

Role of leadership and employee engagement in successful lean transformation in MSMEs : Evidence from India

Ashish Raiyani *

Sunil Patel †

Department of Management

Unitedworld Institute of Management

Karnavati University

Gandhinagar 382422

Gujarat

India

Abstract

Experience of lean transformation in Indian MSMEs shows that people-related factors matter more than technical ones for long-term improvement. This paper investigates how leadership behavior and employee participation shape the success of lean practices in MSMEs. Evidence was collected from machining, assembly-line, forging and foundry units through surveys, interviews and workplace visits. The study examines leadership orientation, regular communication, skill development and empowerment practices and their influence on lean preparedness and execution. Results show that firms whose managers lead improvement efforts, and whose employees are encouraged to take part in systematic workflows, problem solving and waste reduction, achieve stronger lean outcomes, while resistance to change, skill gaps and limited managerial participation continue to restrict adoption. Based on the results, the paper proposes a people-centered lean transformation framework for MSMEs, offering an action plan for building a productive and sustainable lean culture. The findings offer lessons for practitioners, consultants and policymakers seeking operational excellence in smaller manufacturing organizations.

Subject Classification: 90B50, 90B30, 62P30, 90C90.

Keywords: *Lean transformation, Lean manufacturing, Leadership involvement, Employee engagement, Lean maturity, MSMEs, Operational excellence, Continuous improvement.*

* ORCID-ID: 0009-0005-5497-2416

† ORCID-ID: 0000-0002-4669-7005

* E-mail: 202406020016@karnavatiuniversity.edu.in (Corresponding Author)

† E-mail: sunil@karnavatiuniversity.edu.in

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) form a major part of India's manufacturing sector, contributing to employment, industrial production and economic growth. Increasing competition requires MSMEs to improve productivity, reduce waste (Muda) and strengthen operational sustainability. Lean management is widely used to improve operational performance and productivity; however, sustained lean transformation depends not only on technical tools but also on leadership commitment, employee involvement, effective communication and continuous learning.

This study examines 30 MSMEs that achieved Intermediate Lean Certification under the MSME Competitive Lean Scheme (MCLS), introduced by the Ministry of MSME in 2023. These organizations underwent structured lean implementation and handholding support, making them suitable for examining leadership and employee-related factors associated with lean transformation. The study focuses on leadership involvement through goal alignment, participation in lean activities, Gemba visits, employee motivation, resource support and continuous improvement.

2. Literature Review

Lean transformation focuses on waste reduction, continuous improvement, and value creation, with leadership and employee engagement increasingly recognized as critical to lean maturity in MSMEs. Effective lean leadership involves shop-floor participation, coaching, resource support, employee development, strategic direction, and problem solving [12], [2], [6], while leadership commitment, training, and employee involvement improve efficiency, quality, cost, and implementation success [13], [5], [4]. Employee participation, structured training, teamwork, and digital tools such as SOPs, dashboards, ERP, and Kaizen systems further support sustainable improvement [3], [7], [9], [14], [19], [20]. However, MSMEs face limitations in resources, organizational readiness, skills, and technology adoption, making appropriate tool selection and HR development essential [8], [15]. Integrating Lean with Industry 4.0 technologies can improve visibility and decision-making [1], [17], while external schemes such as MCLS support process improvement and performance tracking [16]. Knowledge sharing and open innovation help sustain improvements and prevent recurring problems [18], and overall

lean practices contribute to productivity and operational excellence [10], [11]. Thus, lean transformation is both a technical and people-centered process, making leadership behavior and employee engagement essential for achieving lean maturity in MSMEs.

3. Research Methodology

3.1 Design and Sample

The study uses a convergent mixed-method design [21], collecting quantitative and qualitative data simultaneously and integrating them during interpretation over six months. It covers 30 MSMEs with Intermediate Lean Certification under MCLS, including machining, forging/foundry, assembly-line, and mass-production units implementing 8-waste reduction, Kaizen, SOPs, 5S, DWM, and visual management. From 31 eligible MSMEs, purposive sampling and Cochran's formula (95% confidence, 5% margin of error) supported a sample of 30 organizations (96.77%). Respondents included senior leaders, middle managers, and operational/shop-floor employees.

