

## Role of Total quality Management and Six Sigma in Manufacturing Industry

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### Abstract

The industrial sector frequently employs Total Quality Management (TQM) and Six Sigma as prominent approaches to raise the effectiveness and quality of their products. Continuous improvement, customer happiness, and staff involvement in the production process are all key components of the TQM management philosophy. Contrarily, Six Sigma is a data-driven strategy that concentrates on lowering errors and variability in the production process. TQM and Six Sigma deployment can have a variety of positive effects on the manufacturing sector, including better product quality, more productivity, and lower costs. TQM aids in locating and resolving the underlying causes of quality problems, whereas Six Sigma offers a structured method for information analysis and problem-solving. Manufacturing businesses can enhance their production processes and raise customer satisfaction by implementing these approaches. Thus, TQM and Six Sigma are crucial tools for manufacturing firms that want to attain operational excellence, and their application can significantly raise the quality of their output and their general effectiveness.

**Keywords:** Total Quality Management, Six Sigma, Manufacturing Industry, Continuous Improvement, Efficiency.

### Introduction

Demand for higher-quality products, more efficiency, and cost-cutting has been rising in the manufacturing sector. Manufacturers have used Total Quality Management (TQM) and Six Sigma approaches to attain these objectives. Numerous manufacturing sectors have embraced TQM and Six Sigma to achieve operational excellence and maintain market competitiveness.

A management strategy called total quality management puts an emphasis on raising product quality, customer satisfaction, and employee engagement. Since its introduction in the 1980s, TQM has been broadly embraced by the manufacturing sector. Every employee in the company has a part to play in quality management, according to the TQM methodology. In order to attain qualitative perfection, TQM is a mindset that mandates the participation of all employees in the manufacturing process. The goal of the data-driven Six Sigma methodology is to lower variability and defects in the manufacturing process. The statistical analysis and problem-solving foundation of Six Sigma. It offers an organised method for analysing data, finding problems, and fixing them. A strict process called Six Sigma seeks to lower defects to no more than 3.4 per million opportunities because it may boost customer satisfaction, save costs, and streamline processes. Six Sigma is widely employed in the manufacturing sector. There are many advantages to the manufacturing industries' adoption of TQM and Six Sigma processes. These advantages include better product quality, enhanced productivity, cost savings, and increased customer satisfaction. A considerable investment in training and materials is needed to execute these approaches. The return on investment is substantial, and the advantages far exceed the disadvantages. There are many advantages to applying TQM and Six Sigma processes in manufacturing sectors. The enhancement of product quality is one of the most important advantages of TQM and Six Sigma implementation. While Six Sigma offers a disciplined method for identifying and reducing variability in the manufacturing process, TQM focuses on enhancing quality by addressing the underlying causes of quality concerns. TQM and Six Sigma work together to increase product quality significantly. This study looks at the applications of Six Sigma and Total Quality Management in the industrial sector and examines the advantages of applying TQM and Six Sigma approaches in the manufacturing sector, as well as the implementation's difficulties and solutions. The effectiveness of leadership in the use of TQM and Six Sigma approaches is also examined in this study.

