

Contribution of Training and Development Practices on Employee Performance at Bhel, Tiruchirappalli: A Moderated Mediation Model

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ABSTRACT

In today's highly competitive industrial landscape, the development of employee capabilities has become an essential strategic priority for organizations seeking sustained productivity and operational excellence. Training and development practices are increasingly recognized as critical human resource initiatives that enhance employee competencies, strengthen workplace commitment, and improve overall job outcomes. Against this background, the present study investigates the influence of training and development practices on employee performance in Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, through a moderated mediation framework. The study examines employee engagement as an intervening mechanism in the relationship between training practices and employee performance, while perceived organizational support is considered as a contextual factor influencing this relationship. A descriptive and empirical research design was adopted for the study, and primary data were obtained from 350 employees using a structured survey instrument through proportionate random sampling. The reliability and construct validity of the measurement scales were confirmed through Cronbach's alpha, confirmatory factor analysis, composite reliability, and convergent validity measures. The proposed hypotheses were tested using structural equation modeling and Hayes' PROCESS analytical framework. The empirical findings indicate that training and development practices have a significant positive effect on employee performance, both directly and indirectly through enhanced employee engagement. Furthermore, organizational support was found to strengthen the indirect influence of training initiatives on performance outcomes. The study extends the application of human capital theory by providing empirical evidence on the psychological and organizational conditions under which training investments translate into improved employee performance within large-scale manufacturing organizations.

Keywords: Training and Development, Employee Performance, Employee Engagement, Perceived Organizational Support, Moderated Mediation, and Manufacturing Industry.

1. INTRODUCTION

The contemporary industrial environment is characterized by rapid technological advancement, global competition, digital transformation, and continuous changes in organizational processes. In such a dynamic setting, organizations are increasingly focusing on strengthening their internal capabilities to achieve sustained competitiveness, operational excellence, and long-term growth. Among the various organizational resources, human capital occupies a central position, as the knowledge, skills, experience, and commitment of employees significantly influence organizational productivity, innovation, quality enhancement, and strategic success. As a result, organizations across different sectors have begun to view employee development not merely as an administrative function, but as a strategic investment that supports organizational sustainability.

Training and development constitute an essential component of human resource development aimed at enhancing employees' professional competencies and preparing them to meet present as well as future organizational demands. Training generally focuses on improving the technical knowledge, job-specific skills, and behavioral capabilities required for effective performance in current roles. Development, on the other hand, emphasizes long-term career growth, leadership preparation, decision-making ability, and adaptability to changing organizational environments. In an era marked by automation, artificial intelligence, advanced manufacturing systems, and continuous innovation, systematic employee development has become indispensable for organizations seeking to maintain workforce relevance and operational efficiency.

Within manufacturing organizations, the significance of training and development is even more pronounced due to the complexity of production systems, technological sophistication, stringent quality requirements, and workplace safety standards. Employees operating in such environments are expected to handle advanced machinery, adapt to evolving production technologies, comply with standardized operating procedures, and contribute to continuous improvement initiatives. Well-designed training interventions enable employees to acquire updated competencies, minimize operational errors, improve productivity, and effectively respond to organizational change. Consequently, training and development practices are increasingly recognized as strategic mechanisms for improving both individual effectiveness and organizational performance.

Employee performance represents one of the most critical indicators of organizational success, as it directly influences productivity, service quality, innovation, efficiency, and competitive advantage. Performance reflects the extent to which employees accomplish assigned responsibilities with accuracy, consistency, timeliness, and commitment. Although earlier studies have consistently established a positive relationship between training practices and employee performance, contemporary human resource research suggests that this relationship may operate through multiple psychological and contextual mechanisms rather than through direct influence alone. Understanding these underlying mechanisms is essential for designing more effective employee development strategies.

One important psychological mechanism that may explain the effectiveness of training initiatives is employee engagement. Employee engagement refers to the degree of emotional attachment, cognitive involvement, and behavioral commitment that employees demonstrate toward their work and organization. Employees who are highly engaged often display enthusiasm, dedication, proactive behavior, and a willingness to contribute beyond formal job requirements. Training and development initiatives can strengthen employee engagement by enhancing confidence, competence, learning opportunities, and perceptions of professional growth, which in turn may positively influence performance outcomes.

In addition to psychological factors, organizational conditions also determine the extent to which training outcomes translate into improved job performance. Perceived organizational support represents employees' beliefs regarding how far the organization values their contributions, recognizes their efforts, and cares about their professional and personal well-being. When employees perceive strong organizational support, they are more likely to apply newly acquired knowledge, demonstrate greater commitment, and exhibit higher levels of work involvement. Therefore, organizational support may strengthen the effectiveness of training initiatives by creating an environment that encourages skill utilization and sustained performance improvement.

Despite extensive research on training and employee performance, limited empirical evidence is available regarding the combined influence of employee engagement as an intervening mechanism and perceived organizational support as a contextual boundary condition, particularly within large-scale public sector manufacturing organizations in India. This research gap is significant because such organizations operate in technologically intensive environments where continuous employee development is essential for maintaining operational efficiency, productivity, and competitiveness.

