

# Assessing Employee Perceptions on Six Sigma Practices in the Automobile Industry

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## Abstract

This study investigates employee perceptions of Six Sigma implementation in the automobile manufacturing sector, focusing on the Coimbatore auto-component cluster in India. Although Six Sigma is widely adopted to enhance quality and reduce process variation, its effectiveness largely depends on employee acceptance, engagement, and perception. The study emphasizes the human dimension of quality management by examining the influence of training, leadership support, and organizational culture on employee attitudes toward Six Sigma practices. A quantitative approach using a descriptive survey design was employed to collect primary data from 85 respondents, including operators, supervisors, engineers, and managers. Data were gathered through a structured questionnaire using a five-point Likert scale. Statistical tools such as descriptive analysis, Pearson correlation, multiple regression, and Chi-square tests were applied using SPSS software. The results indicate a high level of awareness of Six Sigma methodologies, particularly the DMAIC framework. A strong positive correlation ( $r = 0.888$ ,  $p < 0.01$ ) was found between employee training and leadership support, suggesting that effective training enhances perceptions of managerial commitment. Regression analysis further confirms that training is the most significant predictor of leadership support, followed by employee acceptance, with the model explaining 80.5% of the variance. Despite generally positive perceptions, challenges such as process complexity, limited resources, and psychological pressure were identified. The study concludes that strengthening training initiatives, enhancing leadership involvement, and fostering effective communication are essential for improving employee engagement and ensuring the sustainability of Six Sigma practices in the automobile industry.

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## 1. Introduction

The automobile industry plays a pivotal role in the economic development of India, contributing significantly to industrial output, employment generation, and export earnings. With increasing global competition and rising customer expectations for quality and reliability, automobile manufacturers are under constant pressure to adopt advanced quality management practices. In this context, Six Sigma has emerged as a powerful methodology for achieving operational excellence by minimizing defects, reducing process variation, and enhancing overall efficiency. Six Sigma, originally

developed by Motorola and later popularized by General Electric, focuses on a data-driven approach to problem-solving using structured methodologies such as DMAIC (Define, Measure, Analyse, Improve, and Control). In the Indian automobile sector, both large Original Equipment Manufacturers (OEMs) and small and medium enterprises (SMEs) have increasingly embraced Six Sigma practices to remain competitive in both domestic and global markets. Coimbatore, known as one of India's leading auto-component manufacturing clusters, has witnessed widespread adoption of such quality initiatives. However, while the technical benefits

of Six Sigma are well documented, its success in practice is heavily dependent on the human element within organizations. Employee perception, motivation, and involvement play a crucial role in determining whether Six Sigma initiatives are effectively implemented and sustained over time. Resistance to change, lack of adequate training, insufficient leadership support, and communication gaps can significantly hinder the success of quality improvement programs. Furthermore, the hierarchical nature of manufacturing organizations often creates differences in perception across job roles, ranging from shop-floor operators to top management. Employees at different levels may interpret Six Sigma practices differently based on their experience, exposure, and level of participation. Therefore, understanding these perceptions is essential for identifying the key drivers and barriers influencing successful implementation. This study aims to bridge this gap by focusing on employee perspectives toward Six Sigma practices in automobile manufacturing units located in Coimbatore. It examines how factors such as training, leadership support, organizational culture, and process complexity shape employee attitudes and acceptance levels. By analysing these dimensions, the study seeks to provide practical insights for managers and policymakers to enhance employee engagement, improve implementation effectiveness, and ensure the long-term sustainability of Six Sigma initiatives in the automobile industry.

## 2. Review of Literature

The adoption of Six Sigma in manufacturing industries has been widely examined, particularly in relation to quality improvement and organizational performance. Pande P. S. *et al.* (2000) highlighted that Six Sigma is a structured, data-driven methodology that enables organizations to minimize defects and enhance process efficiency. Their work established the foundation for integrating quality improvement with business strategy, emphasizing the importance of leadership commitment and employee involvement. Building on this, Chakravorty S. S. (2009) proposed an implementation model that underscores the role of organizational readiness, communication, and training in ensuring successful Six Sigma adoption. The study identified that lack of employee engagement often leads to failure in quality initiatives. Further, George M. L. (2002) introduced the concept of Lean Six Sigma, combining speed and quality improvement, and emphasized cross-functional collaboration and workforce participation as critical success factors. This highlights the increasing relevance of human factors in quality management. In the Indian manufacturing context, Gijo E. V. *et al.* (2022) found that Six Sigma practices significantly improve productivity and process consistency, but their effectiveness depends on employee training and management support. Similarly, Sreedharan V. R. and Sunder M. V. (2020) emphasized that structured project management and leadership involvement enhance the success rate of Six Sigma initiatives. Moreover, Antony J. *et al.* (2020) highlighted that while Six Sigma improves operational performance, challenges such as resistance to change, lack of awareness, and inadequate training can limit its effectiveness. This aligns with the findings of Gupta S. *et al.* (2020), who identified critical barriers including poor communication and insufficient employee participation. Recent studies by Kumar S. *et al.* (2024) and Swarnakar V. *et al.* (2024) demonstrate that quality improvement initiatives positively influence firm performance, but require continuous employee motivation and

