

Workforce Safety Practices and Employee Performance in Textile Manufacturing: Evidence from a Cotton Spinning Unit in Coimbatore, India

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ABSTRACT

Background: Workplace safety is a crucial factor in determining employee well-being and organizational success in the textile manufacturing industry due to occupational dangers such as cotton dust, mechanical injury risk, noise exposure, and ergonomic strain. Empirical data on the safety-performance link at the departmental level in Indian private-sector textile operations is still lacking, despite increased regulatory awareness.

Objectives

In five production divisions of a cotton spinning facility in Coimbatore, Tamil Nadu, this study looks at the current state of workforce safety procedures and how they relate to worker performance.

Methods

A constructed 22-item Likert-scale questionnaire (Cronbach's $\alpha = 0.956$, excellent internal consistency) was used to give a descriptive, cross-sectional survey to $N = 147$ personnel in the departments of spinning, weaving, dying, processing, and quality control. Descriptive statistics using composite performance measures, one-way ANOVA with eta-squared (η^2) effect sizes, Pearson Chi-Square with Cramér's V , simple linear regression, and Pearson correlation were all included in the statistical study.

Findings

A major safety-performance gap was confirmed by the Safety Practices Composite Index (SPCI) = 72.2% and Employee Performance Composite Index (EPCI) = 72.1%, both above the adequate-performance threshold of 65%. However, raw mean scores (2.03–2.21 on a 1–5 scale) reveal that employee perceptions of safety and performance remain below moderate, indicating a discrepancy between formal policy and felt experience. Training frequency ($p = 0.004$), budget allocation ($p = 0.011$), and equipment maintenance ($p = 0.021$) were the main drivers of the substantial inter-departmental differences in safety practices ($F(4, 142) = 3.482$, $p = 0.010$, $\eta^2 = 0.089$, medium effect) found by one-way ANOVA. Chi-Square analysis revealed a significant correlation between work experience and safety training attendance ($\chi^2 = 31.805$, $p = 0.001$, $V = 0.269$, medium effect) and between department and PPE usage frequency ($\chi^2 = 39.840$, $p < 0.001$, $V = 0.260$, medium effect). Employee performance and safety practices were found to be strongly positively correlated by Pearson correlation ($r = 0.758$, $p < 0.001$, $R^2 = 0.575$), meaning that safety practices account for 57.5% of the variance in employee performance. Safety practices were found to be a strong statistical predictor of performance in

this cross-sectional sample, explaining 57.5% of the variance. While predictive, this does not establish causality. using simple linear regression ($\beta = 0.758$, $F = 195.83$, $p < 0.001$).

Conclusions: In Indian cotton textile production, Workplace safety procedures are a strong and statistically significant predictor of employee performance within this organizational context. While the findings highlight the importance of standardized SOPs, refresher training, and equitable resource allocation, further multi-organizational studies with objective indicators are needed to confirm generalizability. Standardized safety SOPs, required periodic refresher training, fair budget allocation, and safety-integrated performance evaluations are all strongly supported by the major performance gaps identified by composite indices, as well as the high correlation and regression evidence.

Keywords: Workforce safety practices; employee performance; PPE compliance; textile manufacturing; ANOVA; Cramér's V; regression; composite performance index; Coimbatore; India.

INTRODUCTION

One of the most important management goals in labour-intensive manufacturing sectors worldwide is occupational health and safety. Employees in the textile industry are constantly exposed to a complex array of occupational hazards, including chemical dye exposure during finishing processes, high-speed machinery that increases the risk of mechanical injuries, cotton dust that causes byssinosis, and ergonomic strain from repetitive tasks (Medeni et al., 2025; Ghorri et al., 2025). When these risks are not well controlled, they have a direct negative impact on organizational performance and employee well-being, leading to more absenteeism, poorer productivity, worse-quality output, and higher turnover (Maduranga & Harshani, 2024; Awais-E-Yazdan & Birau, 2025).

With about 45 million direct workers and almost 60 million more in related industries, India's textile sector is the nation's second-largest employer. The "Manchester of South India," Coimbatore, Tamil Nadu, is home to hundreds of spinning, weaving, and processing facilities and serves as one of the country's most important centres for textile production. Even with progressive legislative frameworks like the Occupational Safety, Health and Working Conditions Code (2020) and the Factories Act (1948), many private-sector textile companies still struggle to maintain employee engagement in safety programs, ensure consistent safety compliance, and distribute safety resources fairly. This study's practical driving background is the discrepancy between policy intent and floor-level implementation.

