

Research Article

Training Effectiveness and Employee Performance in Public Sector Manufacturing: A Moderated Mediation Analysis of Employee Competence and Organizational Support at Bhel Tiruchirappalli

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Article History

Received: 12.05.2026

Accepted: 02.06.2026

Published: 24.06.2026

Abstract: Training and development initiatives play a critical role in enhancing workforce capability and organizational effectiveness, particularly within technologically intensive manufacturing environments. Despite substantial investments in employee training, limited research has examined the mechanisms and contextual conditions through which training programs influence employee performance in public-sector manufacturing organizations. This study investigates the relationship between training programs and employee performance among employees of Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, by examining the mediating role of employee competence and the moderating role of organizational support. The study adopted a quantitative cross-sectional research design and collected data from 350 employees across multiple functional departments of BHEL Tiruchirappalli. Data were gathered using a structured questionnaire and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM). The proposed model evaluated direct effects, mediation effects, moderation effects, and moderated mediation relationships among the study variables. The findings reveal that training programs exert a significant positive influence on employee competence ($\beta = 0.587, p < 0.001$) and employee performance ($\beta = 0.271, p < 0.001$). Employee competence significantly affects employee performance ($\beta = 0.534, p < 0.001$) and mediates the relationship between training programs and employee performance ($\beta = 0.313, p < 0.001$). The results further indicate that organizational support positively moderates the relationship between training programs and employee competence ($\beta = 0.214, p < 0.001$). Moreover, the moderated mediation analysis confirms that the indirect effect of training programs on employee performance through employee competence becomes substantially stronger under higher levels of organizational support. The study contributes to the human resource management literature by integrating Human Capital Theory, Training Transfer Theory, and Organizational Support Theory within a conditional process framework. The findings highlight that training effectiveness depends not only on the quality of training initiatives but also on competency development and supportive organizational conditions. The study provides practical guidance for managers and policymakers seeking to maximize workforce performance through strategic investments in employee development and organizational support systems within public-sector manufacturing organizations.

Keywords: Training Programs; Employee Competence; Organizational Support; Employee Performance; Human Capital Theory; Training Transfer Theory; PLS-SEM; Moderated Mediation; Public-Sector Manufacturing; BHEL.

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INTRODUCTION

The increasing complexity of manufacturing operations, rapid technological advancements, and heightened global competition have significantly transformed workforce requirements across industrial organizations. In this environment,

organizations are compelled to continuously develop employee knowledge, skills, and capabilities to maintain operational efficiency, innovation, and long-term competitiveness. Employee training has consequently emerged as one of the most important human resource development interventions for enhancing workforce effectiveness and organizational performance. Training initiatives not only improve job-related competencies but also enable employees to adapt to technological changes, quality standards, and evolving workplace demands (Aguinis & Kraiger, 2009; Noe, 2017).

Over the past several decades, training and development have received considerable attention in organizational research. Empirical evidence suggests that well-designed training programs positively influence employee productivity, job performance, learning outcomes, and organizational effectiveness (Arthur et al., 2003; Salas et al., 2012). Training interventions facilitate the acquisition of technical knowledge, problem-solving abilities, and behavioral competencies that are essential for achieving superior performance outcomes. Meta-analytic findings further indicate that investments in employee training generate benefits at individual, team, and organizational levels by improving work quality, efficiency, and adaptability (Aguinis & Kraiger, 2009; Bell et al., 2017).

Despite widespread recognition of the value of training, scholars have argued that training does not automatically translate into improved workplace performance. The effectiveness of training depends on employees' ability to acquire, retain, and apply newly learned knowledge and skills in their job environments (Baldwin & Ford, 1988; Blume et al., 2010). Consequently, understanding the mechanisms through which training contributes to performance has become a critical concern in human resource management research. Previous studies have emphasized that training outcomes are often realized through intermediate variables that explain how learning experiences are transformed into improved work behaviors and performance results (Burke & Hutchins, 2007; Cheng & Ho, 2001).

Among the various mechanisms proposed in the literature, employee competence represents one of the most significant pathways linking training to performance. Employee competence refers to the combination of knowledge, technical expertise, skills, and abilities that enable individuals to perform their tasks effectively. Training programs enhance employee competence by developing professional capabilities that support higher levels of productivity and job effectiveness. Research has consistently demonstrated that competency development contributes to organizational effectiveness and serves as an important outcome of human resource development initiatives (Potnuru & Sahoo, 2016; Kraiger et al., 1993). Employees who possess stronger competencies are generally better equipped to handle complex work responsibilities, solve operational problems, and contribute to organizational objectives.

At the same time, the success of training initiatives is influenced by the organizational environment in which employees operate. Training transfer literature suggests that supportive workplace conditions play a vital role in determining whether acquired knowledge and skills are successfully applied in practice (Tracey et al., 1995; Hughes et al., 2020). Among the various contextual factors examined by researchers, organizational support has emerged as a particularly influential determinant of employee attitudes and behaviors. Organizational support reflects employees' perceptions regarding the extent to which the organization values their contributions and cares about their well-being (Eisenberger et al., 1986). When employees perceive strong organizational support, they are more likely to engage in learning activities, utilize newly acquired competencies, and demonstrate improved performance outcomes (Rhoades & Eisenberger, 2002; Zumrah & Boyle, 2015).

The theoretical foundations of perceived organizational support suggest that supportive organizational practices create reciprocal obligations that encourage employees to contribute positively to organizational goals. In training contexts, organizational support may strengthen employees' motivation to learn, enhance knowledge application, and facilitate competency development following training participation (Al-Eisa et al., 2009; Chiaburu & Marinova, 2005). Consequently, organizational support may influence not only the direct effectiveness of training programs but also the extent to which training-generated competencies translate into enhanced performance.

Although substantial research has examined training effectiveness, relatively limited empirical attention has been devoted to understanding the combined roles of employee competence and organizational support within a single integrated framework, particularly in public-sector manufacturing organizations. Much of the existing literature has focused on private-sector firms, service industries, or Western organizational settings, leaving significant gaps regarding workforce development processes in large industrial enterprises operating in emerging economies. Public-sector manufacturing organizations face unique challenges associated with technological modernization, productivity enhancement, workforce diversity, and skill renewal, making the examination of training effectiveness particularly relevant.

