can use the study for developing strategies, policies to invest in quality improvement programs and support overall financial growth of the organizations. The study also has a benefit related to academic research where in by orchestrating the analysis of existing literature, by identifying gaps has offered new vision for effective use of quality tools and techniques. Overall, the scope of the study extends beyond industrial boundaries having broader sense related to industry practices, policymaking, and academic studies, providing change management and nurturing culture of excellence.

### **CONCLUSION**

The paper "Enhancing Operational Excellence: Through use TQM, Lean and 6 Sigma" presents a thorough insight on Operational Excellence (OE/OpEx) and the necessity of the recommendation in the current industrial world of turmoil caused by everchanging dynamics. By carefully studying quality tools of this generation such as 6 Sigma, LEAN, CI, TQM, this paper recommends organizations to aim for quality improvements and process optimization. A thorough explanation of OE and its importance in the current corporate world can be found in the research " Enhancing Operational Excellence: Through use TQM, Lean and 6 Sigma". The paper throws light on the necessity to overcome regularly observed challenges, such as change - resistance, lack of resources, siloed departments, to ensure successful launch and sustainable benefit of quality improvement initiatives. The implications of the study goes to the desk of organizational leaders, board members, policy makers and academicians, offering valuable inputs for driving much needed change and cultivating a culture of excellence in industry scenarios. In short, by leveraging quality tools and

embracing best practices, organizations can improve their operational excellence and achieve long lasting growth in performance, competitiveness leading to success.

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