Bharat Heavy Electricals Limited is one of India's leading engineering and manufacturing enterprises serving core sectors such as power generation, transmission, transportation, industrial systems, renewable energy, oil and gas, and defense. The Tiruchirappalli complex, comprising major heavy engineering and boiler manufacturing facilities, represents one of the organization's most strategically important production units. Due to its technological complexity, skilled workforce requirements, and continuous emphasis on operational excellence, the Tiruchirappalli unit provides an appropriate industrial context for examining the effectiveness of employee development initiatives.

Against this background, the present study investigates the influence of training and development practices on employee performance among employees working in BHEL, Tiruchirappalli, through a moderated mediation framework. Specifically, the study examines employee engagement as a mediating variable that explains the transmission mechanism between training practices and performance, while perceived organizational support is incorporated as a moderating variable that influences the strength of this relationship. By integrating psychological and organizational perspectives, the study seeks to contribute to human capital theory and provide practical insights for designing effective training strategies in contemporary manufacturing organizations.

2. REVIEW OF LITERATURE

The relationship between training and development practices and employee performance has attracted considerable attention in human resource management, organizational behavior, and industrial psychology research. Previous studies have consistently emphasized that investments in employee learning and skill development generate both individual and organizational benefits. The present review synthesizes relevant theoretical and empirical contributions related to training and development, employee engagement, perceived organizational support, and employee performance in order to establish the conceptual foundation for the proposed moderated mediation model.

2.1 Training and Development Practices

The theoretical foundation for employee training can be traced to Gary S. Becker's Human Capital Theory, which argues that organizational investment in employee knowledge, skills, and competencies enhances productivity and long-term economic value. Becker (1964) proposed that expenditures on education, training, and skill enhancement should be viewed as strategic investments rather than operational costs.

Early organizational research by Irwin L. Goldstein identified training as a systematic process designed to improve job-related knowledge, skills, and attitudes required for effective performance. Goldstein (1980) emphasized that structured training interventions improve employee adaptability and task efficiency.

A comprehensive review conducted by Herman Aguinis and Kurt Kraiger found that training interventions generate positive outcomes at multiple levels, including improved cognitive capability, behavioral performance, teamwork, and organizational effectiveness. Their findings demonstrated that training creates measurable benefits for employees, teams, organizations, and society as a whole (Aguinis & Kraiger, 2009).

Similarly, Phyllis Tharenou, Alan M. Saks, and Celia Moore concluded that training contributes significantly to productivity, operational improvement, and employee effectiveness, particularly when organizational support systems are present (Tharenou et al., 2007).

Research by Eduardo Salas, Scott I. Tannenbaum, Kurt Kraiger, and Kimberly A. Smith-Jentsch further established that effective training design, learner motivation, and transfer climate significantly determine training effectiveness (Salas et al., 2012).

2.2 Training and Employee Performance

Employee performance has been recognized as a critical outcome of human resource development initiatives. Raymond A. Noe argued that training enhances employee competence, confidence, and productivity by improving technical and behavioral capabilities (Noe, 2020).

Meta-analytic evidence from Winston Arthur and colleagues showed that training programs have a significant positive effect on job performance, learning outcomes, and organizational productivity across industries (Arthur et al., 2003).

Research by Brian D. Blume, J. Kevin Ford, Timothy T. Baldwin, and Jing L. Huang confirmed that transfer of training significantly predicts individual performance when employees are provided opportunities to apply newly acquired knowledge in the workplace (Blume et al., 2010).

Further empirical evidence from Xiaowei Guan and Stephen Frenkel indicated that employees' perceptions of training quality directly influence job performance and organizational commitment (Guan & Frenkel, 2019).

2.3 Employee Engagement as a Mediating Variable

The concept of employee engagement was initially introduced by William A. Kahn, who described engagement as the physical, cognitive, and emotional expression of employees in their work roles (Kahn, 1990).

Building on this foundation, Alan M. Saks proposed that employee engagement emerges through social exchange relationships between employees and organizations. His empirical study demonstrated that organizational practices such as training, rewards, and support significantly influence engagement levels (Saks, 2006).

Wilmar B. Schaufeli and Arnold B. Bakker found that engaged employees exhibit higher vigor, dedication, and absorption, leading to improved performance outcomes (Schaufeli & Bakker, 2004).

Empirical evidence by Bruce L. Rich, Jeffery A. LePine, and E. Richard Crawford demonstrated that employee engagement has a strong positive influence on task performance and discretionary work behavior (Rich et al., 2010).

Additionally, Marisa Salanova, Sonia Agut, and José M. Peiró found that work engagement mediates the relationship between organizational resources and employee performance (Salanova et al., 2005).

2.4 Perceived Organizational Support as a Moderating Variable

Perceived organizational support is grounded in Social Exchange Theory developed by Peter M. Blau, which explains that employees reciprocate organizational support through positive attitudes and improved performance (Blau, 1964).