Theoretically, the relationship between workplace safety and employee performance is based on Herzberg's Two-Factor Theory, which views safety as a hygiene factor whose presence maintains the motivational conditions for performance and whose absence causes dissatisfaction, and Maslow's Hierarchy of Needs, where safety is a prerequisite for higher-order motivation (Sharma & Gupta, 2023). Effective safety procedures greatly increase productivity, lower absenteeism, and improve job satisfaction, according to an increasing amount of empirical data from international textile and industrial contexts (Maduranga & Harshani, 2024; Bira, Zanabazar & Purev, 2025; Hasan, Ali & Noor, 2024). However, the majority of current research concentrates on large-scale or export-oriented manufacturing facilities; private-sector cotton textile businesses in Tier-2 Indian cities are still empirically underrepresented.

This study makes three distinct contributions to close that gap. First, it uses one-way ANOVA to empirically examine safety practice variance at the department level inside a single cotton spinning unit, a level of detail lacking in the majority of previous Indian textile safety studies. In order to convert frequency-level survey data into a single, benchmarkable organizational diagnosis, it also provides composite performance indices (Safety Practices Composite Index and Employee Performance Composite Index). Third, it enhances the usual toolset with Cramér's V effect sizes, eta-squared, and simple linear regression, allowing for practical magnitude assessment of the safety-performance relationship as well as statistical significance. The study's objectives are to: (i) evaluate current workforce safety practices across five departments; (ii) investigate inter-departmental safety practice variation with effect sizes; (iii) use Chi-Square with Cramér's V to test associations between demographic variables and safety behaviour; and (iv) use regression analysis and correlation to quantify the predictive relationship between safety practices and employee performance.

REVIEW OF LITERATURE

Occupational Safety and Employee Performance: Global Evidence

There is strong evidence in industrial and labour-intensive industries that occupational safety and employee performance are related. According to Maduranga and Harshani's (2024) study of operational-level workers in Sri Lanka's apparel industry, which was published in the *Kelaniya Journal of Human Resource Management*, safe and healthy working conditions have a positive and significant impact on workers' job performance, with workers' personal safety valuation acting as a crucial mediating mechanism. The current study's use of regression analysis to examine the predicted association between safety behaviours and performance is directly motivated by this conclusion. According to Foncubierta-Rodríguez et al. (2024), inadequate safety conditions lead to stress and absenteeism, which directly reduce productivity, while occupational health and safety standards enhance employee engagement and job performance. In their analysis of manufacturing companies, Yamoah and Nsowah (2023) discovered that management and staff dedication to safety procedures results in better safety outcomes and increased productivity, with safety culture and ongoing safety activities lowering workplace occurrences.

Occupational health and safety measures increase employee awareness, which in turn mediates the relationship between safety practices and performance, as Joshua, Mutegi, and Maina (2023) showed. The conceptual framework of the current study, which incorporates awareness and compliance as a mediating construct between safety practices and performance, is directly related to their discovery that awareness fully mediates the safety-performance link. This evidence was extended to HR management systems by Deng, Turner, Granger, Grocutt, and Mantel (2026), who used ethnographic data to show how manager support, employee empowerment, and participatory decision-making lead to better work performance and greater safety behaviours.

Safety Practices in the Textile Industry: Sector-Specific Evidence

The unique occupational risk profile of textile manufacturing necessitates sector-specific study. Awais-E-Yazdan and Birau (2025) looked at how management practices affected worker safety performance in Pakistan's textile sector and discovered that safety outcomes are positively impacted by management commitment, safety training, and employee promotion, with safety knowledge and motivation playing crucial roles. Crucially, their study confirmed the applicability of survey-based approaches for textile safety research by using SmartPLS and SPSS on 165 managerial staff replies. In cross-sectional research on Turkish textile workers published in *Workplace Health & Safety*, Medeni et al. (2025) discovered that long work hours and a lack of personal protective equipment (PPE) increase the health risks associated with occupational hazards such as chemicals, noise, and dust. In order to improve employee performance, their findings highlight the importance of increasing safety awareness, training, and compliance.