Within the Indian industrial context, Bharat Heavy Electricals Limited (BHEL) represents one of the country's largest engineering and manufacturing enterprises, employing a highly skilled workforce engaged in the production of critical industrial equipment. Continuous employee development is essential for maintaining operational excellence and sustaining competitiveness in such technologically intensive environments. However, empirical evidence explaining how training programs improve employee performance within BHEL remains limited. Furthermore, little is known about whether

SHEELA B, *et al*; Training Effectiveness and Employee Performance in Public Sector Manufacturing: A Moderated Mediation Analysis of Employee Competence and Organizational Support at Bhel Tiruchirappalli. *Canadian Journal of Marketing Research*; Vol-16, Iss- 2 (April-June- 2026): 662-679

organizational support strengthens the competency-building effects of training interventions among manufacturing employees.

To address these gaps, the present study develops and tests a moderated mediation framework examining the relationship between training programs and employee performance at BHEL Tiruchirappalli. Specifically, the study investigates employee competence as a mediating mechanism through which training programs influence employee performance and evaluates organizational support as a moderating factor affecting the relationship between training programs and employee competence. By integrating human resource development theory, training transfer perspectives, and organizational support theory, the study seeks to provide a more comprehensive understanding of how and under what conditions training investments contribute to superior employee outcomes.

The findings are expected to contribute to the human resource management literature in three important ways. First, the study extends existing knowledge by examining employee competence as a central explanatory mechanism linking training and performance. Second, it enriches organizational support research by investigating its boundary-condition role within a training effectiveness framework. Third, it offers practical insights for managers and policymakers in public-sector manufacturing organizations seeking to maximize returns on training investments through competency development and supportive workplace practices.

1.2 Statement of the Problem

In the contemporary manufacturing environment, technological advancements, automation, digital transformation, and increasing global competition have significantly altered workforce requirements. Organizations are compelled to continuously enhance employee knowledge, skills, and competencies to maintain operational efficiency, innovation capability, and sustainable competitive advantage. Consequently, employee training and development have become strategic investments that contribute to both individual and organizational performance (Aguinis & Kraiger, 2009; Salas et al., 2012). Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, one of India's premier public-sector manufacturing enterprises, regularly allocates substantial resources toward employee training and development initiatives aimed at improving technical expertise, operational efficiency, and workforce productivity. Despite these investments, organizations frequently encounter challenges in ensuring that training interventions generate measurable improvements in employee performance. Research indicates that the effectiveness of training programs depends not only on the quality of training provided but also on employees' ability to acquire, retain, transfer, and apply newly acquired knowledge and skills in their workplace (Baldwin & Ford, 1988; Arthur et al., 2003).

Previous studies have consistently demonstrated a positive association between training and employee performance. However, the underlying mechanisms through which training contributes to performance enhancement remain insufficiently understood, particularly within large-scale manufacturing organizations. Training initiatives are expected to improve employee effectiveness by enhancing professional capabilities and work-related competencies; nevertheless, the extent to which employee competence serves as a mechanism linking training interventions to performance outcomes requires further empirical investigation (Potnuru & Sahoo, 2016; Kraiger et al., 1993).

In addition, organizational conditions may significantly influence the effectiveness of training initiatives. Employees are more likely to utilize and transfer acquired knowledge and skills when they perceive adequate organizational support in the form of managerial encouragement, resource availability, recognition, and developmental opportunities. Organizational Support Theory suggests that employees who perceive higher levels of organizational support are more likely to exhibit positive work attitudes, stronger commitment, and improved job performance (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002). Furthermore, supportive organizational environments enhance training transfer and competency development, thereby strengthening the effectiveness of training programs (Zumrah & Boyle, 2015; Al-Eisa et al., 2009). Although extensive research has examined training effectiveness across different sectors and organizational settings, empirical evidence regarding the simultaneous examination of training programs, employee competence, organizational support, and employee performance within a moderated mediation framework remains limited, particularly in the context of India's public-sector manufacturing industry. Moreover, studies focusing specifically on BHEL Tiruchirappalli are scarce despite the organization's strategic importance in India's industrial sector. Therefore, there is a need to investigate how training programs influence employee performance through employee competence and how organizational support strengthens this relationship. Addressing this gap will contribute to a deeper understanding of training effectiveness and provide valuable insights for enhancing human resource development practices within public-sector manufacturing organizations.

1.3 Research Objectives

General Objective

To examine the relationship between training programs and employee performance at Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, through the mediating role of employee competence and the moderating role of organizational support.

Specific Objectives

- To examine the effect of training programs on employee performance among employees of BHEL Tiruchirappalli.
- To assess the influence of training programs on employee competence.
- To analyze the effect of employee competence on employee performance.
- To investigate the mediating role of employee competence in the relationship between training programs and employee performance.
- To examine the moderating effect of organizational support on the relationship between training programs and employee competence.
- To evaluate the moderated mediation effect of organizational support on the indirect relationship between training programs and employee performance through employee competence.
- To provide managerial recommendations for enhancing employee performance through effective training programs and supportive organizational practices.

REVIEW OF LITERATURE

2.1 Training Programs and Employee Performance

Employee training has long been recognized as a strategic mechanism for improving workforce capabilities and enhancing organizational effectiveness. As organizations increasingly operate in dynamic and technology-intensive environments, continuous learning and skill development have become essential for sustaining competitiveness. Training programs provide employees with opportunities to acquire new knowledge, improve technical expertise, and develop behavioral competencies that facilitate effective job performance. Research consistently demonstrates that organizations investing in employee development experience higher levels of productivity, work quality, and operational efficiency (Aguinis & Kraiger, 2009). A substantial body of empirical evidence supports the positive relationship between training and employee performance. Arthur et al. (2003), through a comprehensive meta-analysis, reported that training interventions significantly improve learning outcomes and job-related performance. Similarly, Salas et al. (2012) emphasized that effective training systems contribute to individual and organizational success by enhancing employee capabilities and strengthening workplace effectiveness. Bell et al. (2017) further noted that a century of training research confirms the critical role of employee development initiatives in improving organizational performance outcomes.