### **Literature Review**

Manufacturing companies have embraced two well-liked approaches, Total Quality Management (TQM) and Six Sigma, to attain operational excellence. The benefits, difficulties, and best practices for effective adoption of TQM and Six Sigma in the manufacturing business are covered in this literature study. The TQM management philosophy places a strong emphasis on ongoing development, client satisfaction, and staff involvement. TQM adoption in the manufacturing sector has a number of advantages. TQM has several advantages, one of which is an improvement in product quality. Customer satisfaction rises as a result of TQM's emphasis on meeting requirements and expectations of customers (Ahire et al., 1996). TQM also has a positive effect on production. TQM places a strong emphasis on reducing waste and enhancing manufacturing procedures, which boosts productivity and efficiency (Gharakhani et al., 2012). Cost reduction in the industrial sector is another benefit of TQM. Manufacturing firms can save costs and boost profitability by reducing waste and improving production procedures (Kumari et al., 2016). Better staff engagement and motivation are additional benefits of TQM. Employee participation in the production process is important and is emphasised by TQM, which increases employee motivation and job satisfaction (Pyzdek, 2014). TQM has advantages, but there are also difficulties with applying it to the manufacturing sector. The difficulty of changing company culture is one of the TQM's problems. To embrace customer satisfaction and continual improvement, TQM calls for an adjustment in company culture (Gharakhani et al., 2012). The difficulty of integrating the technique across many departments and functions inside the organisation is another obstacle TQM faces (Kumari et al., 2016). Some best practises have been found in the literature to help adopt TQM despite its difficulties. Including top management in the process is one of the finest ways to execute TQM successfully. The successful deployment of TQM requires top management backing (Ahire et al., 1996). Employee participation in the process is another recommended practise. Engagement among employees raises motivation and job satisfaction, which improves TQM implementation (Gharakhani et al., 2012). The goal of the data-driven Six Sigma methodology is to lower variability and defects in the manufacturing process. Many advantages come from Six Sigma application in the manufacturing sector. The enhancement of product quality is one advantage of Six Sigma. In order to identify and reduce manufacturing process flaws, Six Sigma offers a structured method for problem-solving and data analysis (Jiju Antony et al., 2016). The improvement in efficiency is another advantage of Six Sigma. Six Sigma places a strong emphasis on waste reduction and process enhancement, which boosts productivity and efficiency (Mukherjee et al., 2014). Moreover, Six Sigma lowers costs in the manufacturing sector. Manufacturing firms can save costs and boost profitability by reducing waste and improving production procedures (Jiju Antony et al., 2016). Notwithstanding Six Sigma's advantages, there are difficulties with its application in the manufacturing sector. The task of gathering and evaluating data is one of Six Sigma's challenges. Using a structured strategy is another best practise for Six Sigma adoption that is successful. In order to identify and reduce manufacturing process flaws, Six Sigma offers a structured method for problem-solving and data analysis (Dangayach & Deshmukh, 2008). Establishing a precise definition of the issue to be treated and the desired results is equally crucial. In the manufacturing sector, gathering and analysing the amount of data needed for Six Sigma analysis can be challenging (Mukherjee et al., 2014). Using integrated TQM and Six Sigma, which combines the two techniques, has been demonstrated to provide more advantages than doing it independently. The enhancement of product quality is one advantage of integrating TQM with Six Sigma. An investigation into the application of Six Sigma in Indian manufacturing businesses was done in 2012 by Muralidharan and Anantharaman. The goal of the study was to pinpoint the advantages, difficulties, and potential future directions of Six Sigma in this situation. The authors studied the replies from 85 Indian manufacturing companies that had adopted Six Sigma. According to the report, Six Sigma has a number of advantages, including increased customer satisfaction, a decrease in defects, better quality, and increased productivity. Also, it has been discovered that Six Sigma aids businesses in streamlining operations and cutting waste. The deployment of Six Sigma in Indian manufacturing businesses experienced a number of difficulties, according to the authors, including cultural opposition, a lack of support from senior management, and insufficient training. Manufacturing industries can improve product quality more effectively by combining the continuous improvement emphasis of TQM with the data-driven problem-solving methodology of Six Sigma (Kumar & Antony, 2008). The rise in productivity is another advantage of TQM and Six Sigma integration. Integrated TQM and Six Sigma offers a holistic strategy for enhancing production procedures and removing waste, which boosts productivity and efficiency (Kumar & Antony, 2008). By concentrating on fulfilling customer needs and expectations, integrated TQM and Six Sigma also improves customer happiness (Yang & Hung, 2009). The literature has highlighted a number of best practises that can be used to overcome the difficulties of implementing combined TQM and Six Sigma. The

participation of upper management in the process is one of the best practises. The successful deployment of integrated TQM and Six Sigma depends on top management support ( Nonthaleerak and Hendry, 2008).Establishing a precise definition of the issue to be solved and the expected results is another great practise. It is crucial to remember that the dedication and participation of every employee in the organisation is necessary for TQM and Six Sigma efforts to be successful. To guarantee that personnel at all levels have the abilities and knowledge required to take part in these activities, comprehensive training and education are necessary in addition to top management assistance.

