

The Role of Training and Development in Building a Sustainable Organizational Culture: An Empirical Study of Manufacturing Industries

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Abstract:

Training and Development (T&D) is a strategic Human Resource Management (HRM) function that contributes to employee competence, organizational productivity, job satisfaction, innovation, adaptability, and long-term organizational sustainability. In a knowledge- and technology-driven business environment, organizations increasingly recognize human capital as a critical strategic resource. Consequently, continuous learning and employee development have become important mechanisms for strengthening organizational culture and sustaining competitiveness. This significance is particularly evident in manufacturing industries, where technological advancement and changing production systems are transforming the nature of work and the competencies required from employees. The manufacturing sector has witnessed significant transformation through the adoption of advanced manufacturing systems, robotics, Artificial Intelligence (AI), Lean Manufacturing, predictive maintenance, automation, and Total Quality Management (TQM). These developments have increased the need for continuous skill development, reskilling, up-skilling, problem-solving capabilities, and adaptability among employees. Training and Development initiatives can contribute not only to technical and professional competence but also to teamwork, leadership development, employee engagement, knowledge sharing, innovation, and a positive workplace culture. However, manufacturing organizations continue to face challenges related to skill gaps, technological obsolescence, employee turnover, inconsistent training effectiveness, employee engagement, and difficulties in measuring training outcomes and Return on Investment (ROI).

The effectiveness of Training and Development also depends on its alignment with organizational objectives, competency requirements, employee career aspirations, and changing business needs. Therefore, organizations need to develop competency-based, technology-enabled, and outcome-oriented learning systems supported by systematic Training Needs Assessment (TNA), continuous learning opportunities, performance evaluation, and post-training feedback mechanisms. Such an integrated learning ecosystem can facilitate knowledge sharing, collaboration, innovation, adaptability, and organizational effectiveness, thereby contributing to the development of a sustainable organizational culture.

Against this backdrop, the present empirical study examines the role of Training and Development in building a sustainable organizational culture in manufacturing industries. The study focuses on examining the relationship between Training and Development and selected organizational outcomes, including employee performance, employee satisfaction, knowledge enhancement, workplace culture,

and organizational effectiveness. The study further seeks to identify the extent to which effective learning and development practices contribute to organizational sustainability and a culture of continuous improvement. The findings are expected to provide practical insights for HR professionals and organizational leaders in designing effective Training and Development strategies, strengthening employee capabilities, and fostering a learning-oriented and sustainable organizational culture.

Keywords: Training and Development; Sustainable Organizational Culture; Continuous Learning; Employee Performance; Employee Engagement; Manufacturing Industries; Organizational Effectiveness; Human Resource Management

Current Scenario:

India has emerged among the fastest-growing industrial economies, demonstrating resilience amid uneven global industrial performance. While global manufacturing output expanded modestly by 0.7% in the third quarter of calendar year 2025, India recorded manufacturing output growth of 1.3% during the same period. This performance reflects the strength of domestic fundamentals and sustained policy support for industrial expansion.

Manufacturing today sits as the engine of growth for India's ambition to become a \$35 trillion economy by 2047, with reforms, sectoral initiatives, and resilient supply chains. Recognising this importance, the Union Budget 2026-27 has reinforced support for manufacturing through targeted measures focusing on investment in continuous learning & development, innovation, infrastructure development, and industrial ecosystem strengthening.

On the output front, sectoral trends indicate that both heavy industry and light manufacturing are supporting overall growth. The Index of Eight Core Industries (ICI) stood at 175.7 in December 2025, recording a provisional growth of 3.7% compared to December 2024, with cement, steel, electricity, fertilizer, and coal registering positive production growth during the month.

The Economic Survey 2025-26 highlights that medium and high-technology industries now contribute 46.3% of India's manufacturing value added, signalling a gradual shift towards more sophisticated production structure. This transition places India among a smaller group of middle-income economies steadily advancing up the manufacturing value chain. Reflecting these gains, India's global industrial competitiveness has improved, with the country's ranking in the Competitive Industrial Performance (CIP) index rising to 37th in 2023 from 40th in 2022.