The effectiveness of training programs depends not only on content quality but also on the extent to which employees can transfer acquired knowledge and skills to their work environments. Baldwin and Ford (1988) proposed that successful training outcomes require effective learning transfer processes, while Blume et al. (2010) demonstrated that training transfer significantly influences workplace performance improvements. Organizations that design training interventions aligned with job requirements are more likely to achieve desirable performance outcomes among employees.

Within manufacturing environments, training assumes even greater significance because employees are required to adapt to advanced technologies, quality management systems, and continuously evolving production processes. Consequently, training programs have become indispensable tools for enhancing operational competence and improving employee productivity in industrial organizations.

2.2 Employee Competence as an Outcome of Training

Employee competence represents an essential organizational resource that contributes directly to workplace effectiveness and performance improvement. Competence encompasses employees' knowledge, technical skills, abilities, and professional expertise required for successful task execution. Human resource development scholars argue that competency enhancement constitutes one of the primary objectives of employee training programs (Swanson & Holton, 2009).

Training interventions facilitate competency development by enabling employees to acquire updated knowledge and refine existing skills. Kraiger et al. (1993) categorized training outcomes into cognitive, skill-based, and affective dimensions, emphasizing that competency development is a critical result of effective learning experiences. Employees who participate in structured training programs generally demonstrate higher levels of technical proficiency and job-related expertise than those without comparable developmental opportunities.

Potnuru and Sahoo (2016) found that human resource development interventions significantly enhance employee competencies, which subsequently improve organizational effectiveness. Their findings suggest that competency development serves as a critical mechanism through which training investments generate organizational value. Similarly, Noe (2017) emphasized that employee training contributes substantially to knowledge acquisition and capability enhancement, thereby strengthening workforce performance.

In manufacturing organizations, employee competence is particularly important because operational efficiency often depends on employees' ability to perform technically complex tasks. Training programs therefore play a vital role in strengthening workforce competencies and ensuring the effective utilization of organizational resources.

2.3 Employee Competence and Employee Performance

The relationship between employee competence and performance has attracted considerable attention in organizational research. Competent employees possess the necessary knowledge, technical expertise, and problem-solving abilities required to perform job responsibilities effectively. As a result, competency development is frequently associated with improved productivity, work quality, innovation, and efficiency.

Human capital theory suggests that investments in employee skills and knowledge increase workforce productivity and organizational performance. Employees with stronger competencies are better equipped to handle complex operational challenges, adapt to changing work requirements, and contribute to organizational objectives. Potnuru and Sahoo (2016) demonstrated that enhanced employee competencies positively influence organizational effectiveness and individual performance outcomes.

Kraiger et al. (1993) argued that training-induced learning outcomes improve employees' ability to perform work-related tasks successfully. Furthermore, Yáñez-Araque et al. (2017) found that employee development initiatives strengthen workplace behaviors and contribute to improved organizational performance. These findings collectively indicate that competence functions as a critical determinant of employee effectiveness.

In manufacturing settings, competency development is especially important because employee performance directly affects productivity, product quality, workplace safety, and operational efficiency. Consequently, organizations increasingly focus on competency-building initiatives as a means of achieving sustainable performance improvements.

2.4 Organizational Support and Training Effectiveness

Organizational support theory provides an important framework for understanding employee attitudes and workplace behavior. According to Eisenberger et al. (1986), perceived organizational support reflects employees' beliefs regarding the extent to which the organization values their contributions and cares about their well-being. Employees who perceive higher organizational support are generally more motivated, committed, and willing to contribute positively to organizational objectives.

Rhoades and Eisenberger (2002) argued that supportive organizational environments encourage reciprocal employee behaviors through social exchange processes. When organizations invest in employee welfare, provide developmental opportunities, and recognize employee contributions, workers are more likely to exhibit positive attitudes and higher performance levels.

Training researchers have identified organizational support as a critical determinant of training success. Chiaburu and Marinova (2005) found that supportive workplace environments facilitate the transfer of training by encouraging employees to apply newly acquired knowledge and skills. Similarly, Al-Eisa et al. (2009) reported that organizational and supervisory support positively influence employees' motivation to learn and transfer training outcomes to workplace settings.

Hughes et al. (2020) further demonstrated that supportive work environments contribute significantly to training sustainment and long-term learning application. These findings indicate that organizational support strengthens employees' ability to transform training experiences into practical competencies that improve workplace performance.

2.5 Organizational Support as a Moderator

Although training programs generally improve employee capabilities, the magnitude of their effectiveness may vary across organizational contexts. Researchers have increasingly recognized that organizational support functions as a boundary condition influencing the success of training interventions.

Training transfer literature suggests that supportive organizational environments provide employees with resources, encouragement, and opportunities necessary for applying newly acquired competencies (Burke & Hutchins, 2007). Employees who perceive strong organizational support are more likely to utilize learned skills and engage in continuous learning behaviors. Conversely, inadequate organizational support may reduce employees' motivation to implement training outcomes, thereby limiting competency development.

Zumrah and Boyle (2015) found that perceived organizational support significantly enhances training transfer and employee development outcomes. Their findings indicate that supportive organizational climates amplify the benefits derived from training initiatives. Similarly, Tracey et al. (2001) highlighted the importance of workplace conditions in shaping training effectiveness and performance outcomes.

These studies suggest that organizational support may strengthen the relationship between training programs and employee competence by creating conditions that facilitate learning application and skill development. Therefore, organizational support can be conceptualized as a moderating variable influencing the effectiveness of training interventions.

2.6 Employee Competence as a Mediating Mechanism

Contemporary human resource development research increasingly emphasizes the importance of understanding the mechanisms through which training influences employee performance. Rather than producing performance improvements directly, training often generates outcomes through intermediate processes that enhance employee capabilities.

The learning and transfer literature suggests that training first contributes to knowledge acquisition, skill development, and competency enhancement before influencing workplace performance (Baldwin & Ford, 1988; Blume et al., 2010). Employees who successfully develop competencies through training are subsequently able to perform their tasks more effectively, resulting in improved job performance.

Potnuru and Sahoo (2016) provided empirical evidence supporting the mediating role of employee competencies between human resource development interventions and organizational effectiveness. Similarly, training effectiveness models proposed by Holton (1996) and Holton et al. (2000) emphasize that learning outcomes serve as important intermediary variables connecting training inputs with organizational results.