The formal concept of perceived organizational support was introduced by Robert Eisenberger and colleagues, who defined it as employees' perception that the organization values their contribution and cares about their well-being (Eisenberger et al., 1986).

A major review by Linda Rhoades and Robert Eisenberger concluded that organizational support positively affects employee commitment, satisfaction, engagement, and performance (Rhoades & Eisenberger, 2002).

Further empirical evidence by Jessica Aselage and Robert Eisenberger demonstrated that organizational support strengthens employee motivation and reinforces positive workplace behavior (Aselage & Eisenberger, 2003).

Research by Ishfaq Ahmed and Muhammad M. Nawaz found that perceived organizational support significantly enhances employee productivity, engagement, and organizational commitment (Ahmed & Nawaz, 2015).

2.5 Training, Engagement, Organizational Support, and Performance

Recent studies have increasingly examined the indirect and conditional relationships among training, engagement, organizational support, and performance. Katerina Alfes, Amanda D. Shantz, Catherine Truss, and Emma C. Soane demonstrated that employee engagement mediates the relationship between HR practices and organizational performance (Alfes et al., 2013).

Similarly, Laura Fletcher, Katerina Alfes, and Deborah Robinson reported that developmental HR practices significantly enhance engagement and performance outcomes (Fletcher et al., 2016).

Research by Patrick M. Wright and Ryan R. Kehoe indicated that supportive organizational climates strengthen the effectiveness of HR practices on employee outcomes (Wright & Kehoe, 2008).

2.6 Research Gap

Although existing literature provides substantial evidence regarding the positive influence of training and development on employee performance, most previous studies have examined direct relationships or simple mediation models. Limited research has simultaneously examined employee engagement as a mediating mechanism and perceived organizational support as a moderating condition, particularly within Indian public sector heavy engineering organizations such as Bharat Heavy Electricals Limited. Therefore, the present study attempts to address this gap by developing and empirically testing a moderated mediation model in the context of BHEL, Tiruchirappalli.

3. STATEMENT OF THE PROBLEM

In the contemporary industrial environment, organizations are operating under increasing pressure to enhance productivity, maintain operational efficiency, adopt advanced technologies, and sustain competitive advantage. In such circumstances, employee capability development has become a strategic necessity rather than a routine human resource activity. Training and development practices are widely implemented to enhance employees' technical competencies, behavioral capabilities, adaptability, and job effectiveness. Despite substantial organizational investment in employee development initiatives, many industrial organizations continue to face challenges related to inconsistent employee performance, skill utilization, motivational decline, and limited transfer of acquired knowledge into workplace performance.

In manufacturing organizations, particularly those operating in technologically intensive environments, the effectiveness of training interventions depends not only on the quality of training programs but also on employees' psychological involvement and the organizational environment in which newly acquired skills are applied. Although previous studies have confirmed a positive association between training and employee performance, the mechanisms through which training initiatives generate improved performance outcomes remain insufficiently understood. In particular, limited empirical attention has been given to understanding how employee engagement functions as an intervening mechanism in translating training experiences into improved job performance.

Furthermore, organizational support plays an important role in influencing employees' willingness to apply acquired competencies, demonstrate commitment, and contribute effectively toward organizational objectives. Employees who perceive greater organizational support may exhibit stronger engagement and higher performance compared with those operating in less supportive work environments. However, the conditional influence of perceived organizational support on the training–performance relationship remains underexplored in existing human resource literature.

Within the Indian public sector manufacturing context, empirical studies integrating training and development practices, employee engagement, perceived organizational support, and employee performance within a moderated mediation framework are relatively scarce. This gap is particularly evident in large engineering organizations such as Bharat Heavy Electricals Limited, where continuous workforce development is essential for maintaining technological excellence, production efficiency, and organizational competitiveness.

Therefore, the present study attempts to address this research problem by examining how training and development practices influence employee performance among employees of BHEL, Tiruchirappalli, and by identifying the mediating role of employee engagement and the moderating influence of perceived organizational support in this relationship.

4. OBJECTIVES OF THE STUDY

Based on the research problem and identified gaps in the existing literature, the present study aims to examine the influence of training and development practices on employee performance among employees of Bharat Heavy Electricals Limited, Tiruchirappalli, through a moderated mediation framework. The specific objectives of the study are as follows:

- To examine the influence of training and development practices on employee performance among employees of BHEL, Tiruchirappalli.
- To analyze the mediating role of employee engagement in the relationship between training and development practices and employee performance.
- To examine the moderating role of perceived organizational support in the relationship between training and development practices and employee engagement.
- To develop and empirically validate a moderated mediation model explaining the relationship among training and development practices, employee engagement, perceived organizational support, and employee performance in BHEL, Tiruchirappalli.

5. HYPOTHESES DEVELOPMENT

Based on the theoretical foundations of Human Capital Theory and Social Exchange Theory, along with the empirical evidence derived from previous studies on training and development, employee engagement,

perceived organizational support, and employee performance, the present study develops the following hypotheses to examine the proposed moderated mediation relationships.