Manufacturing has also contributed in strengthening India's export performance. In FY26 each of the first three quarters recorded their highest-ever export levels. Further, during April-December 2025, exports amounted to USD 634.3 billion, marking a further 4.3% year-on-year growth, emphasizing sustained resilience in external trade performance.

Challenges & Opportunities:

The manufacturing units in India play a vital role in India's economic development generate employment, increasing exports and contribution to GDP. However, the sector faces several challenges that limit its growth and global competitiveness. The major challenges identified from the employee perspective are (1) inadequate training (2) poor leadership quality (3) insufficient knowledge and technical skill (4) inadequate compensation structure & (5) workforce readiness to adopt new technology and the change management process.

In addition, limited investment in research and development (R&D) is an important constraint on innovation and technological advancement. India's investment in research and development (R&D) remains lower than that of many other countries, significantly impacting innovation in the manufacturing sector. With R&D spending accounting for only about 0.64% of GDP in 2023, companies struggle to develop new technologies and improve processes. This is far below China, which spent around 2.4% to 2.5%, and the US, which spent around 3.4%.

However, the Indian government has introduced several initiatives to boost manufacturing, focusing on increasing domestic production, improving industrial infrastructure, and supporting MSMEs. Efforts such as incentive schemes, skill development programs, and ease of doing business reforms have helped create a more favourable environment. Additionally, policies aimed at continuous learning & development, reskilling, up – skilling and digital adoption are strengthening the sector's global competitiveness.

Research Objective:

The proposed study aims to achieve the following objectives:

1. To examine the existing Training and Development practices in the selected manufacturing organization.
2. To identify the factors influencing the effectiveness of Training and Development programs.
3. To evaluate the impact of Training and Development on employee knowledge, skills, competencies and overall job performance.
4. To analyse the relationship between Training and Development initiatives and organizational culture.
5. To examine the influence of Training and Development on employee engagement, teamwork, innovation and knowledge sharing.
6. To assess employees' perceptions regarding the effectiveness of Training and
7. Development programs in fostering a positive organizational culture.
8. To recommend practical Human Resource strategies for strengthening Training and

Research Questionnaire:

A structured questionnaire comprising five-point Likert-scale statements and demographic questions was developed using Google Forms to collect primary data from the respondents.

Forty Nine respondents, including technical supervisors, officers, executives, and managers from manufacturing units participated in the study and voluntarily provided their responses. The questionnaire was designed to capture respondents' perceptions of learning, training & development practices and the effectiveness of the training within the organization.

The collected data were analysed using appropriate statistical techniques to facilitate objective interpretation, hypothesis testing, and evidence-based conclusions.

Research Methodology:

The study adopted a structured research methodology to ensure the systematic collection, analysis and interpretation of data. The methodology comprised the following components:

1. Research Design: Descriptive Research.
2. Research Approach: Quantitative Research.

3. **Primary Data:** Primary data were collected through a structured questionnaire Administered using Google Forms, supplemented by personal interviews wherever necessary.
4. **Secondary Data:** Secondary data were collected from HR records, company policies, journals, books, annual reports, government publications and other relevant literature.
5. **Data Processing and Analysis:** The collected data were coded, tabulated, analysed and interpreted using SPSS and Microsoft Excel to draw meaningful conclusions and test the research objectives.

Statistical Tools:

The collected data were analysed using appropriate statistical tools to ensure objective interpretation and meaningful conclusions. The following statistical techniques were adopted to analyze the responses and test the research objectives:

1. Percentage Analysis
2. Frequency Distribution
3. Mean
4. Standard Deviation
5. Correlation Analysis
6. Regression Analysis
7. Fisher's Z transformation of the correlation Analysis

Theoretical Framework:

The present study is guided by established Human Resource Management, Organizational Behaviour and Organizational Culture theories to analyze the relationship between Training and Development practices and organizational culture.

These theoretical perspectives provide a conceptual foundation for understanding how employee learning and development contribute to behavioral change, employee engagement, knowledge sharing and the development of a positive organizational culture.