Accordingly, employee competence represents a theoretically meaningful mediating mechanism through which training programs contribute to employee performance. Investigating this mediating relationship provides deeper insights into the processes underlying training effectiveness in organizational settings.

2.7 Research Gap

Although extensive research has examined training effectiveness, several important gaps remain in the existing literature. First, many studies have primarily investigated the direct relationship between training and employee performance without adequately exploring the mechanisms through which training generates performance outcomes. Second, relatively limited attention has been given to employee competence as a mediating variable within training-performance relationships, particularly in manufacturing environments.

Third, while organizational support has been recognized as an important contextual factor, its moderating role within a competence-based training framework remains insufficiently examined. Existing studies have generally analyzed training transfer, motivation, or support independently rather than integrating these concepts into a comprehensive moderated mediation model.

Finally, empirical evidence from large public-sector manufacturing organizations in India remains scarce. Organizations such as Bharat Heavy Electricals Limited (BHEL) operate in technologically sophisticated environments where employee development plays a crucial role in achieving operational excellence. However, limited research has investigated how training programs influence employee performance through competency development under varying levels of organizational support within such settings.

To address these gaps, the present study proposes and empirically tests a moderated mediation framework in which employee competence mediates the relationship between training programs and employee performance, while organizational support moderates the relationship between training programs and employee competence among employees of BHEL Tiruchirappalli.

CONCEPTUAL FRAMEWORK

The conceptual framework of the present study is developed based on Human Capital Theory, Training Transfer Theory, and Organizational Support Theory. The framework proposes that training programs enhance employee performance both directly and indirectly through the development of employee competence. Furthermore, the framework posits that organizational support strengthens the effectiveness of training programs in developing employee competence.

Training programs constitute the primary independent variable because structured learning interventions facilitate the acquisition of knowledge, technical skills, and professional abilities required for effective job performance. Employee competence is conceptualized as a mediating variable that explains the mechanism through which training initiatives contribute to improved employee performance. Competent employees are expected to demonstrate higher productivity, better work quality, enhanced problem-solving capabilities, and superior task execution.

Organizational support is incorporated as a moderating variable based on the premise that employees who perceive higher levels of organizational support are more likely to utilize and apply the knowledge and skills gained through training. Supportive organizational environments provide resources, encouragement, recognition, and opportunities that facilitate competency development and training transfer.

Accordingly, the proposed moderated mediation framework suggests that:

- Training Programs positively influence Employee Performance.

- Training Programs positively influence Employee Competence.
- Employee Competence positively influences Employee Performance.
- Employee Competence mediates the relationship between Training Programs and Employee Performance.
- Organizational Support moderates the relationship between Training Programs and Employee Competence.

The indirect effect of Training Programs on Employee Performance through Employee Competence becomes stronger when Organizational Support is high.

Conceptual Model

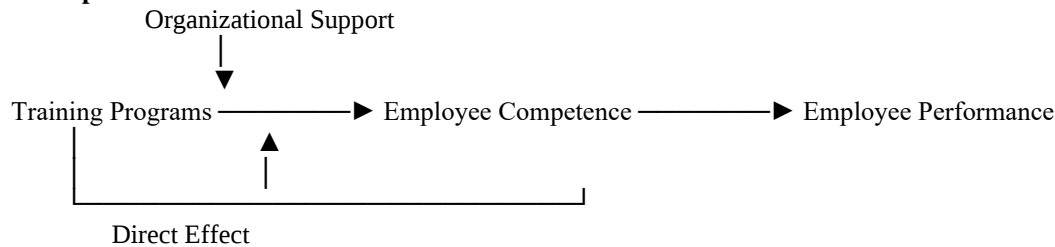


Figure 1. Proposed Moderated Mediation Framework Examining the Relationship Between Training Programs and Employee Performance through Employee Competence under the Influence of Organizational Support.

Variable Classification

Variable Type	Construct
Independent Variable	Training Programs (TP)
Mediating Variable	Employee Competence (EC)
Moderating Variable	Organizational Support (OS)
Dependent Variable	Employee Performance (EP)

The framework proposes that employee competence serves as the primary mechanism through which training interventions improve employee performance, while organizational support acts as a contextual factor that enhances the effectiveness of training in developing employee competence. This integrated model provides a comprehensive explanation of how and under what conditions training programs contribute to superior employee outcomes within the manufacturing sector.

HYPOTHESIS DEVELOPMENT

4.1 Training Programs and Employee Performance

Training programs are designed to improve employees' knowledge, technical capabilities, and work-related competencies, thereby enhancing their ability to perform assigned tasks effectively. Human Capital Theory suggests that investments in employee development generate productivity improvements by increasing the value of human resources within organizations. Empirical studies consistently demonstrate that employees who participate in well-structured training programs exhibit higher levels of productivity, job quality, efficiency, and performance (Arthur et al., 2003; Aguinis & Kraiger, 2009; Salas et al., 2012).

Within manufacturing organizations, training programs facilitate adaptation to technological advancements, operational changes, and quality management requirements. Employees who receive adequate training are generally better equipped to perform complex tasks, solve operational problems, and contribute to organizational objectives. Consequently, training programs are expected to positively influence employee performance.

H1: Training Programs have a positive and significant effect on Employee Performance.

4.2 Training Programs and Employee Competence

Employee competence represents the knowledge, skills, abilities, and professional expertise necessary for effective job performance. Training interventions are specifically designed to enhance these competencies by providing employees with learning opportunities that strengthen their technical and behavioral capabilities.

According to learning and development theory, training serves as a mechanism through which employees acquire and refine competencies required for workplace effectiveness. Previous studies indicate that training programs significantly improve employee competence through knowledge enhancement, skill development, and capability building (Kraiger et al., 1993; Noe, 2017; Potnuru & Sahoo, 2016).

In manufacturing environments, competency development is particularly important because employees must continuously update their skills to meet evolving technological and operational requirements. Therefore, participation in training programs is expected to enhance employee competence.

H2: Training Programs have a positive and significant effect on Employee Competence.

4.3 Employee Competence and Employee Performance

Competent employees possess the technical knowledge, problem-solving abilities, and operational skills necessary to perform their duties effectively. Human Capital Theory proposes that enhanced competencies increase employee productivity and organizational effectiveness by improving task execution and decision-making capabilities.