alignment with organizational goals. Similarly, Valencia K. M. *et al.* (2025) emphasized that employee perception plays a crucial role in sustaining quality practices over time. Additionally, Trimarjoko A. *et al.* (2025) examined the consistency of DMAIC implementation and concluded that proper training and adherence to structured methodologies are essential for achieving desired outcomes. Supporting this, Farrukh A. *et al.* (2022) highlighted the importance of managerial perspective and organizational culture in influencing quality adoption. Overall, the literature indicates that while Six Sigma provides a robust framework for quality improvement, its success largely depends on human factors such as employee training, leadership support, organizational culture, and effective communication. However, limited studies have specifically focused on employee perceptions in the Indian automobile sector, particularly in regional clusters like Coimbatore. This gap forms the basis for the present study.

## 3. Research GAP

Although prior studies have extensively examined Six Sigma in terms of process improvement, cost reduction, and organizational performance, relatively limited attention has been given to the human dimension, particularly employee perceptions, attitudes, and engagement in its implementation. Existing research highlights the importance of factors such as training, leadership support, and organizational culture; however, these variables are often studied in isolation rather than as an integrated framework influencing employee acceptance of Six Sigma practices. Furthermore, there is a lack of empirical evidence focusing specifically on the automobile manufacturing sector in India, especially within regional industrial clusters like Coimbatore. Additionally, the role of demographic factors such as experience and educational background in shaping employee perceptions remains underexplored. Therefore, this study seeks to address these gaps by providing a comprehensive analysis of employee perspectives, examining the combined influence of key organizational factors, and offering context-specific insights into the successful implementation of Six Sigma practices.

## 4. Objectives of the Study

- To examine the influence of employee training, leadership support, workplace culture, and process complexity on employee perceptions of Six Sigma practices in the Indian automobile industry.
- To assess how employee training levels, impact the acceptance of Six Sigma practices among automobile industry workers.
- To investigate the role of leadership support in shaping positive employee attitudes towards Six Sigma adoption.

## 5. Research Methodology

This study adopts a quantitative approach using a descriptive survey design to examine employee perceptions of Six Sigma implementation in automobile manufacturing units within the Coimbatore cluster. The design enables systematic collection and analysis of data to understand employee attitudes, experiences, and satisfaction, and to identify relationships between factors such as training, leadership support, and employee perception without manipulating variables. The target population includes employees from production, quality, and HR departments, comprising operators,

supervisors, engineers, and managerial personnel. A stratified random sampling technique is used to ensure representation across organizational levels. Although 200–400 respondents are generally recommended, the study is based on a sample of 85 respondents, providing meaningful preliminary insights.

Primary data are collected through a structured questionnaire using a 5-point Likert scale, measuring constructs such as training, management commitment, leadership support, reward and recognition, organizational culture, teamwork, communication, and usability of Six Sigma tools. Secondary data are sourced from company reports, quality manuals, and academic literature. The analytical framework includes both descriptive and inferential statistics. Descriptive tools such as percentage, mean, and standard deviation summarize employee responses, while inferential techniques, including Chi-square tests, Pearson correlation, and multiple regression analysis, examine relationships and determine the impact of independent variables on employee perception. Data analysis is conducted using SPSS.

The conceptual framework identifies independent variables (management commitment, training and development, reward and recognition, organizational culture, teamwork, and communication), a dependent variable (employee perspective measured through job satisfaction, perceived usefulness, psychological impact, and skill enhancement), and moderating variables (experience level and educational background). Reliability is ensured using Cronbach’s Alpha, while correlation and regression analyses assess relationships and the contribution of each factor. Overall, the methodology provides a structured approach to understanding employee engagement in Six Sigma implementation.

**6. Data Analysis and Interpretation**

**6.1 Identifying Job Level/Position Distribution-Table-1**

**Table 1: Identifying Job Level/Position Distribution**

Category	Frequency	Percent
Operator/Technician	34	40.0
Supervisor/Team Leader	19	22.4
Engineer	19	22.4
Manager	11	12.9
Senior Management/Executive	2	2.4
Total	85	100.0

**Interpretations:** From the above table, operators and technicians form the largest group at 40.0%, highlighting the prevalence of frontline roles in the sample. Supervisors and engineers each represent 22.4%, showing balanced mid-level involvement in the survey. Managers account for 12.9%, while senior management is minimal at 2.4%, indicating limited high-level participation. This structure mirrors the hierarchical composition typical of the automobile manufacturing sector. The distribution reveals a base-heavy respondent profile focused on operational levels.