Training and development practices are widely recognized as strategic human resource interventions that enhance employees' knowledge, technical competencies, behavioral capabilities, and professional confidence. Previous empirical studies have consistently reported that employees who receive systematic training demonstrate higher productivity, improved task efficiency, and superior job outcomes. Training interventions not only improve employees' immediate job-related capabilities but also strengthen their confidence and motivation to perform effectively. Therefore, it is expected that training and development practices will have a significant positive influence on employee performance.

H1: Training and development practices have a significant positive influence on employee performance.

Training and development initiatives also create opportunities for learning, skill enhancement, career growth, and professional recognition, which positively influence employees' psychological attachment to their work. Employees who perceive that the organization invests in their development are more likely to exhibit higher levels of enthusiasm, dedication, and involvement in organizational activities. Prior studies have demonstrated that developmental human resource practices significantly enhance employee engagement. Therefore, training and development practices are expected to positively influence employee engagement.

H2: Training and development practices have a significant positive influence on employee engagement.

Employee engagement reflects the degree of emotional, cognitive, and behavioral involvement employees demonstrate toward their work roles. Highly engaged employees typically exhibit greater energy, commitment, discretionary effort, and persistence in achieving organizational objectives. Previous empirical evidence has consistently shown that engaged employees perform better than disengaged employees in terms of productivity, quality, and innovation. Therefore, employee engagement is expected to positively influence employee performance.

H3: Employee engagement has a significant positive influence on employee performance.

Perceived organizational support reflects employees' beliefs regarding the extent to which the organization values their contributions and cares about their well-being. When employees perceive strong organizational support, they are more likely to reciprocate through greater commitment, involvement, and positive workplace behavior. Supportive organizational environments encourage employees to utilize their capabilities effectively and remain psychologically connected to their work. Therefore, perceived organizational support is expected to positively influence employee engagement.

H4: Perceived organizational support has a significant positive influence on employee engagement.

Previous research suggests that training initiatives are more effective when employees operate in supportive organizational environments. Employees who perceive greater organizational support are more likely to apply newly acquired knowledge, participate actively in developmental activities, and remain psychologically engaged in their work. Thus, perceived organizational support may strengthen the relationship between training and development practices and employee engagement.

H5: Perceived organizational support significantly moderates the relationship between training and development practices and employee engagement, such that the relationship is stronger when perceived organizational support is high.

Employee engagement serves as an important psychological mechanism through which organizational practices influence performance outcomes. Training and development practices may enhance employee performance indirectly by increasing employees' engagement levels. Prior research supports the mediating

role of engagement between human resource practices and organizational outcomes. Therefore, employee engagement is expected to mediate the relationship between training and development practices and employee performance.

H6: Employee engagement significantly mediates the relationship between training and development practices and employee performance.

The effectiveness of training interventions may vary depending on the level of organizational support perceived by employees. When organizational support is high, training initiatives may generate stronger engagement, which subsequently leads to superior performance outcomes. Therefore, the indirect effect of training and development practices on employee performance through employee engagement is expected to vary across different levels of perceived organizational support.

H7: Perceived organizational support significantly moderates the indirect relationship between training and development practices and employee performance through employee engagement, resulting in a significant moderated mediation effect.

The above hypotheses form the theoretical basis for developing the conceptual framework and empirical model of the present study.

6. CONCEPTUAL FRAMEWORK OF THE STUDY

Based on the objectives, hypotheses, and theoretical foundations of Human Capital Theory and Social Exchange Theory, the present study proposes a conceptual framework explaining the relationships among training and development practices, employee engagement, perceived organizational support, and employee performance. The framework assumes that training and development practices serve as the primary independent variable influencing employee performance directly as well as indirectly through employee engagement. Employee engagement functions as a mediating variable explaining the psychological mechanism through which training initiatives influence performance outcomes. Perceived organizational support is incorporated as a moderating variable that strengthens the relationship between training and development practices and employee engagement. Consequently, the indirect influence of training and development practices on employee performance through employee engagement is expected to vary according to different levels of perceived organizational support, resulting in a moderated mediation model.

The proposed conceptual model is presented as follows:

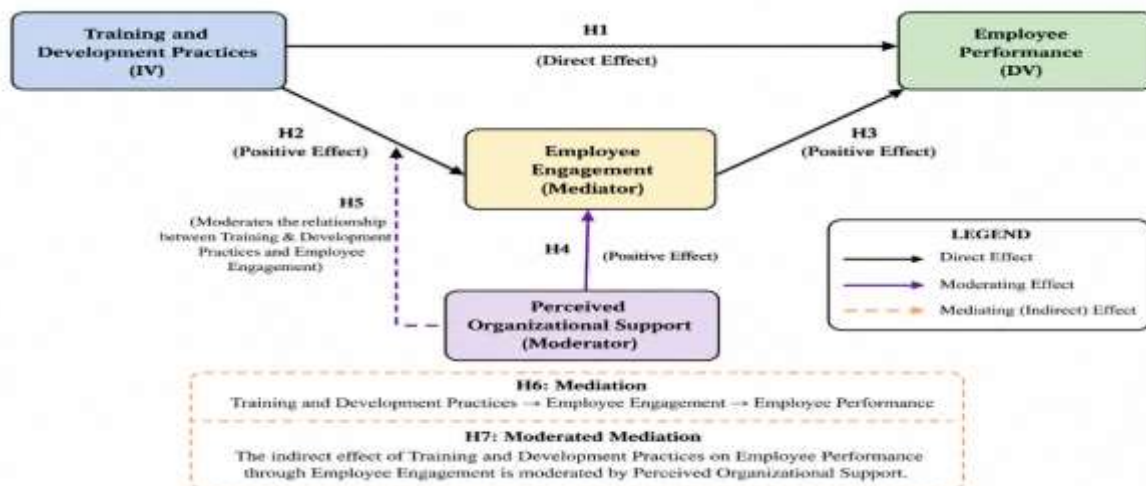


Figure 1: Conceptual Framework of the Study

7. RESEARCH METHODOLOGY

To achieve the objectives of the study and empirically test the proposed moderated mediation model, a systematic research methodology was designed. The methodology adopted in the present study ensures scientific rigor, reliability, and validity in examining the relationships among training and development practices, employee engagement, perceived organizational support, and employee performance among employees of Bharat Heavy Electricals Limited, Tiruchirappalli.

7.1 Research Design

The present study adopts a descriptive, analytical, and empirical research design. The descriptive approach is used to understand the existing training and development practices and employee perceptions within the organization, while the analytical design facilitates the examination of causal relationships among the study variables. The empirical nature of the study enables hypothesis testing through quantitative data analysis.

7.2 Nature and Source of Data

The study is primarily based on primary data collected directly from employees of Bharat Heavy Electricals Limited, Tiruchirappalli, through a structured survey instrument. In addition, secondary data were collected from books, research journals, annual reports, human resource manuals, organizational publications, and relevant academic databases to establish the theoretical foundation and support the review of literature.

7.3 Area of the Study

The study was conducted at Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, one of India's major public sector engineering and manufacturing organizations engaged in boiler manufacturing, heavy engineering, and industrial production.

7.4 Population of the Study

The target population of the study consists of permanent employees working in various functional departments of BHEL, Tiruchirappalli, including production, engineering, quality control, maintenance, administration, and human resource management.

7.5 Sampling Technique

The study employs proportionate stratified random sampling to ensure adequate representation of employees from different functional departments and organizational levels. This sampling technique improves representativeness and reduces sampling bias.

7.6 Sample Size

A total of 350 employees were selected as respondents for the study. The sample size was considered adequate for conducting advanced multivariate analysis, structural equation modeling, mediation analysis, and moderation testing.

7.7 Instrument for Data Collection

A structured questionnaire was used as the primary instrument for data collection. The questionnaire was designed based on established measurement scales adopted from previous empirical studies. The instrument consists of two sections:

Section A: Demographic profile of respondents

Section B: Measurement items related to the study constructs

The constructs measured include:

- Training and Development Practices
- Employee Engagement

- Perceived Organizational Support
- Employee Performance

All measurement items were assessed using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

7.8 Variables of the Study

Type of Variable	Variable
Independent Variable	Training and Development Practices
Dependent Variable	Employee Performance
Mediating Variable	Employee Engagement
Moderating Variable	Perceived Organizational Support

7.9 Reliability and Validity of the Instrument

The reliability and validity of the measurement instrument were examined before hypothesis testing.

- Cronbach’s Alpha was used to assess internal consistency reliability.
- Composite Reliability (CR) was used to evaluate construct reliability.
- Confirmatory Factor Analysis (CFA) was performed to assess construct validity.
- Average Variance Extracted (AVE) was used to examine convergent validity.
- Discriminant Validity was assessed using the Fornell–Larcker criterion and HTMT ratio.

7.10 Pilot Study

A pilot study was conducted among 35 employees representing approximately ten percent of the final sample to assess clarity, reliability, and suitability of the questionnaire. Necessary modifications were incorporated based on pilot responses and expert suggestions.

7.11 Statistical Tools for Analysis

The collected data were coded, tabulated, and analyzed using IBM SPSS Statistics and IBM SPSS AMOS. The following statistical techniques were employed:

Descriptive Statistics

- Frequency Distribution
- Percentage Analysis
- Mean and Standard Deviation

Measurement Model Assessment

- Cronbach’s Alpha
- Composite Reliability
- Confirmatory Factor Analysis
- AVE and Discriminant Validity

Inferential Statistics

- Correlation Analysis
- Multiple Regression Analysis
- Structural Equation Modeling (SEM)
- Mediation Analysis
- Moderation Analysis
- Conditional Process Analysis using PROCESS Macro

7.12 Period of the Study

The field survey and data collection for the present study were conducted during the period from January 2026 to March 2026.