**Objectives of the study:**

1. To find the role of total quality management and six sigma in manufacturing industry

**Research Methodology:**

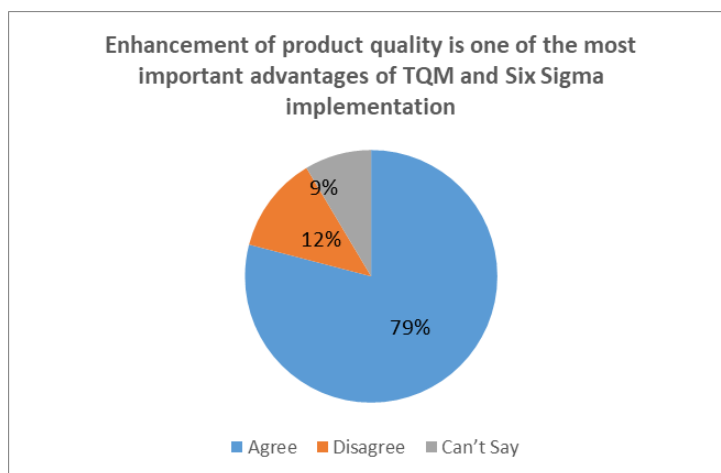
This study is empirical in nature. In this study 210 respondents were contacted to give their viewpoints on the role of total quality management and six sigma in manufacturing industry. The data analysis was done with the help of the frequency distribution and pie charts were used to present the data.

**Data Analysis and Interpretation:**

**Table 1 Enhancement of product quality is one of the most important advantages of TQM and Six Sigma implementation**

| Particulars | Agree | Disagree | Can't Say | Total |
|-------------|-------|----------|-----------|-------|
| Respondents | 166   | 26       | 18        | 210   |
| % age       | 79.0  | 12.4     | 8.6       | 100   |

Table 1 presents that with the statement **enhancement of product quality is one of the most important advantages of TQM and Six Sigma implementation**, it is found that 79.0% of the respondents agree with this statement.



**Figure 1 Enhancement of product quality is one of the most important advantages of TQM and Six Sigma implementation**

**Table 2 Cost reduction in the industrial sector is another benefit of TQM**

| Particulars | Agree | Disagree | Can't Say | Total |
|-------------|-------|----------|-----------|-------|
| Respondents | 173   | 27       | 10        | 210   |
| % age       | 82.0  | 13.0     | 5.0       | 100   |

Table 2 presents that with the statement **cost reduction in the industrial sector is another benefit of TQM**, it is found that 82.0% of the respondents agree with this statement.

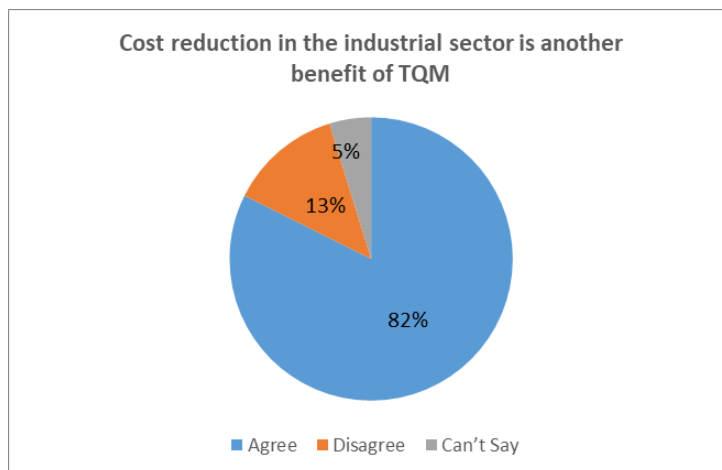


Figure 2 Cost reduction in the industrial sector is another benefit of TQM

Table 3 TQM places a strong emphasis on reducing waste and enhancing manufacturing procedures

| Particulars | Agree | Disagree | Can't Say | Total |
|-------------|-------|----------|-----------|-------|
| Respondents | 178   | 17       | 15        | 210   |
| % age       | 85.0  | 8.0      | 7.0       | 100   |

Table 3 presents that with the statement **TQM places a strong emphasis on reducing waste and enhancing manufacturing procedures**, it is found that 85.0% of the respondents agree with this statement.

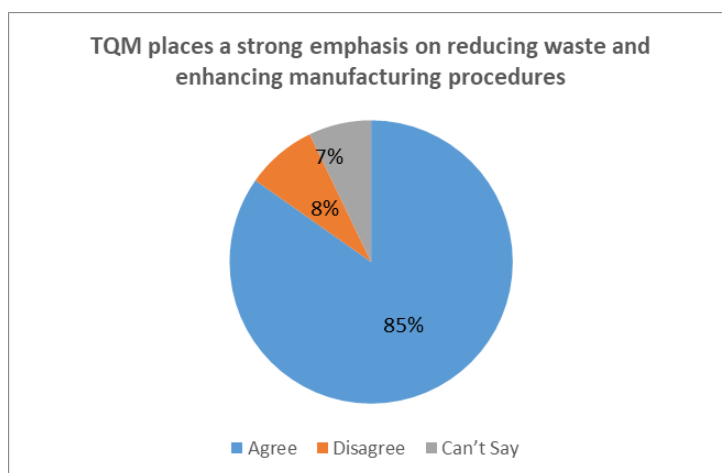


Figure 3 TQM places a strong emphasis on reducing waste and enhancing manufacturing procedures

Table 4 Better staff engagement and motivation are additional benefits of TQM

| Particulars | Agree | Disagree | Can't Say | Total |
|-------------|-------|----------|-----------|-------|
| Respondents | 184   | 15       | 9         | 210   |
| % age       | 88.0  | 7.0      | 5.0       | 100   |

Table 4 presents that with the statement **better staff engagement and motivation are additional benefits of TQM**, it is found that 88.0% of the respondents agree with this statement.