According to Ghori et al. (2025), textile workers are exposed to dust, chemicals, and noise, all of which have a detrimental impact on their health and productivity. Appropriate safety training and ongoing education also improve PPE usage and boost performance. Using a qualitative investigation of Pakistan's textile industries, Kiani (2025) found that inadequate reporting methods, a lack of safety education, and a lack of access to healthcare were the main obstacles. Fear of reporting events and inadequate training also affected employee morale and decreased safety compliance. Özbakır (2023) carried out a risk assessment in a Turkish textile workshop and discovered that ergonomics, emergency response, and workplace hygiene were high-risk areas, with neglected safety procedures leading to higher risks and decreased production.

PPE Compliance and Safety Training as Performance Drivers

It has been independently determined that compliance with personal protective equipment and safety training are important channels through which safety practices affect performance. According to research by Rani and Prakash (2022), skilled workers adhere to safety protocols more successfully, have fewer workplace mishaps, and have greater confidence while managing equipment and emergencies. Regular safety awareness programs lower workplace accidents and increase employee productivity, according to Priya and Kumar's (2022)

research, with management support and safety communication having a beneficial impact on safety behaviour. Particularly in the apparel industry, Rajesh and Suresh (2024) verified that appropriate safety gear, emergency readiness, and safety training boost worker confidence and productivity, with workers in secure settings exhibiting reduced absenteeism and increased output.

The current study's conclusion that work experience has a significant impact on training attendance (Chi-Square: $p = 0.001$) is in line with earlier research that documented experience-based complacency. Kavin and Arul (2021) found that workers exposed to occupational hazards experience fatigue and stress that impair their ability to perform effectively, and they recommended appropriate ventilation, medical facilities, and routine health check-ups. According to Deepa and Manikandan (2021), appropriate safety supervision and training lower workplace injuries and increase productivity, especially when paired with frequent safety audits and awareness campaigns.

Departmental and Demographic Variation in Safety Compliance

One aspect of Indian textile safety research that has received little attention is departmental heterogeneity in safety measures and compliance. In their study of industrial organizations, Sharma and Gupta (2023) discovered that hazardous working conditions have a detrimental effect on workers' health, morale, and productivity. The impact is not evenly distributed across departments; departments with less supervisory density and greater exposure to machinery typically exhibit lower compliance. In a qualitative study of industrial organizations in Telangana, Majumdar et al. (2022) discovered that while effective safety policies enhance worker comfort, productivity, and health, their efficacy varies greatly depending on departmental working conditions and available resources.

According to Mhina (2023), safe equipment, adequate ventilation, and comfortable working conditions increase worker productivity and lower stress levels, while management support and safety communication have a positive impact on motivation. This suggests that departmental differences in supervisory culture account for some of the PPE compliance variations found in the current study. The gender makeup of the current study's sample, which is 51.7% female, is also noteworthy. According to Babel and Sharma (2022), textile workers are exposed to a variety of risks, such as dust, chemicals, and noise, and gender-differentiated exposure patterns should be taken into consideration because female workers may encounter different ergonomic and chemical risk profiles in textile production environments.

Research Gap

The present study is motivated by three unique inadequacies in the Indian textile setting, despite the fact that the worldwide literature repeatedly demonstrates that workplace safety policies favourably enhance employee performance. First, the majority of Indian textile safety studies treat workers as a homogeneous group and do not use inferential tests with effect sizes to look at inter-departmental differences in safety performance or practices. Second, unlike large export-oriented plants, the quantitative relationship between safety procedures and performance in private-sector cotton textile units has not been demonstrated using regression-based analysis. Third, it is impossible to evaluate the practical relevance of stated associations because the majority of research declare statistical significance without providing practical impact sizes (Cramér's V , eta-squared, R^2). Regression-based prediction, composite performance metrics, and department-level ANOVA with effect sizes are used in this study to fill all three deficiencies.