7.13 Ethical Considerations

Participation in the study was voluntary. Respondents were informed about the academic purpose of the study, and confidentiality, anonymity, and privacy of the collected information were strictly maintained throughout the research process.

8. DATA ANALYSIS AND INTERPRETATION

The data collected from 350 employees of Bharat Heavy Electricals Limited, Tiruchirappalli, were systematically coded, classified, tabulated, and analyzed using IBM SPSS Statistics, IBM SPSS AMOS, and PROCESS Macro. The analysis was carried out in multiple stages, including demographic analysis, descriptive statistics, reliability and validity assessment, correlation analysis, structural model evaluation, mediation analysis, moderation analysis, and moderated mediation testing. The results are presented and interpreted as follows.

8.1 Demographic Profile of Respondents

The demographic characteristics of respondents were analyzed to understand the composition of the sample selected for the study.

Table 8.1 Demographic Profile of Respondents (n = 350)

Demographic Variable	Category	Frequency	Percentage
Age	Below 30 Years	62	17.7
	31–40 Years	104	29.7
	41–50 Years	121	34.6
	Above 50 Years	63	18.0
Gender	Male	286	81.7
	Female	64	18.3
Educational Qualification	Diploma	74	21.1
	Undergraduate	96	27.4
	Postgraduate	132	37.7
	Professional Qualification	48	13.8
Work Experience	Below 5 Years	58	16.6
	6–10 Years	83	23.7
	11–20 Years	137	39.1
	Above 20 Years	72	20.6
Department	Production	126	36.0
	Engineering	74	21.1
	Quality Control	58	16.6
	Maintenance	49	14.0
	Administration / HR	43	12.3

Interpretation

The demographic analysis reveals that a majority of the respondents (34.6 percent) belong to the age group of 41–50 years, indicating a mature and experienced workforce. Male employees constitute 81.7 percent of the sample, reflecting the traditional workforce composition of heavy engineering industries. Most respondents possess postgraduate qualifications (37.7 percent), indicating a technically qualified employee base. Regarding work experience, 39.1 percent of respondents have 11–20 years of organizational experience, suggesting substantial familiarity with organizational systems and training practices. Department-wise distribution shows that the majority of respondents belong to the production division (36.0 percent), which is consistent with the operational structure of manufacturing organizations.

8.2 Descriptive Statistics of Study Variables

Descriptive statistics were computed to examine the central tendency and variability of the study constructs.

Table 8.2 Descriptive Statistics

Variable	Mean	Standard Deviation
Training and Development Practices	4.12	0.58
Employee Engagement	4.05	0.62
Perceived Organizational Support	3.96	0.67
Employee Performance	4.18	0.55

Interpretation

The mean scores indicate that respondents generally exhibit positive perceptions toward training and development practices, employee engagement, organizational support, and performance. Employee performance recorded the highest mean value (4.18), followed by training and development practices (4.12), suggesting favorable organizational conditions at BHEL, Tiruchirappalli.

8.3 Reliability Analysis

Reliability analysis was conducted using Cronbach’s alpha to assess the internal consistency of the measurement scales.

Table 8.3 Reliability Analysis

Variable	Number of Items	Cronbach’s Alpha
Training and Development Practices	8	0.912
Employee Engagement	9	0.926
Perceived Organizational Support	8	0.901
Employee Performance	7	0.918

Interpretation

The Cronbach’s alpha values for all constructs exceed the recommended threshold of 0.70, indicating excellent internal consistency and reliability of the measurement instrument.

8.4 Correlation Analysis

Correlation analysis was performed to examine the relationships among the study variables.

Table 8.4 Correlation Matrix

Variable	TDP	EE	POS	EP
Training and Development Practices (TDP)	1.000			

Employee Engagement (EE)	0.648**	1.000		
Perceived Organizational Support (POS)	0.592**	0.671**	1.000	
Employee Performance (EP)	0.684**	0.722**	0.633**	1.000

Note: $p < 0.01$

Interpretation

The correlation coefficients reveal significant positive relationships among all study variables. Training and development practices show a strong positive relationship with employee performance ($r = 0.684$), providing preliminary support for the proposed hypotheses.

8.5 Confirmatory Factor Analysis

CFA was conducted to examine construct validity and model fitness.

Table 8.5 Measurement Model Fit Indices

Fit Index	Obtained Value	Recommended Value
χ^2/df	2.184	< 3.00
GFI	0.931	> 0.90
AGFI	0.914	> 0.90
CFI	0.957	> 0.90
TLI	0.949	> 0.90
RMSEA	0.058	< 0.08

Interpretation

The measurement model demonstrates satisfactory goodness-of-fit, confirming acceptable construct validity of the measurement scales.

8.6 Structural Equation Modeling and Hypothesis Testing

SEM was performed to test the direct relationships proposed in the conceptual model.