Previous research has demonstrated that employee competence contributes significantly to individual performance outcomes. Employees with higher levels of competence are more capable of handling workplace challenges, maintaining quality standards, and achieving organizational objectives (Kraiger et al., 1993; Potnuru & Sahoo, 2016; Yáñez-Araque et al., 2017).

In manufacturing organizations, employee competence directly influences productivity, operational efficiency, product quality, and workplace safety. Consequently, employee competence is expected to positively affect employee performance.

H3: Employee Competence has a positive and significant effect on Employee Performance.

4.4 Mediating Role of Employee Competence

Training effectiveness literature suggests that training does not directly improve performance in all situations. Instead, training first enhances employee knowledge, skills, and competencies, which subsequently contribute to improved job performance. This perspective is consistent with training transfer theory, which emphasizes that learning outcomes serve as intermediate mechanisms linking training interventions to organizational results (Baldwin & Ford, 1988; Blume et al., 2010). Holton (1996) and Holton et al. (2000) argued that learning and competency development function as critical pathways through which training influences performance outcomes. Similarly, Potnuru and Sahoo (2016) found that employee competencies mediate the relationship between human resource development initiatives and organizational effectiveness. Accordingly, employee competence is expected to act as a mediating mechanism through which training programs improve employee performance.

H4: Employee Competence mediates the relationship between Training Programs and Employee Performance.

4.5 Moderating Role of Organizational Support

Organizational Support Theory posits that employees develop positive attitudes and behaviors when they perceive that their organization values their contributions and cares about their well-being (Eisenberger et al., 1986). Supportive organizations provide employees with resources, encouragement, recognition, and opportunities that facilitate learning and development. Training transfer research indicates that organizational support strengthens employees' ability to apply newly acquired knowledge and skills in workplace settings (Chiaburu & Marinova, 2005; Al-Eisa et al., 2009; Hughes et al., 2020). Employees who perceive stronger organizational support are more likely to engage in learning activities and effectively convert training experiences into meaningful competencies.

Therefore, organizational support is expected to strengthen the relationship between training programs and employee competence.

H5: Organizational Support positively moderates the relationship between Training Programs and Employee Competence, such that the relationship becomes stronger when Organizational Support is high.

4.6 Moderated Mediation Effect

Recent advances in organizational research emphasize the importance of examining conditional indirect effects to understand how contextual factors influence mediation relationships (Preacher et al., 2007; Hayes, 2022). The moderated mediation perspective suggests that the indirect effect of training programs on employee performance through employee competence may vary depending on the level of organizational support.

When organizational support is high, employees are more likely to utilize organizational resources, apply learned skills, and develop stronger competencies following training participation. Consequently, the competency-building effect of training becomes stronger, resulting in greater performance improvements.

Accordingly, the indirect relationship between training programs and employee performance through employee competence is expected to be conditional upon organizational support.

H6: Organizational Support positively moderates the indirect effect of Training Programs on Employee Performance through Employee Competence, such that the indirect effect is stronger at higher levels of Organizational Support.

Table 1. Summary of Research Hypotheses

Hypothesis	Relationship
H1	Training Programs → Employee Performance
H2	Training Programs → Employee Competence
H3	Employee Competence → Employee Performance
H4	Training Programs → Employee Competence → Employee Performance (Mediation)
H5	Organizational Support × Training Programs → Employee Competence (Moderation)
H6	Conditional indirect effect of Training Programs on Employee Performance through Employee Competence under Organizational Support (Moderated Mediation)

RESEARCH METHODOLOGY

5.1 Research Design

The present study adopts a quantitative research approach to examine the relationship between training programs and employee performance among employees of Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli. A cross-sectional survey design was employed because it facilitates the collection of data from a large number of respondents at a single point in time and enables the empirical testing of relationships among multiple constructs. The study specifically investigates the direct effect of training programs on employee performance, the mediating role of employee competence, and the moderating role of organizational support within a moderated mediation framework.

The quantitative approach was considered appropriate because the study seeks to test theoretically derived hypotheses and evaluate causal relationships among latent variables using statistical techniques. Furthermore, the use of a structured survey instrument ensures consistency in data collection and enhances the reliability and validity of the findings.

5.2 Study Area

The study was conducted at Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, Tamil Nadu, India. BHEL Tiruchirappalli is one of the largest manufacturing units of BHEL and plays a significant role in the production of boilers, pressure vessels, heat exchangers, and other engineering products used in power generation and industrial applications. The organization employs a diverse workforce consisting of engineers, supervisors, technicians, administrative personnel, and operational staff, making it an appropriate setting for examining training effectiveness and employee performance.

5.3 Population of the Study

The target population comprised permanent employees working in various departments of BHEL Tiruchirappalli, including production, quality control, engineering, maintenance, human resource management, administration, procurement, and support services. These employees regularly participate in organizational training and development programs and therefore possess adequate experience to evaluate the effectiveness of training initiatives and their impact on workplace performance.

5.4 Sample Size and Sampling Technique

A sample of 350 employees was selected for the study. The sample size was considered adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), which requires sufficient observations to estimate structural relationships and interaction effects reliably.

A stratified random sampling technique was employed to ensure proportional representation of employees from different functional departments. This approach improves the representativeness of the sample and reduces potential sampling bias. Employees were selected from multiple organizational levels to capture diverse perspectives regarding training experiences, competency development, organizational support, and performance outcomes.

5.5 Sources of Data

The study utilized both primary and secondary sources of data.

Primary Data

Primary data were collected directly from employees of BHEL Tiruchirappalli using a structured questionnaire. The questionnaire was designed to capture respondents' perceptions regarding training programs, employee competence, organizational support, and employee performance.

Secondary Data

Secondary information was obtained from academic journals, books, conference proceedings, organizational reports, training manuals, and published research studies related to employee training, competence development, organizational support, and performance management. These sources were used to establish the theoretical foundation of the study and support hypothesis development.

5.6 Instrument Development

A structured questionnaire was developed based on validated measurement scales reported in prior literature. The questionnaire consisted of two sections.

The first section collected demographic information such as age, gender, educational qualification, job designation, department, and work experience.

The second section measured the study constructs using multiple-item scales adapted from established research.

All construct items were measured using a five-point Likert scale ranging from:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

The use of a five-point Likert scale improves response consistency and facilitates statistical analysis of latent variables.