RESEARCH METHODOLOGY

Research Design and Setting

The present state of workforce safety procedures and their connection to worker performance in a cotton textile manufacturing facility in Coimbatore, Tamil Nadu (henceforth referred to as "the study firm") was investigated in this study using a descriptive, cross-sectional research approach. Founded in the 1990s, the company employs people in five production departments—Spinning, Weaving, Dyeing, Processing, and Quality Control—and runs constantly in three shifts (morning, evening, and night). Examining departmental

variation in safety practices and their effects on performance is theoretically appropriate given the manufacturing context, which includes high-speed machinery, continuous exposure to cotton dust, chemical processing, and ergonomic strain across departments with materially different risk profiles.

Population, Sampling, and Sample

The research firm's 312 permanent employees from all five departments make up the target population. Using simple random sampling, a sample of $N = 147$ respondents was chosen, meeting the 95% confidence level and $\pm 5\%$ margin of error requirements for this population size. The sample reflects the normal demographic profile of a labour-intensive textile plant in South India. It is gender-balanced (48.3% male, 51.7% female), primarily young (50.3% under 25 years), and concentrated in the less-than-one-year experience group (44.2%).

Instrument and Measurement

A structured questionnaire with 22 items divided into four sections—Demographic Details (4 items), Safety Practices (6 items, Likert 1–5 scale: Strongly Agree to Strongly Disagree), Awareness and Compliance (6 items, combined Likert and frequency-based response formats), and Employee Performance (6 items, combined Likert and frequency-based response formats)—was used to gather primary data. Cronbach's alpha ($\alpha = 0.956$) was used to evaluate the internal consistency of the 18 construct items, indicating good reliability considerably above the 0.70 criterion. Peer-reviewed literature, safety audit reports, and corporate records were the sources of secondary data.

Statistical Tools and Analytical Rationale

Using SPSS 26, the following statistical tools were used. The Safety Practices Composite Index (SPCI) and Employee Performance Composite Index (EPCI), each normalized to a 0–1 scale to facilitate organizational benchmarking, were calculated using descriptive statistics and composite performance indices to describe variable-level distributions. The measurement tool was confirmed by reliability analysis using Cronbach's alpha. Eta-squared (η^2) effect sizes (small: 0.01–0.06; medium: 0.06–0.14; large: ≥ 0.14) were calculated to measure practical magnitude in a one-way ANOVA test of interdepartmental variations in safety procedures. Cramér's V effect sizes (small: < 0.10 ; medium: 0.11–0.30; large: > 0.31) were added to Pearson Chi-Square tests to investigate categorical connections. The bivariate connection between composite safety practices and performance scores was measured using Pearson correlation. By producing standardized β , R^2 , and F-statistics, simple linear regression explicitly validated safety behaviours as a predictor of employee performance.

DATA ANALYSIS AND RESULTS

Demographic Profile

The demographic makeup of the 147 respondents is shown in Table 1. In line with the high turnover and new-entrant pattern typical of South Indian textile SMEs, the staff is young (50.3% under 25 years old) and primarily inexperienced (44.2% less than one year, 74.2% less than three years). With 48.3% of men and 51.7% of women, the gender distribution is almost equal. The largest group by department is spinning (29.3%), followed by weaving and dying (19.0% each).

Table 1. Demographic Profile of Respondents (N = 147)

Variable	Category	n	(%)
Age	Below 25 years	74	50.3
	25–35 years	37	25.2

	36–45 years	30	20.4
	Above 45 years	6	4.1
Gender	Male	71	48.3
	Female	76	51.7
Department	Spinning	43	29.3
	Weaving	28	19.0
	Dyeing	28	19.0
	Processing	23	15.6
	Quality Control	25	17.0
Experience	Less than 1 year	65	44.2
	1–3 years	44	29.9
	4–5 years	25	17.0
	More than 5 years	13	8.8

Note. N = 147. Simple random sampling from the study firm (total population = 312). Processing department n differs from original table (23 vs. 23 corrected from 233 typographical error in source data).

Reliability Analysis

For the 18 construct elements (6 Safety Practices + 6 Awareness/Compliance + 6 Performance), Cronbach's alpha was calculated. The excellent reliability requirement ($\alpha > 0.90$) is satisfied by the alpha value of 0.956, which significantly surpasses the 0.70 threshold. This demonstrates that all 18 questions make up a coherent, internally consistent measuring scale appropriate for inferential analysis and that the instrument consistently assesses the underlying constructs.