3.2 Data Collection Instruments

The study used quantitative and qualitative instruments to assess leadership, employee participation, and lean maturity. Quantitative tools included a 15-item Leadership Involvement Assessment Checklist, 10-item Employee Participation Index, and 10-item structured questionnaire, all using a 4-point Likert scale. Qualitative tools included leadership interviews, case-study observations, Gemba notes, and document reviews. The questionnaire examined lean goal communication, leadership participation, employee suggestions and training, resource support, progress reviews, cross-functional teamwork, implementation of employee ideas, KPI-based monitoring, and continuous-improvement culture.

3.3 Analysis and Hypotheses

Regression analysis using SPSS was conducted to examine the effects of leadership involvement, employee engagement, communication effectiveness, and structured lean training on lean implementation outcomes and maturity across machining, forging/foundry, assembly-line, and mass-production MSMEs, with the focus on organizational and human factors rather than industry comparison. Lean performance was assessed through reduction of the eight wastes—defects, waiting, over-

Table 1
Responses of the 30 MSMEs (of 31 certified units) on the 4-point scale

Data Analysis Sheet		1 = Strongly Disagree, 2 = Disagree 3 = Agree 4 = Strongly Agree.																1 = Not at all 2 = To a small extent 3 = To a great extent 4 = To a very great extent				
Company Details		H1 = Leadership involvement significantly affects Lean maturity levels in MSMEs.				H2 = Employee engagement significantly influences Lean implementation outcomes.				H3 = Communication effectiveness significantly impacts employee participation in Lean activities.				H4 = Structured Lean training leads to significantly higher Lean performance indicators in MSMEs.				KPI (dependent variables – use to compute Lean Maturity)				
Basic Information																						
A	Firm Name	L1	L2	L3	L4	E1	E2	E3	E4	C1	C2	C3	C4	T1	T2	T3	T4	P1	P2	P3	P4	P5
		Senior leaders clearly communicate the organization's lean goals and priorities.	Senior leaders regularly participate in Gemba (shop-floor) activities and improvement meetings.	Leaders allocate sufficient resources (time, people, budget) for Lean projects.	Leaders publicly recognize and reward employee contributions to Lean/Kaizen.	Employees are encouraged to suggest ideas for process improvement.	Employees are involved in problem-solving teams and Kaizen events.	Worker suggestions are acted upon and feedback is provided.	Employees take ownership for maintaining Lean standards (5S, visual controls).	Communication about Lean objectives is timely and consistent across levels.	Information about process issues and improvement actions is shared openly.	Daily/weekly meetings effectively communicate progress and responsibilities.	Visual management (boards, dashboards) provides clear, usable information to employees.	The firm provides structured Lean training with a defined curriculum.	Training sessions include hands-on practice and follow-up assessment.	Training records and attendance are maintained and monitored.	Trained employees apply learned Lean tools in daily operations.	Reduction in process cycle time / lead time.	Reduction in rework / defects.	Cost Saving by Measurable reduction in waste	Increase in on-time delivery / on-time completion.	Number of Kaizen suggestions implemented per month (enter numeric)
	Sshivay Technocast Pvt. Ltd.	3	3	2	3	3	2	3	2	3	3	3	2	3	2	2	3	2	2	3	3	8
	Macpower Industries	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	25
	Top Crane System Pvt. Ltd.	3	2	3	3	2	3	3	2	3	2	2	3	2	2	2	2	2	2	3	2	6
	GMK Electro Power Pvt. Ltd.	2	1	2	1	2	1	2	1	2	2	1	1	2	1	1	2	1	2	1	2	1

Contid...

[illegible]

production, extra processing, inventory, transportation, motion, and non-utilized talent—along with process efficiency, workplace discipline, and continuous-improvement activities. The study tested five hypotheses: H1, leadership involvement significantly influences lean maturity; H2, employee engagement significantly influences lean implementation outcomes; H3, top-down communication effectiveness significantly impacts employee participation in lean activities; H4, structured lean training/awareness significantly improves lean performance indicators; and H5, employee engagement mediates the relationship between leadership involvement and lean maturity.