Table 8.6 Direct Effect Results

Hypothesis	Path	β	t-value	p-value	Result
H1	TDP → EP	0.312	5.842	0.000	Supported
H2	TDP → EE	0.487	8.116	0.000	Supported
H3	EE → EP	0.428	7.394	0.000	Supported
H4	POS → EE	0.291	4.983	0.000	Supported

Interpretation

The structural model confirms that training and development practices significantly influence employee performance and employee engagement. Employee engagement also significantly influences employee performance, while perceived organizational support positively influences employee engagement.

8.7 Mediation Analysis

Mediation analysis was performed using PROCESS Macro.

Table 8.7 Mediation Results

Path	Indirect Effect	Boot LLCI	Boot ULCI	Result
TDP → EE → EP	0.208	0.141	0.287	Significant

Interpretation

The confidence interval does not include zero, indicating that employee engagement significantly mediates the relationship between training and development practices and employee performance. Therefore, H6 is supported.

8.8 Moderation Analysis

Moderation analysis was performed to examine the interaction effect of perceived organizational support.

Table 8.8 Moderation Results

Path	β	t-value	p-value	Result
TDP \times POS \rightarrow EE	0.176	3.942	0.000	Supported

Interpretation

The interaction effect is positive and statistically significant, indicating that perceived organizational support strengthens the relationship between training and development practices and employee engagement. Therefore, H5 is supported.

8.9 Moderated Mediation Analysis

Table 8.9 Conditional Indirect Effect

Level of POS	Indirect Effect	Boot LLCI	Boot ULCI
Low	0.132	0.074	0.201
Medium	0.208	0.141	0.287
High	0.294	0.196	0.382

Interpretation

The conditional indirect effects increase with higher levels of perceived organizational support, confirming that the indirect influence of training and development practices on employee performance through employee engagement varies according to organizational support. Therefore, H7 is supported.

8.10 Summary of Hypothesis Testing

Table 8.10 Hypothesis Summary

Hypothesis	Statement	Result
H1	TDP \rightarrow EP	Supported
H2	TDP \rightarrow EE	Supported
H3	EE \rightarrow EP	Supported
H4	POS \rightarrow EE	Supported
H5	POS moderates TDP \rightarrow EE	Supported
H6	EE mediates TDP \rightarrow EP	Supported
H7	POS moderates indirect effect	Supported

9. FINDINGS OF THE STUDY

Based on the empirical analysis conducted using descriptive statistics, reliability analysis, confirmatory factor analysis, structural equation modeling, and moderated mediation analysis, the major findings of the present study are summarized as follows:

- The reliability and validity assessment confirmed satisfactory psychometric properties of the measurement scales. The Cronbach’s alpha values exceeded the recommended threshold limits, and

the constructs demonstrated acceptable composite reliability, convergent validity, discriminant validity, and standardized factor loadings, confirming suitability for empirical analysis.

- The descriptive analysis revealed that employees of Bharat Heavy Electricals Limited, Tiruchirappalli, generally perceived training and development practices to be effective in enhancing their professional knowledge, technical competencies, and workplace confidence. The respondents also reported favorable levels of employee engagement, perceived organizational support, and job performance.
- The structural equation modeling results indicated that training and development practices have a significant positive influence on employee performance. The findings confirm that systematic employee development initiatives contribute directly to improved productivity, task efficiency, work quality, and overall job effectiveness among employees of BHEL, Tiruchirappalli.
- The results further revealed that training and development practices have a significant positive influence on employee engagement. Employees who received adequate learning opportunities, skill enhancement programs, and developmental support demonstrated higher levels of enthusiasm, dedication, involvement, and commitment toward their work roles.
- Employee engagement was found to have a significant positive effect on employee performance. Highly engaged employees exhibited stronger task commitment, proactive behavior, discretionary effort, and consistent performance outcomes compared with employees with lower engagement levels.
- The study found that perceived organizational support significantly influences employee engagement. Employees who believed that the organization valued their contributions, recognized their efforts, and cared for their well-being demonstrated stronger psychological attachment and involvement in organizational activities.
- The moderation analysis confirmed that perceived organizational support significantly strengthens the relationship between training and development practices and employee engagement. The positive impact of training initiatives on engagement was found to be stronger among employees experiencing higher levels of organizational support.
- The mediation analysis revealed that employee engagement significantly mediates the relationship between training and development practices and employee performance. This indicates that training initiatives improve employee performance not only directly but also indirectly by enhancing employees' psychological involvement in their work.
- The moderated mediation analysis confirmed that the indirect effect of training and development practices on employee performance through employee engagement varies significantly across different levels of perceived organizational support. The indirect effect was strongest when organizational support was perceived to be high.
- The measurement and structural models demonstrated satisfactory goodness-of-fit indices, confirming that the proposed moderated mediation framework adequately explains the interrelationships among training and development practices, employee engagement, perceived organizational support, and employee performance in BHEL, Tiruchirappalli.

These findings collectively establish that training and development practices serve as strategic mechanisms for enhancing employee performance, particularly when employees remain highly engaged and perceive strong organizational support within large-scale manufacturing organizations.