**6.2 Pearson Correlation Test: Employee Training Level and Leadership Support**

**Null Hypothesis (H<sub>0</sub>):** There is no significant correlation between employee training level and leadership support ( $\rho = 0$ ).

**Alternative Hypothesis (H<sub>1</sub>):** There is a significant positive correlation between employee training level and leadership support ( $\rho > 0$ ).

**Table 2: Correlations**

		Employee Training Level	Leadership Support
Employee Training Level	Pearson Correlation	1	.888**
	Sig. (2-tailed)		.000
	N	85	85
Leadership Support	Pearson Correlation	.888**	1
	Sig. (2-tailed)	.000	
	N	85	85

\*\* . Correlation is significant at the 0.01 level (2-tailed)

**Interpretations:** From the correlation table, a strong positive Pearson correlation coefficient of 0.888 exists between employee training level and leadership support, significant at the 0.01 level, indicating that higher training levels are closely associated with stronger leadership endorsement of Six Sigma practices. This suggests that well-trained employees perceive greater support from leaders, potentially fostering a symbiotic relationship where training enhances leadership visibility in quality initiatives. The bidirectional symmetry in the matrix reinforces the robustness of this linear association across the 85 respondents. Such a high correlation implies that investments in training could indirectly bolster leadership commitment, aligning with organizational goals in the automobile sector. However, the strength warrants caution against multicollinearity in further models. Overall, this finding supports the notion that training acts as a catalyst for supportive leadership environments conducive to Six Sigma adoption.

**6.3 Multiple Linear Regression Test: Predictors of Leadership Support**

**Null Hypothesis (H<sub>0</sub>):** Employee training level and acceptance of Six Sigma practices have no significant effect on leadership support ( $\beta_1 = 0$  and  $\beta_2 = 0$ ).

**Alternative Hypothesis (H<sub>1</sub>):** At least one of employee training level or acceptance of Six Sigma practices significantly predicts leadership support ( $\beta_1 \neq 0$  or  $\beta_2 \neq 0$ ).

**Table 3: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.897 <sup>a</sup>	.805	.800	.51536

a. Predictors: (Constant), Acceptance, Employee Training Level

**Table 4: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.378	.211		-1.791	.077
	Employee Training Level	.823	.105	.694	7.847	.000
	Acceptance	.271	.103	.233	2.628	.010

a. Dependent Variable: Leadership Support

**Interpretations:** The regression model explains 80.5% of the variance in leadership support ( $R^2 = .805$ ), with an adjusted  $R^2$  of .800, indicating a strong fit for predicting leadership perceptions based on training and acceptance variables among the 85 respondents. Employee training level emerges as the dominant predictor with a significant positive beta of .694 ( $p$

< .001), suggesting that each unit increase in training score boosts leadership support by .823 units, underscoring training's pivotal role in shaping supportive attitudes. Acceptance of Six Sigma practices also contributes significantly (beta = .233, p = .010), adding .271 units per score increase, implying that positive employee buy-in reinforces leadership engagement. The constant term is non-significant (p = .077), but overall model F-statistic (inferred from R) confirms predictive power. This analysis highlights synergistic effects where training drives acceptance, which in turn amplifies leadership support in the Indian automobile context. The low standard error (.515) affirms model precision, guiding targeted interventions for enhanced Six Sigma integration.

**6.4 Chi-Square Test of Independence: Gender and Leadership Support**

**Null Hypothesis (H<sub>0</sub>):** There is no significant association between gender and perceptions of leadership support (Gender and Leadership Support are independent).

**Alternative Hypothesis (H<sub>1</sub>):** There is a significant association between gender and perceptions of leadership support (Gender and Leadership Support are dependent).

**Table 5:** Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	23.992 <sup>a</sup>	15	.065
Likelihood Ratio	30.618	15	.010
Linear-by-Linear Association	2.954	1	.086
N of Valid Cases	85		

a. 27 cells (84.4%) have expected count less than 5. The minimum expected count is .42.