5.7 Measurement of Variables

Training Programs (TP)

Training Programs were measured using items assessing employees' perceptions regarding the quality, relevance, effectiveness, and usefulness of organizational training initiatives. The measurement focused on training design, knowledge acquisition, skill development, and applicability of learning outcomes to workplace tasks.

Employee Competence (EC)

Employee Competence was measured through indicators reflecting employees' knowledge, technical expertise, professional skills, problem-solving ability, and capability to perform assigned responsibilities effectively.

Organizational Support (OS)

Organizational Support was assessed using items examining employees' perceptions regarding managerial support, resource availability, recognition, developmental opportunities, and organizational concern for employee well-being.

Employee Performance (EP)

Employee Performance was measured using indicators related to work quality, productivity, efficiency, achievement of work objectives, and overall job effectiveness.

5.8 Pilot Study

Prior to the main survey, a pilot study was conducted among 30 employees to assess the clarity, reliability, and relevance of questionnaire items. Feedback obtained from participants was used to refine item wording and improve questionnaire structure.

The pilot results indicated satisfactory reliability levels for all constructs, confirming the suitability of the instrument for large-scale data collection.

5.9 Data Collection Procedure

Data collection was carried out through direct distribution of questionnaires to employees across various departments of BHEL Tiruchirappalli. Participants were informed about the academic purpose of the study and assured that their responses would remain confidential and anonymous.

Participation in the survey was voluntary. Respondents were requested to complete the questionnaire independently and return it within the specified period. Completed questionnaires were screened for completeness before being included in the final analysis.

5.10 Common Method Bias Assessment

Since data for all constructs were collected using a single survey instrument, potential common method bias was assessed. Procedural remedies were implemented during questionnaire design, including respondent anonymity, clear item wording, and separation of construct measurements.

Additionally, Harman's single-factor test was performed to evaluate the extent of common method variance. The results indicated that no single factor accounted for the majority of variance, suggesting that common method bias did not pose a significant threat to the validity of the study findings.

5.11 Data Analysis Techniques

- The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) and SmartPLS software.
- The analysis was conducted in two stages.
- Measurement Model Assessment
- The measurement model was evaluated using:
 - Indicator Reliability
 - Internal Consistency Reliability (Cronbach’s Alpha and Composite Reliability)
 - Convergent Validity using Average Variance Extracted (AVE)
 - Discriminant Validity using the Fornell–Larcker Criterion
 - Heterotrait–Monotrait Ratio (HTMT)
- The recommended threshold values suggested by Hair et al. (2022) were used to assess construct validity and reliability.
- Structural Model Assessment
- The structural model was evaluated using:
 - Path Coefficients (β)
 - Bootstrapping Procedure
 - t-values
 - p-values
 - Coefficient of Determination (R^2)
 - Effect Size (f^2)
 - Predictive Relevance (Q^2)

The mediation effect of Employee Competence was assessed through indirect effect analysis, while the moderating effect of Organizational Support was examined using interaction-term analysis. Furthermore, moderated mediation was evaluated using conditional indirect effect analysis following the procedures recommended by Hayes (2022) and Preacher et al. (2007).

5.12 Ethical Considerations

The study adhered to accepted ethical research standards. Participation was voluntary, and respondents were informed about the purpose of the research before completing the questionnaire. Confidentiality and anonymity of responses were maintained throughout the study. Data were used exclusively for academic purposes and were reported only in aggregate form to protect participant privacy.

This section described the methodological procedures adopted for examining the relationship between training programs and employee performance at BHEL Tiruchirappalli. The study employed a quantitative cross-sectional design and collected data from 350 employees using a structured questionnaire. The proposed moderated mediation model was tested using PLS-SEM techniques to evaluate direct, indirect, moderating, and conditional indirect effects among the study variables.

DATA ANALYSIS AND RESULTS

6.1 Respondent Profile

Data were collected from 350 employees working in various functional departments of Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli. The respondents represented production, engineering, quality control, maintenance, administration, and support divisions. The demographic profile indicated adequate representation across age groups, educational qualifications, organizational tenure, and job categories, ensuring the suitability of the sample for examining training effectiveness within a large public-sector manufacturing environment.

The sample consisted of employees possessing substantial organizational experience and direct exposure to training and development programs conducted by the organization. Such representation provided a comprehensive understanding of employee perceptions regarding training programs, competence development, organizational support, and performance outcomes.

6.2 Assessment of the Measurement Model

The measurement model was evaluated using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity in accordance with recommended PLS-SEM procedures (Hair et al., 2022).

6.2.1 Indicator Reliability

Indicator reliability was assessed through outer factor loadings. All measurement items exhibited loadings exceeding the recommended threshold of 0.70, indicating satisfactory item reliability.

Table 6.1 Outer Loadings of Measurement Items

Construct	Item	Loading
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Training Programs	TP1	0.846
	TP2	0.873
	TP3	0.825
	TP4	0.857
Employee Competence	EC1	0.882
	EC2	0.864
	EC3	0.846
	EC4	0.891
Organizational Support	OS1	0.838
	OS2	0.871
	OS3	0.854
	OS4	0.879
Employee Performance	EP1	0.892
	EP2	0.875
	EP3	0.851
	EP4	0.886

All indicators exceeded the minimum acceptable loading criterion, confirming adequate indicator reliability.

6.3 Internal Consistency Reliability and Convergent Validity

Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) were examined.

Table 6.2 Reliability and Convergent Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability	AVE
Training Programs	0.882	0.919	0.739
Employee Competence	0.897	0.928	0.763
Organizational Support	0.884	0.920	0.742
Employee Performance	0.901	0.931	0.772

The results indicate satisfactory reliability because all Cronbach's Alpha and Composite Reliability values exceed 0.70. Furthermore, AVE values are greater than 0.50, confirming convergent validity.

6.4 Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion.

Table 6.3 Fornell-Larcker Criterion

Construct	TP	EC	OS	EP
Training Programs (TP)	0.860			
Employee Competence (EC)	0.654	0.873		
Organizational Support (OS)	0.548	0.621	0.861	
Employee Performance (EP)	0.592	0.708	0.574	0.879

The square root of AVE for each construct exceeds its correlations with other constructs, thereby confirming discriminant validity.