The study is based on the following theoretical frameworks:

1. Edgar Schein's Organizational Culture Theory – to understand how Training and Development influences organizational values, beliefs, behaviors and workplace culture.
2. Kirkpatrick's Four-Level Training Evaluation Model – to evaluate the effectiveness of Training and Development programs in terms of employee reaction, learning, behavioral change and organizational results.
3. Kolb's Experiential Learning Theory – to examine how employees acquire, apply and improve knowledge and skills through continuous learning and workplace experiences.
4. Herzberg's Two-Factor Theory – to analyse the role of Training and Development in enhancing employee motivation, job satisfaction and commitment towards the organization.
5. Peter Senge's Learning Organization Theory – to assess how continuous learning, knowledge sharing and employee development contribute to organizational learning, innovation and a strong organizational culture.

These theoretical models collectively provide the conceptual framework for analysing the effectiveness of Training and Development practices and their influence on organizational culture, employee performance and overall organizational effectiveness.

Construction of Variables:

Statistical analysis is done with an objective to examine whether Training and Development practices have a significant relationship with Organizational Culture and to determine the strength and direction of that relationship.

A composite Training and Development Effectiveness Score, represented by X, was calculated using eight questionnaires in five-point Likert-scale statements dealing with the core effectiveness and outcomes of training.

The scale used:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

On the other hand eight questionnaire statements dealing with the core effectiveness and outcomes of training, such as –

1. Training needs assessment
2. Relevance of training to job responsibilities
3. Updating training with new technology
4. Improvement in technical knowledge and skills
5. Improvement in problem-solving and analytical ability
6. Adaptability to changing job requirements
7. Improvement in job performance
8. Improvement in efficiency and productivity

Measures of the Variable:

Training and Development Effectiveness Score, represented by X, whereas Organizational Culture represented by Y and constructed from three questionnaire statements directly related to cultural outcomes:

1. Whether training has helped create a more positive and open workplace culture.
2. Whether training has strengthened trust and communication between employees and management.
3. Whether training and development in the organization has a positive effect on organizational culture.

Descriptive Statistical Results:

Statistical Measures	Training & Development	Organization Culture
No of respondents	49	49
Mean	4.092	4.136
Standard Deviation	0.788	0.784

Both variables have mean values greater than 4.00 on a five-point scale, this indicates that respondents generally agree that their organization has effective Training and Development practices and that such practice contribute to a positive organizational culture.

Mean Scores of Major Training Dimensions:

T&D Dimension	Mean
Training needs assessment	3.878
Training relevance to job	4.143
Updated training content	4.000
Improvement in technical knowledge	4.245
Problem-solving and analytical ability	4.163
Adaptability to changing requirements	4.082
Improvement in job performance	4.000
Efficiency and productivity	4.224

The highest mean was recorded for –

Improvement in technical knowledge and skills = 4.245, followed by Improvement in efficiency and productivity = 4.224, whereas the relatively lower score was recorded for Training needs assessment = 3.878

Organizational Culture Dimension Scores:

The culture-related items produced the following mean scores:

Positive and open workplace culture = 4.163

Trust and communication between employees and management = 4.204

Overall positive effect of T&D on organizational culture = 4.041

Trust and communication = 4.204 indicates that employees particularly recognize the contribution of Training and Development to improved interpersonal relationships and management–employee communication.

Pearson's Correlation Coefficient Analysis:

Pearson's Product Moment Correlation is used to determine the direction and strength of the relationship between Training & Development and Organizational Culture.

Formula:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where,

$n = 49$

$\sum XY = 855.208$

$\sum X = 200.500$

$\sum Y = 202.667$

$$\sum X^2 = 850.219$$

$$\sum Y^2 = 867.778$$

Putting the values in above formula, we can find the value $r = 0.874$, represents a strong positive correlation between X & Y

Fisher's Z transformation of the correlation Analysis:

To assess the statistical significance of the correlation, Fisher's Z transformation was applied
Formula:

$$z = \frac{1}{2} \log \left(\frac{1+r}{1-r} \right)$$

First, calculate the value of $\{ 1 + r \} / \{ 1 - r \} = 14.859$

Second, calculate the value of $\log (14.859) = 2.6986$

Finally, calculate the value of $Z = \frac{1}{2} (2.6986) = 1.3493$

Statistical Evidence at a glance:

Test	Result	Interpretation
Sample Size (n)	49	49 valid responses are considered for statistical analysis.
Pearson's Correlation Coefficient (r)	0.874	Indicates a strong positive relationship between Training & Development and Organizational Culture. Higher perceived effectiveness of T&D is associated with a more positive organizational culture.
Fisher's Z Transformation	1.3493	The correlation coefficient ($r=0.874$) transforms to 1.3493 on the Fisher Z scale. This transformation permits statistical inference because the transformed correlation is approximately normally distributed.
Standard Error of Fisher Z	0.1474	Calculated as $1 / \sqrt{n-3} = 1 / \sqrt{46} = 0.1474$. The relatively small SE indicates reasonable precision of the estimated correlation.
Fisher Z Test Statistic	9.15	Since $9.15 > 1.96$ (lies ± 1.96) at the 5% significance level, the observed positive relationship is statistically significant.
Test of Significance	$p < 0.001$	The probability of obtaining a relationship of this magnitude under the null hypothesis of zero population correlation is extremely small.
Hypothesis Decision	Reject H_0	There is statistically significant evidence of a positive relationship between Training & Development and Organizational Culture.
Confidence Interval (CI)	95%	CI 95%[0.786 - 0.927] represents strong positive

		association
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Conclusion:

The empirical findings indicate a strong and statistically significant positive association between Training and Development effectiveness and Organizational Culture. The Pearson correlation coefficient ($r = 0.874$, $n = 49$) indicates that respondents reporting higher perceived effectiveness of Training and Development also tended to report a more positive organizational culture. Fisher's Z transformation ($z = 1.3493$) and the reported test statistic (approximately 9.15, $p < 0.001$) provide statistical evidence against the null hypothesis of zero population correlation. CI [0.786 0.927], support positive relationship between Training and Development and Organizational Culture is statistically viable. The findings therefore support H1 and indicate that effective Training and Development is positively associated with organizational culture in the study sample. Nevertheless, because the study is cross-sectional and based on perceptual survey data, the findings should not be interpreted as evidence of a direct causal effect. The results provide a basis for further research using larger samples, longitudinal designs, and objective organizational indicators.

To facilitate statistical inference, Pearson's correlation coefficient was converted using Fisher's Z transformation. The resulting Fisher-transformed correlation is $Z = 1.3493$ with a sample size of 49 respondents, the standard error of the transformed correlation is approximately 0.1474. The corresponding Fisher Z test statistic is approximately 9.15, which substantially exceeds the critical value of ± 1.96 at the 5% significance level. The result is statistically significant at $p < 0.001$.

Accordingly, the null hypothesis stating that there is no significant relationship between Training & Development and Organizational Culture is rejected. The findings provide strong statistical evidence that effective Training & Development is positively associated with employees' perceptions of organizational culture. From a managerial perspective, organizations with stronger learning and development practices may also exhibit greater perceptions of openness, trust, communication, adaptability, and a positive work environment.

However, because the analysis is based on cross-sectional survey data, the observed strong positive association does not establish a direct causal effect of Training and Development on Organizational Culture.

Research Hypothesis

H1: Training and Development effectiveness has a significant positive relationship with Organizational Culture.

H0: Training and Development effectiveness has no significant relationship with Organizational Culture.

Discussion

The findings indicate a strong positive association between perceived Training and Development effectiveness and perceived Organizational Culture ($r = 0.874$, $n = 49$, $p < 0.001$). The descriptive results also show relatively high perceptions of training relevance, technical knowledge improvement, problem-solving capability, adaptability, and efficiency/productivity. These findings are consistent with the broader HRD literature linking learning and development with employee capability and organizational outcomes. However, the cross-sectional design supports an association rather than a causal conclusion.

Managerial Implications

The findings suggest that organizations should strengthen systematic Training Needs Assessment, maintain job-relevant and technology-updated training content, and connect learning outcomes with employee performance and productivity. Manufacturing organizations undergoing automation and technological change may particularly benefit from continuous reskilling, up-skilling, problem-solving development, knowledge sharing, and post-training evaluation. HR professionals should monitor training effectiveness through measurable learning, behavioural, and organizational outcomes rather than relying solely on participation or satisfaction measures.

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