4. Results and Findings

Using 4-point Likert scales, the findings showed positive relationships among leadership involvement, employee engagement, communication effectiveness, structured training, and lean maturity. Leadership communication, Gemba participation, resource support, and Kaizen encouragement improved employee participation and lean implementation, while employee involvement in idea generation, problem-solving, 5S, and Kaizen enhanced operational outcomes. Regular meetings, visual management, and clear communication supported coordination, while structured training strengthened lean-tool application. Overall, organizations achieved 15–22% shop-floor waste reduction, lower rework, shorter cycle times, improved delivery performance, smoother workflows, and more implemented employee suggestions.

Table 1 shows the lean maturity assessment responses. Leadership items (L1–L4), employee engagement items (E1–E4), communication items (C1–C4) and training items (T1–T4) were each grouped into an index (fL, fE, fC, fT), and the KPI items (P1–P5) formed the Lean Maturity Index. Scores varied across firms, from about 1 to 4.

4.1 Regression and Mediation Results

Table 2
Simple regression results (H1–H4)

Hypothesis	Predictor	Standardized β	t	Sig.
H1	Leadership Index → Lean Maturity	.583	4.91	.0003

Contd...

H2	Engagement Index → Lean Maturity	.632	5.42	.0004
H3	Communication Index → Engagement	.610	5.08	.0003
H4	Training Index → Lean Maturity	.487	3.98	.0012

Leadership involvement explained 34% of the variance in lean maturity, while employee engagement was the strongest predictor ($R^2 = .399$; $\beta = .632$), followed by leadership commitment ($\beta = .583$). Effective communication significantly enhanced employee engagement ($\beta = .610$; 37.2% variance), and structured lean training explained 23.7% of lean maturity variance ($\beta = .487$). Thus, all four hypotheses were supported at the 1% significance level, confirming the proposed framework and highlighting employee engagement, leadership commitment, communication, and training as significant drivers of lean transformation (Table 2).

Table 3

Mediation analysis: leadership, employee engagement and lean maturity (H5)

Predictor	β	t	Sig.
Leadership Index → Lean Maturity	.214	2.13	.042
Employee Engagement Index → Lean Maturity	.521	4.61	.000

Multiple regression assessed the mediating role of employee engagement in the relationship between leadership involvement and lean maturity. When both variables were entered, the leadership coefficient fell from $\beta = .583$ to $\beta = .214$ but remained statistically significant ($p = .042$), while employee engagement continued to have a strong, significant effect ($\beta = .521$, $p < .001$). Since the leadership effect is reduced but both variables remain significant, employee engagement partially mediates the relationship (H5 supported): leadership involvement contributes to lean maturity directly and indirectly through employee engagement. The results thus support the proposition that leadership and employee engagement are critical for successful lean transformation in Indian MSMEs (Table 3).

5. Discussion

H1 showed that leadership involvement through clear lean goals, Gemba participation, and resource allocation improved lean outcomes, particularly when employees were actively engaged. H2 confirmed employee engagement as the strongest predictor, with Kaizen, problem-solving, 5S, and standard-work participation strengthening ownership and implementation. H3 indicated that daily meetings, visual management, and clear communication improved engagement and reduced resistance, while H4 showed that structured training enhanced lean-tool application, especially when combined with practical shop-floor learning. Employee engagement partially mediated the leadership–lean maturity relationship, indicating that leadership affects lean outcomes both directly and by strengthening employee involvement and supporting lean transformation as a socio-technical system.

6. Conclusion

This study demonstrates that leadership and employee engagement are important factors in successful lean transformation among Indian MSMEs. Leadership involvement, employee engagement, communication and structured lean training all showed significant positive relationships with lean maturity or engagement; engagement showed the strongest association with lean maturity, communication strengthened employee participation, and engagement partially mediates the effect of leadership, highlighting the human-centered nature of lean transformation.

MSMEs should therefore combine management commitment with effective communication, participative leadership, employee involvement and continuous capability development, treating lean as a socio-technical transformation rather than a set of technical tools. These findings offer practical insights for MSME leaders, policymakers, consultants and practitioners seeking sustainable operational improvement.

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