**Interpretations:** The Pearson Chi-Square value of 23.992 (df=15, p=.065) fails to reject the null hypothesis at the 0.05 level, suggesting no statistically significant association between gender and leadership support perceptions in the sample of 85 respondents from the automobile industry. However, the Likelihood Ratio test (30.618, p=.010) indicates significance at 0.01, hinting at potential dependency when considering distributional assumptions, though sparse cells (84.4% with expected <5) undermine reliability. Females show higher concentrations in higher support scores (e.g., 12 in 4.00 vs. 6 for males), while males dominate lower ends, implying subtle gender-based perceptual differences possibly linked to role disparities. The non-significant linear-by-linear association (p=.086) further supports weak overall trends. This mixed evidence calls for larger samples to clarify gender influences on leadership views in Six Sigma contexts. Cautiously, the findings point to equitable perceptions but highlight analytical challenges from data sparsity.

**7. Discussion and Suggestions**

The findings of this study reinforce the growing consensus in the literature that the success of Six Sigma implementation extends beyond technical tools and is strongly influenced by human factors such as training, leadership support, and employee acceptance. Consistent with the work of Pande P. S. *et al.* (2000) and George M. L. (2002), which emphasize employee involvement in quality initiatives, the present study demonstrates that training plays a pivotal role in shaping employee perceptions and engagement.

The strong positive correlation (r = 0.888) between employee training and leadership support aligns with the findings of Chakravorty S. S. (2009), highlighting training as a critical

success factor. Similarly, Antony J. *et al.* (2020) and Gijo E. V. *et al.* (2022) emphasize that inadequate training leads to resistance and weak implementation. The present study extends this by showing that training not only enhances skills but also strengthens perceived leadership commitment. Therefore, organizations should invest in structured, continuous training programs, including practical and hands-on learning approaches such as Green Belt and Black Belt certifications, to improve both competence and confidence among employees.

The regression results further confirm that employee training is the most significant predictor of leadership support, followed by acceptance of Six Sigma practices. This supports the arguments of Sreedharan V. R. and Sunder M. V. (2020), who highlight the importance of employee buy-in. This suggests that beyond training, organizations must focus on enhancing employee acceptance by involving them in decision-making, improving communication, and reducing resistance to change. Creating awareness programs and aligning Six Sigma goals with individual performance can further strengthen engagement. The absence of a significant relationship between gender and leadership support indicates that Six Sigma practices are perceived uniformly across demographic groups. However, the dominance of shop-floor employees in the sample highlights the need for targeted interventions at the operational level. Since frontline workers play a crucial role in execution, organizations should design customized training and communication strategies specifically tailored to their needs. Furthermore, the findings reveal challenges related to process complexity and psychological pressure, which are consistent with the observations of Gupta S. *et al.* (2020). To address these issues, organizations should foster a supportive organizational culture by shifting from punitive approaches to learning-oriented practices, encouraging teamwork, and promoting cross-functional collaboration. Simplifying Six Sigma tools and providing clear guidelines can also help reduce complexity and improve usability. Overall, the study highlights that the integration of training, leadership support, and employee acceptance creates a synergistic effect that enhances Six Sigma implementation. By strengthening training initiatives, promoting inclusive leadership, simplifying processes, and fostering a positive work culture, organizations can improve employee engagement and ensure the long-term sustainability of quality improvement practices in the automobile industry.

**Conclusion**

This study examined employee perceptions of Six Sigma implementation in the automobile manufacturing sector, with specific reference to the Coimbatore auto-component cluster. The findings reveal that employees generally hold a positive perception of Six Sigma practices, particularly in terms of their contribution to process improvement, quality enhancement, and operational efficiency. However, the effectiveness and sustainability of these initiatives are strongly influenced by key human factors such as training, leadership support, and employee acceptance. The analysis clearly indicates that employee training is the most critical determinant of successful Six Sigma implementation. The strong positive relationship between training and leadership support demonstrates that well-trained employees are more likely to perceive management as committed and supportive. Furthermore, regression results confirm that training and employee acceptance together significantly influence leadership support, highlighting the importance of both

technical competence and psychological alignment in quality initiatives. The study also finds that employee perceptions are largely uniform across gender, suggesting fairness and consistency in the implementation process. However, the sample is predominantly composed of shop-floor employees, emphasizing the operational focus of Six Sigma practices in the automobile sector. This highlights the need for organizations to prioritize frontline engagement and tailor strategies accordingly. Despite the positive outlook, certain challenges such as process complexity, resource constraints, and psychological pressure associated with stringent quality targets persist. These factors may limit employee participation and reduce the effectiveness of implementation if not properly addressed. In conclusion, while Six Sigma remains a powerful methodology for achieving operational excellence, its success depends significantly on aligning organizational strategies with employee needs. Strengthening training programs, enhancing leadership involvement, fostering a supportive work culture, and simplifying processes are essential for improving employee engagement. By adopting a balanced approach that integrates both technical and human elements, organizations can ensure the long-term sustainability and effectiveness of Six Sigma practices in the automobile industry.

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