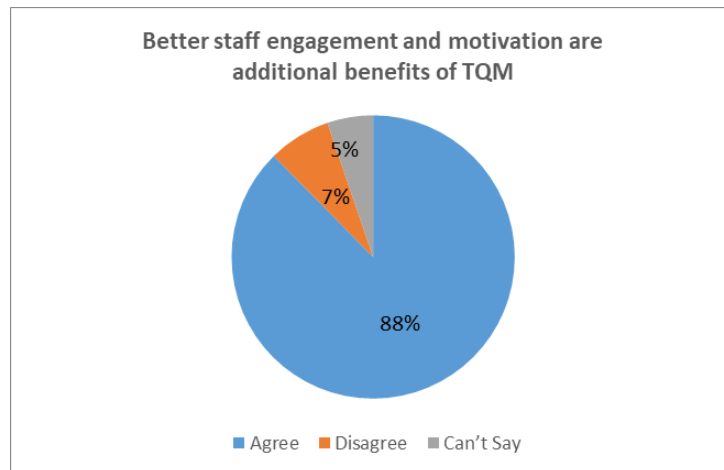


Figure 4 Better staff engagement and motivation are additional benefits of TQM

Table 5 TQM embrace customer satisfaction and continual improvement

| Particulars | Agree | Disagree | Can't Say | Total |
|-------------|-------|----------|-----------|-------|
| Respondents | 181   | 19       | 6         | 210   |
| % age       | 88.0  | 9.0      | 3.0       | 100   |

Table 5 presents that with the statement **TQM embrace customer satisfaction and continual improvement**, it is found that 88.0% of the respondents agree with this statement. Considering all the responses of the statements, it was found that to a good percentage, the respondents have agreed which means that TQM and six sigma plays an important role in manufacturing industry

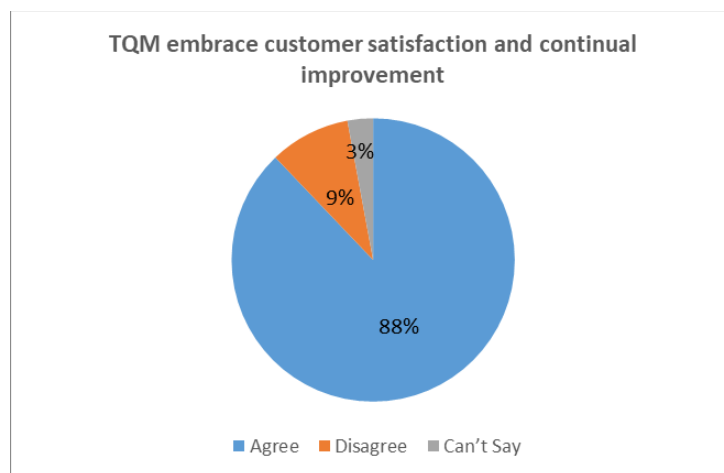


Figure 5 TQM embrace customer satisfaction and continual improvement

### Conclusion

To sum up, Six Sigma and Total Quality Management (TQM) are two potent approaches that can dramatically raise the calibre and effectiveness of industrial processes. While Six Sigma stresses statistical analysis to find and remove process flaws, TQM focuses on continuous improvement through the participation of all employees in the organisation. According to research, implementing TQM and Six Sigma can have a number of advantages, such as better quality, more customer satisfaction, and increased productivity. Yet, there are obstacles to these approaches' application as well, including cultural opposition, a lack of support from top management, and inadequate training. Strong leadership and a continuous improvement culture are essential for overcoming these obstacles and ensuring the success of TQM and Six Sigma programmes. Businesses that give these criteria top priority are more likely to produce long-lasting gains and obtain a competitive advantage. Overall, TQM and Six Sigma play a crucial role in the manufacturing sector because

they give businesses the tools and strategies they need to enhance their operations and reach high standards of quality and efficiency.

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