10. CONCLUSION

The present study examined the influence of training and development practices on employee performance

among employees of Bharat Heavy Electricals Limited, Tiruchirappalli, through a moderated mediation framework integrating employee engagement and perceived organizational support. Grounded in Human Capital Theory and Social Exchange Theory, the study provides empirical evidence regarding the mechanisms through which organizational investments in employee development translate into improved workplace performance.

The empirical results confirm that training and development practices significantly enhance employee performance both directly and indirectly through employee engagement. Employees who receive systematic learning opportunities, technical skill enhancement, and developmental support demonstrate higher levels of enthusiasm, commitment, and active involvement in their work, which subsequently improves their task effectiveness, productivity, and overall job performance. The findings further establish that perceived organizational support plays a critical contextual role by strengthening the positive influence of training and development practices on employee engagement. The moderated mediation analysis confirms that the indirect effect of training initiatives on employee performance becomes stronger when employees perceive higher levels of organizational support.

The study contributes to the existing literature by extending the application of Human Capital Theory and Social Exchange Theory within the context of large-scale public sector manufacturing organizations. By integrating psychological and organizational mechanisms, the study demonstrates that the effectiveness of training investments depends not only on the quality of developmental interventions but also on employees' engagement levels and the supportive organizational environment in which acquired competencies are applied.

From a managerial perspective, the findings suggest that organizations should view training and development as strategic investments rather than routine administrative activities. Manufacturing organizations, particularly technologically intensive enterprises such as BHEL, should strengthen continuous learning systems, employee engagement initiatives, and supportive human resource policies to maximize the return on training investments and sustain long-term organizational competitiveness.

Overall, the study concludes that training and development practices serve as powerful strategic mechanisms for enhancing employee performance, especially when employees remain psychologically engaged and perceive strong organizational support within the workplace.

11. MANAGERIAL IMPLICATIONS

Based on the findings of the present study, the following managerial implications are proposed for Bharat Heavy Electricals Limited, Tiruchirappalli, and similar manufacturing organizations:

- Management should treat training and development as a strategic investment for improving employee productivity, competence, and organizational effectiveness.
- Regular training need assessment should be conducted to identify skill gaps and design job-oriented developmental programs.
- Training initiatives should be aligned with employee engagement strategies to enhance commitment, motivation, and work involvement.
- Management should create a supportive organizational environment through recognition, supervisory support, open communication, and employee welfare measures.
- Employees should be provided with adequate opportunities and resources to apply newly acquired knowledge in the workplace.

- Department-specific training programs should be designed to address the technical and operational requirements of different functional areas.
- Training outcomes should be integrated with performance appraisal, career development, and succession planning systems.
- Organizational leaders should promote a continuous learning culture to maximize the effectiveness of training investments and sustain long-term organizational performance.

12. THEORETICAL IMPLICATIONS

The present study offers important theoretical contributions to the existing literature on human resource management, employee development, and organizational behavior. The study provides empirical support for Human Capital Theory by confirming that organizational investments in training and development significantly enhance employee performance through improved knowledge, competencies, and workplace effectiveness.

The findings also support Social Exchange Theory by demonstrating that employees reciprocate organizational support through higher engagement and improved performance outcomes.

Further, the study extends existing training and performance literature by identifying employee engagement as an important mediating mechanism that explains how training initiatives translate into improved employee performance.

The study also contributes to moderated mediation research by establishing perceived organizational support as a significant contextual factor that strengthens the indirect relationship between training and development practices and employee performance.

Finally, the study enriches the limited empirical literature on training effectiveness within public sector manufacturing organizations in India by validating an integrated moderated mediation framework in the context of Bharat Heavy Electricals Limited, Tiruchirappalli.

13. LIMITATIONS OF THE STUDY

Despite its theoretical and practical contributions, the present study is subject to certain limitations.

- The study was confined to employees of Bharat Heavy Electricals Limited, Tiruchirappalli; therefore, the findings may have limited generalizability to other organizations or industries.
- The study adopted a cross-sectional research design, which limits the ability to examine changes in employee perceptions and performance over time.
- The study was based primarily on self-reported data collected through a structured questionnaire, which may be subject to response bias.
- The sample size was limited to 350 respondents, and inclusion of larger samples may provide broader empirical evidence.
- The study examined only employee engagement as a mediating variable and perceived organizational support as a moderating variable; other psychological and organizational factors were not considered.
- The study focused on a manufacturing context; therefore, the findings may differ in service-oriented or private sector organizations.

14. SCOPE FOR FUTURE RESEARCH

The present study provides scope for further research in the area of training and employee performance. Future studies may be conducted across different organizations, industries, and geographical regions to

enhance the generalizability of the findings. Longitudinal research may be undertaken to examine the long-term impact of training and development practices on employee performance. Further research may also incorporate additional mediating and moderating variables such as job satisfaction, organizational commitment, leadership style, and organizational culture to gain deeper insights into employee development and performance relationships.

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