Composite Performance Indices

By normalizing each item mean to a 0–1 scale ($(\text{mean} - 1) / (5 - 1)$), where 1 = Strongly Agree (best) and 5 = Strongly Disagree (worst), two composite performance indices were calculated. The results were then reversed for interpretability (1 = best performance, 0 = worst). Item-level means and the corresponding indices are shown in Table 2.

Table 2. Item-Level Descriptive Statistics and Composite Performance Indices

Item	Mean	SD	Index Score	Section
Safety training at least once per year	2.03	1.13	0.742	Safety
PPE (gloves, helmets, masks) always available	2.03	1.15	0.742	Safety
Safety rules clearly displayed at workstations	2.10	1.20	0.725	Safety
Management provides safety equipment budget	2.11	1.16	0.722	Safety

Supervisors regularly check PPE usage	2.21	1.24	0.698	Safety
Safety equipment maintenance is regular	2.19	1.23	0.703	Safety
Safety Practices Composite Index (SPCI)	—	—	0.722 (72.2%)*	—
Productivity: Good safety helps me work faster	2.07	1.12	0.732	Performance
Quality: Feeling safe reduces work mistakes	2.14	1.18	0.715	Performance
Job satisfaction: Safety support helps	2.14	1.17	0.715	Performance
Employee Performance Composite Index (EPCI)	—	—	0.721 (72.1%)*	—

Note. Items scored on 5-point Likert scale (1=Strongly Agree/best to 5=Strongly Disagree/worst). Index = $(5 - \text{mean})/4$, rescaled to 0–1 where 1 = ideal performance. * SPCI and EPCI are averages of their respective items' index scores. A score ≥ 0.65 indicates adequate performance; scores below 0.65 indicate performance gaps requiring intervention. Both SPCI (72.2%) and EPCI (72.1%) are above the 0.65 threshold when means are in the upper range; however, the mean scores of 2.03–2.21 on a 1–5 scale indicate employee-perceived safety is 'below moderate' when compared against the scale midpoint of 3.0.

Careful consideration must be given to the interpretation. The raw mean scores (2.03–2.21 on a 1–5 scale where 1=Strongly Agree) show that employees generally agree with safety practices being in place, despite the normalized index scores appearing relatively high (72%). However, mean scores below 3.0 indicate broad endorsement of the stated practices rather than dissatisfaction. A significant discrepancy between formal policy and felt experience is revealed by cross-referencing the neutral and disagreement response proportions (19–24.5% neutral; 8–17.7% disagree/strongly disagree). This confirms that about 25% of the workforce has neutral or negative perceptions of safety implementation quality.

One-Way ANOVA: Departmental Differences in Safety Practices

H₀: There is no significant difference among departments regarding workplace safety practices.

H₁: There is a significant difference among departments regarding workplace safety practices.

Table 3. One-Way ANOVA — Departmental Differences in Safety Practices (N = 147)

Source	SS	df	MS	F	p	Effect Size
Between Groups (Departments)	14.479	4	3.620	3.482	0.010*	$\eta^2=0.089$ (medium)
Within Groups	147.641	142	1.040			$\omega^2=0.063$
Total	162.120	146				

Note. * $p < 0.05$. $\eta^2 = SS_{\text{between}}/SS_{\text{total}} = 14.479/162.120 = 0.089$; medium effect (0.06–0.14). $\omega^2 = (SS_{\text{between}} - df_{\text{between}} \times MS_{\text{within}})/(SS_{\text{total}} + MS_{\text{within}}) = 0.063$ (less biased estimate). Confidence interval: 95%.

The ANOVA result, $F(4, 142) = 3.482$, $p = 0.010$, is statistically significant. The null hypothesis is disproved since there are notable variations in safety procedures between departments. The departmental differences are both statistically significant and practically noteworthy, as evidenced by the medium practical effect indicated by the eta-squared effect size of $\eta^2 = 0.089$ (8.9% of total variance).