Note: Diagonal elements (bold) represent the square root of AVE, while off-diagonal elements represent inter-construct correlations. Discriminant validity is established when the square root of AVE for each construct is greater than its correlations with all other constructs.

6.5 Structural Model Assessment

After establishing measurement model adequacy, the structural model was evaluated using bootstrapping with 5,000 resamples.

Collinearity Assessment

Variance Inflation Factor (VIF) values ranged between 1.34 and 2.81, indicating the absence of multicollinearity issues.

6.6 Coefficient of Determination (R^2)

Table 6.4 Coefficient of Determination

Endogenous Variable	R^2
Employee Competence	0.512
Employee Performance	0.648

Training Programs and Organizational Support jointly explained 51.2% of the variance in Employee Competence. Similarly,

SHEELA B, *et, al*; Training Effectiveness and Employee Performance in Public Sector Manufacturing: A Moderated Mediation Analysis of Employee Competence and Organizational Support at Bhel Tiruchirappalli. *Canadian Journal of Marketing Research*; Vol-16, Iss- 2 (April-June- 2026): 662-679

Training Programs and Employee Competence explained 64.8% of the variance in Employee Performance, indicating substantial explanatory power.

6.7 Hypothesis Testing

Table 6.5 Direct Effects and Hypothesis Testing Results

Hypothesis	Path	β	t-value	p-value	Result
H1	TP $\rightarrow$ EP	0.271	4.983	<0.001	Supported
H2	TP $\rightarrow$ EC	0.587	11.624	<0.001	Supported
H3	EC $\rightarrow$ EP	0.534	9.716	<0.001	Supported

The findings demonstrate that training programs significantly improve employee competence and employee performance. Furthermore, employee competence exerts a strong positive influence on employee performance.

6.8 Mediation Analysis

The mediating role of employee competence was examined through bootstrapping procedures.

Table 6.6 Mediation Analysis

Hypothesis	Indirect Effect	β	t-value	p-value	Result
H4	TP $\rightarrow$ EC $\rightarrow$ EP	0.313	7.851	<0.001	Supported

The indirect effect is statistically significant, confirming that employee competence mediates the relationship between training programs and employee performance.

The results suggest that training programs enhance employee performance primarily through the development of competencies, including knowledge acquisition, technical skills, and professional capabilities.

6.9 Moderation Analysis

The moderating effect of organizational support on the relationship between training programs and employee competence was examined through the interaction term (TP $\times$ OS).

Table 6.7 Moderation Analysis

Hypothesis	Path	β	t-value	p-value	Result
H5	TP $\times$ OS $\rightarrow$ EC	0.214	4.427	<0.001	Supported

The interaction effect is significant, indicating that organizational support strengthens the positive relationship between training programs and employee competence.

Employees who perceive higher organizational support derive greater competency benefits from training initiatives compared to employees experiencing lower levels of support.

6.10 Moderated Mediation Analysis

The conditional indirect effect of training programs on employee performance through employee competence was examined at different levels of organizational support.

Table 6.8 Conditional Indirect Effects

Organizational Support Level	Indirect Effect	Boot LLCI	Boot ULCI
Low (-1 SD)	0.214	0.143	0.302
Mean	0.313	0.241	0.398
High (+1 SD)	0.427	0.332	0.538

The conditional indirect effects increase as organizational support increases, indicating the presence of moderated mediation.

Table 6.9 Moderated Mediation Test

Hypothesis	Index of Moderated Mediation	Boot LLCI	Boot ULCI	Result
H6	0.114	0.053	0.186	Supported

Since the confidence interval does not include zero, the moderated mediation effect is statistically significant.

The results confirm that the indirect influence of training programs on employee performance through employee competence becomes substantially stronger when employees perceive higher levels of organizational support.

6.11 Summary of Hypothesis Results

Table 6.10 Summary of Hypothesis Testing

Hypothesis	Relationship	Result
H1	Training Programs $\rightarrow$ Employee Performance	Supported
H2	Training Programs $\rightarrow$ Employee Competence	Supported

H3	Employee Competence → Employee Performance	Supported
H4	Training Programs → Employee Competence → Employee Performance	Supported
H5	Organizational Support × Training Programs → Employee Competence	Supported
H6	Conditional indirect effect of Training Programs on Employee Performance through Employee Competence under Organizational Support	Supported

Discussion of Findings

The empirical findings demonstrate that training programs significantly improve employee competence and employee performance within BHEL Tiruchirappalli. Consistent with Human Capital Theory, employees who participate in structured training initiatives acquire valuable knowledge and skills that contribute to improved workplace effectiveness. The results further reveal that employee competence functions as a critical explanatory mechanism linking training investments to performance outcomes.

The study also confirms the importance of organizational support in enhancing training effectiveness. Employees who perceive stronger organizational encouragement, resource availability, and developmental support are more capable of transforming training experiences into practical competencies. Consequently, the indirect effect of training on performance becomes substantially stronger under conditions of high organizational support.

Overall, the findings support the proposed moderated mediation framework and provide empirical evidence that training effectiveness depends not only on the quality of training interventions but also on competence development and supportive organizational conditions. This highlights the importance of integrating employee development initiatives with broader organizational support systems to maximize workforce performance and organizational effectiveness.

CONCLUSION AND IMPLICATIONS

7.1 Conclusion

The objective of this study was to investigate the impact of training programs on employee performance among employees of Bharat Heavy Electricals Limited (BHEL), Tiruchirappalli, by examining the mediating role of employee competence and the moderating influence of organizational support. Grounded in Human Capital Theory, Training Transfer Theory, and Organizational Support Theory, the study developed and empirically tested a moderated mediation model using Partial Least Squares Structural Equation Modeling (PLS-SEM).

The findings indicate that training programs constitute a significant organizational mechanism for enhancing workforce effectiveness. Employees who participate in structured and relevant training initiatives demonstrate higher levels of competence and improved job performance. The results confirm that training interventions contribute not only to direct performance improvements but also to the development of professional capabilities that enable employees to perform their responsibilities more effectively.