The medium effect classification is supported by the adjusted omega-squared estimate ($\omega^2 = 0.063$). The frequency of safety training ($p = 0.004$), management budget allocation for safety equipment ($p = 0.011$), and routine maintenance of safety equipment ($p = 0.021$) were the statistically significant factors influencing the total ANOVA result, according to post-hoc analysis. PPE availability, safety rule display, and supervisor PPE checks did not differ substantially between departments (all $p > 0.05$), suggesting that while standardized/visible practices are similar, more resource-intensive safety measures are dispersed unevenly (Awais-E-Yazdan & Birau, 2025).

Chi-Square Analysis: Demographic Associations with Safety Behaviour

To investigate relationships between demographic factors and safety-related behaviors, two Chi-Square tests were performed.

H₀: There is no significant association between department and PPE usage frequency.

H₁: There is a significant association between department and PPE usage frequency.

H₀: There is no significant association between work experience and safety training attendance.

H₁: There is a significant association between work experience and safety training attendance.

Table 4. Chi-Square Tests with Cramér's V Effect Sizes (N = 147)

Association	χ^2	df	p	V	Effect Size	Decision
Department × PPE Usage Frequency	39.840	16	<0.001	0.260	Medium	H ₁ accepted
Experience × Safety Training Attendance	31.805	12	0.001	0.269	Medium	H ₁ accepted

Note. Cramér's V = $\sqrt{(\chi^2 / (n \times (\min(r,c)-1)))}$. V interpretation: $V \leq 0.10$ = small; $0.11-0.30$ = medium; ≥ 0.31 = large (Cohen, 1988).

The results of both Chi-Square tests are statistically significant. PPE usage frequency is significantly predicted by department ($\chi^2 = 39.840$, $p < 0.001$, $V = 0.260$, medium effect): workers in high-risk departments (Spinning, Dyeing) exhibit higher PPE compliance than those in relatively lower-risk environments (Quality Control, Processing), which is in line with the exposure-driven compliance pattern reported by Medeni et al. (2025). Work experience is a significant predictor of safety training attendance ($\chi^2 = 31.805$, $p = 0.001$, $V = 0.269$, medium effect). The linear-by-linear association ($p < 0.001$) confirms a monotonic decline in training attendance with increasing experience, with experienced workers exhibiting safety complacency, a risk pattern identified by Kiani (2025) and Ghori et al. (2025).

Pearson Correlation: Safety Practices and Employee Performance

H₀: There is no significant relationship between workplace safety practices and employee performance.

H₁: There is a significant positive relationship between workplace safety practices and employee performance.

Table 5. Pearson Correlation — Safety Practices vs. Employee Performance (N = 147)

Variable Pair	r	p-value	R ²	Effect Size
Safety Practices ↔ Employee Performance	0.758	< 0.001***	0.575	Large ($f^2 = 1.351$)

Note. *** $p < 0.001$. $R^2 = 0.575$: safety practices explain 57.5% of the variance in employee performance. Cohen's $f^2 = R^2/(1-R^2) = 1.351$, a large effect ($f^2 \geq 0.35$). $N = 147$.

Employee performance and safety procedures have a substantial positive link, as indicated by the Pearson correlation of $r = 0.758$ ($p < 0.001$). Safety practices alone explain 57.5% of the variance in employee performance, according to the coefficient of determination $R^2 = 0.575$. This is an exceptionally high explanatory share for a bivariate relationship in organizational behaviour research.

This is categorized as a large effect by Cohen's $f^2 = 1.351$, which significantly surpasses the large-effect criterion of 0.35. The null hypothesis is rejected because there is a strong and significant correlation between employee performance and safety procedures.

Simple Linear Regression: Safety Practices as a Predictor of Performance

To explicitly demonstrate safety behaviours as a predictor of employee performance, simple linear regression was performed (Table 6).

Table 6. Simple Linear Regression — Safety Practices Predicting Employee Performance ($N = 147$)

	R	R²	Adj. R²	F	p
Model Summary	0.758	0.575	0.572	195.83	<0.001***
Predictor	B (unstd.)	Std. Error	β (std.)	t	p
(Constant)	0.512	0.143	—	3.58	0.001**
Safety Practices	0.758	0.054	0.758	13.99	<0.001***

Note. Dependent variable: Employee Performance. ** $p < 0.01$; *** $p < 0.001$. Adjusted $R^2 = 1 - (1-R^2)(N-1)/(N-1-1) = 0.572$. $F(1, 145) = 195.83$, $p < 0.001$. β = standardized regression coefficient (= r for simple regression). The unstandardised and standardised coefficients are equal in value because this is a simple (one-predictor) regression; the standardised $\beta = r = 0.758$.

With $F(1, 145) = 195.83$, $p < 0.001$, $R^2 = 0.575$, and Adjusted $R^2 = 0.572$, the regression model is highly significant. Employee performance is statistically significantly predicted by safety procedures ($\beta = 0.758$, $t = 13.99$, $p < 0.001$). 57.5% of the variation in employee performance can be explained by the model. In line with the findings of Maduranga and Harshani (2024) and Joshua, Mutegi, and Maina (2023), this result explicitly proves that safety behaviours are not only connected with performance but also a statistically robust predictor of it.

Summary of Hypothesis Testing

Table 7. Summary of Hypothesis Testing Results ($N = 147$)

H#	Hypothesis	Test (Statistic)	Outcome
H1	Inter-departmental differences in safety practices	ANOVA $F(4,142)=3.482$	Supported ($p=0.010$, $\eta^2=0.089$)
H2	Department $\times$ PPE usage frequency association	Chi-Square, V	Supported ($p<0.001$, $V=0.260$)
H3	Experience $\times$ Safety training attendance association	Chi-Square, V	Supported ($p=0.001$, $V=0.269$)

H4	Safety practices ↔ Employee performance	Pearson r, R ²	Supported (r=0.758, p<0.001, R ² =0.575)
H5	Safety practices predict employee performance	Linear regression	Supported (β=0.758, F=195.83, p<0.001)

DISCUSSION

The Safety-Performance Relationship: A Dominant and Large Effect

Workplace safety procedures account for 57.5% of the variance in employee performance in this context, according to the Pearson correlation of $r = 0.758$ and regression $R^2 = 0.575$. This remarkably high percentage places safety as management's most potent organizational lever for performance improvement. Cohen's $f^2 = 1.351$ is roughly four times the large effect threshold. This is in line with the findings of Maduranga and Harshani (2024), who discovered that OHS practices have a positive impact on job performance in the apparel manufacturing industry, and Joshua, Mutegi, and Maina (2023), who showed that OHS practices raise employee awareness, which completely mediates the relationship between safety and performance. The practical implication is clear: safety investment is the highest-return performance investment available for this firm, not just one that is required by law or ethics. Employee performance improves by 0.758 units for every unit when safety procedures are improved.

Departmental Inequity: A Medium Effect Warranting Structural Intervention

Department membership accounts for 8.9% of the overall variance in safety practice views, according to the ANOVA result of $\eta^2 = 0.089$ (medium effect). This is a realistically significant level of inequality that surpasses statistical significance. Instead of standardized visible features (PPE availability, signs, supervisor inspections), post-hoc analysis shows that the disparity is centered in resource-intensive safety dimensions (training frequency, budget, equipment maintenance). This pattern is in line with Sharma and Gupta's (2023) observation that departmental supervisory density shapes compliance disparities and Awais-E-Yazdan and Birau's (2025) finding that management commitment drives the difference between high- and low-performing departments in safety outcomes. Priority assistance is required for the Spinning department, which is the largest (29.3%) and most dangerous.

Experience-Based Complacency: A Medium-Effect Safety Risk

The experience-complacency pattern that Kiani (2025) found qualitatively in Pakistani textile workers and that Ghorri et al. (2025) confirmed quantitatively is documented by the Chi-Square finding that work experience significantly predicts safety training attendance ($V = 0.269$, medium effect), with the linear-by-linear association confirming a monotonic decline in training attendance with increasing experience. Because overconfidence in familiar danger conditions is a risk factor for mechanical injury, experienced workers' diminishing training participation is a real safety risk rather than just an attitude issue (Rajesh & Suresh, 2024). The remedial action must be structural, requiring yearly refresher training that is not subject to experience level waivers.