The study further establishes that employee competence acts as a crucial explanatory mechanism linking training initiatives with performance outcomes. The acquisition of technical knowledge, problem-solving skills, operational expertise, and job-related capabilities enables employees to translate learning experiences into superior workplace performance. This finding highlights the strategic importance of competency development as an essential outcome of employee training investments. In addition, the analysis reveals that organizational support significantly strengthens the effectiveness of training initiatives. Employees who perceive greater managerial encouragement, resource availability, recognition, and developmental support are better positioned to utilize and apply the competencies acquired through training programs. Consequently, the indirect influence of training programs on employee performance through employee competence becomes considerably stronger when organizational support is high.

Overall, the study demonstrates that training effectiveness is not solely dependent on the quality of training interventions but also on the organizational conditions that facilitate learning transfer and competency development. The integrated moderated mediation framework provides a comprehensive explanation of how training programs generate employee performance improvements and identifies organizational support as a critical contextual factor that enhances the return on training investments.

7.2 Theoretical Implications

This study contributes to the existing body of knowledge in human resource management, organizational behavior, and employee development literature in several significant ways.

First, the study advances Human Capital Theory by providing empirical evidence that employee competence serves as a central mechanism through which training investments generate performance outcomes. The findings reinforce the proposition that organizational investments in employee development create value by enhancing workforce capabilities that

Second, the study extends Training Transfer Theory by demonstrating that competency development represents a critical pathway linking training interventions to workplace performance. The results support the view that effective training outcomes are achieved when acquired knowledge and skills are successfully transformed into practical competencies that can be applied in organizational settings.

Third, the research enriches Organizational Support Theory by identifying organizational support as a contextual condition that strengthens the competency-building effects of training programs. The findings indicate that employees are more likely to maximize the benefits of training when they perceive supportive organizational environments that encourage learning and development.

Fourth, the study contributes methodologically by integrating mediation and moderation perspectives within a single conditional process framework. The examination of moderated mediation provides a deeper understanding of the complex mechanisms and contextual conditions that influence training effectiveness. This integrated perspective offers a more comprehensive explanation of employee development processes than traditional direct-effect models.

Finally, the study contributes to the limited empirical literature concerning workforce development in public-sector manufacturing organizations within emerging economies. By focusing on BHEL Tiruchirappalli, the research expands current understanding of training effectiveness in large industrial organizations operating in technologically intensive environments.

7.3 Practical Implications

The findings provide several important implications for organizational leaders, human resource practitioners, and policymakers responsible for workforce development initiatives.

Organizations should regard training programs as strategic investments that contribute directly to organizational productivity and long-term competitiveness. Training activities should be systematically aligned with organizational goals, technological requirements, and competency development needs to maximize their effectiveness.

Human resource managers should place greater emphasis on competency-based training design. Training interventions should focus not only on knowledge dissemination but also on the development of practical skills, technical expertise, and behavioral competencies that can be effectively applied in workplace situations.

The findings further suggest that organizations should strengthen mechanisms that facilitate learning transfer. Post-training support activities such as coaching, mentoring, performance feedback, and continuous learning opportunities can enhance the application of acquired competencies and improve performance outcomes.

Management should actively cultivate supportive organizational environments that encourage employee learning and development. Supportive practices including supervisory encouragement, recognition systems, resource availability, and career development opportunities can significantly enhance the effectiveness of training initiatives.

For public-sector manufacturing organizations such as BHEL, workforce development strategies should integrate training programs with broader organizational support systems. Such integration can improve employee capability development, strengthen operational efficiency, and contribute to sustained organizational performance.

Furthermore, policymakers responsible for industrial workforce development may utilize the findings to design employee development frameworks that emphasize both competency enhancement and organizational support mechanisms as complementary drivers of workforce productivity.

LIMITATIONS OF THE STUDY

Although the study provides valuable insights into the relationship between training programs and employee performance, several limitations should be acknowledged when interpreting the findings.

First, the study employed a cross-sectional research design in which data were collected at a single point in time. Consequently, the analysis captures relationships among variables but does not allow definitive conclusions regarding causality or changes over time.

Second, the research was conducted within a single public-sector manufacturing organization, namely BHEL Tiruchirappalli. While the organization represents an important industrial context, the findings may not be fully generalizable to private-sector organizations, service industries, or organizations operating in different geographical and

Third, the study relied primarily on self-reported survey responses obtained from employees. Although appropriate procedural and statistical measures were implemented to minimize common method bias, self-reported data may still be influenced by social desirability, perceptual bias, or respondent subjectivity.

Fourth, the study focused exclusively on employee competence as a mediating variable and organizational support as a moderating variable. Other potentially influential mechanisms and contextual factors were not included within the proposed framework.

Fifth, organizational performance is influenced by numerous individual, managerial, and environmental factors that extend beyond the scope of the present investigation. Therefore, the explanatory power of the model should be interpreted within the boundaries of the selected constructs.

Finally, differences in organizational culture, leadership practices, technological infrastructure, and workforce characteristics across industries may influence the applicability of the findings in alternative organizational settings.

DIRECTIONS FOR FUTURE RESEARCH

The present study opens several promising avenues for future investigation.

Future researchers may employ longitudinal research designs to examine how training programs influence employee competence and performance over extended periods. Such studies would provide stronger evidence regarding causal relationships and the sustainability of training outcomes.

Additional mediating variables may be incorporated into future models to provide a more comprehensive understanding of training effectiveness. Constructs such as learning transfer, employee engagement, job satisfaction, psychological empowerment, organizational commitment, and motivation to learn may offer valuable insights into the mechanisms through which training generates performance improvements.

Future studies may also explore alternative moderating factors that influence training effectiveness. Variables such as leadership support, organizational culture, learning climate, technological readiness, innovation orientation, and employee adaptability may serve as important contextual conditions affecting competency development and performance outcomes. Comparative investigations involving public-sector and private-sector organizations may help identify sector-specific determinants of training effectiveness and provide broader insights into workforce development practices across organizational contexts.

Researchers may further conduct multi-industry studies involving manufacturing, service, healthcare, information technology, and educational sectors to enhance the external validity and generalizability of findings.

Future studies may also examine demographic influences such as age, experience, educational background, and job level as potential moderators of training outcomes. Such analyses could help organizations develop more targeted and customized training strategies.

Finally, mixed-method research approaches combining quantitative analysis with qualitative interviews, focus groups, or case studies may provide richer insights into the processes through which employees acquire competencies, transfer learning, and achieve performance improvements within organizational environments.

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