PPE Compliance: Departmentally Driven, Not Individually Driven

The departmental context—the type of job, exposure level, supervisory culture, and peer norms—rather than individual employee characteristics are the primary determinants of PPE usage, as confirmed by the considerable correlation between department and PPE compliance ($V = 0.260$, medium effect). This discovery has a particular managerial implication: Instead than focusing on individual employee behavior modification campaigns, PPE compliance initiatives should be directed at the departmental supervisor level (daily shift briefings, supervisor responsibility). Rather than individual employee carelessness, departments with lower PPE compliance rates probably have a managerial culture that tolerates non-compliance (Deng et al., 2026).

PRACTICAL IMPLICATIONS AND RECOMMENDATIONS

1. To reduce the disparity revealed by ANOVA ($\eta^2 = 0.089$), all five departments should implement a single Safety Standard Operating Procedure (SOP) with department-specific risk modules, standardizing training frequency, budget distribution, and equipment maintenance.
2. The experience-complacency pattern confirmed by Chi-Square ($V = 0.269$) should be directly addressed by mandating quarterly safety refresher training for all experience categories without exception. Training records need to be tracked at the departmental level and connected to HR files.
3. Establish supervisor accountability for PPE compliance by include PPE-related topics in supervisor performance reviews, reviewing PPE compliance scorecards on a monthly basis, and providing daily shift briefings.
4. Through a yearly centralized safety assessment, invest in fair safety equipment budgets across departments, giving priority to the Spinning and Processing departments where budget allocation variations and safety training are most notable.
5. Operationalize the strong safety-performance link ($r = 0.758$, $R^2 = 0.575$) as a management tool instead of an observational result by incorporating safety compliance as a formal Key Performance Indicator (KPI) in employee performance reviews.
6. Create a special safety orientation program for new hires and young workers (50.3% under 25 years, 44.2% under 1 year), utilizing buddy systems to match new hires with seasoned safety mentors to hasten the adoption of safe behaviors.
7. To provide accessibility regardless of literacy level, display safety instructions with color-coded zone markers and graphic guidelines in Tamil, the major language of the workforce.

LIMITATIONS AND FUTURE RESEARCH

It is important to recognize this study's five limitations. First, in order to create industry-level benchmarks, future research should repeat the analysis across several textile units in the Coimbatore cluster, as the single-organization design restricts generalizability. Second, longitudinal studies that follow the same workers before and after safety interventions would establish temporal precedent; nevertheless, the cross-sectional design prevents causal inference. Third, the reliability of Chi-Square tests is decreased when 36–50% of cells have expected counts below 5. To increase cell reliability, future research should either condense answer categories or employ Fisher's Exact Test. Fourth, self-report was used to measure performance; for better construct validity, future research should integrate perceptual data with objective records (such as defect rates, productivity output, accident frequency rates, and absenteeism logs). Fifth, future research should use structural equation modeling (SEM) or PLS-SEM to test the mediation model proposed by Joshua, Mutegi, and Maina (2023), which found that awareness fully mediates the OHS-performance relationship. This study did not formally test the mediating role of awareness/compliance between safety practices and performance.

- The study is limited to a single cotton spinning unit in Coimbatore, restricting generalizability.
- Performance measures are self-reported, which may introduce response bias. Future studies should incorporate objective indicators such as productivity, absenteeism, accident frequency, defect rates, and turnover.
- Cross-sectional design prevents causal inference; longitudinal or SEM-based approaches could better validate mediation effects.

CONCLUSION

This study offers empirical proof of the relationship between worker safety and performance in five production departments ($N = 147$) of a cotton textile manufacturing facility in Coimbatore. Regression-confirmed prediction ($R^2 = 0.575$, $F = 195.83$, $p < 0.001$) and a strong positive Pearson correlation ($r = 0.758$, $p < 0.001$) demonstrate that workplace safety measures account for 57.5% of the variance in employee performance, with a large effect size ($f^2 = 1.351$). In this framework, safety investment is positioned as the most effective organizational lever for performance enhancement. The ANOVA result indicating a medium influence of departmental membership on safety practice quality ($\eta^2 = 0.089$) indicates that safety resources are distributed

structurally unevenly throughout departments, with a focus on money, equipment maintenance, and training. Experience-based complacency in training attendance ($V = 0.269$) and departmentally-driven PPE compliance variance ($V = 0.260$), both medium effects with direct intervention implications, are confirmed by the Chi-Square results.

These results are translated into an organizational diagnostic by the composite indices (SPCI and EPCI): the workforce rates both performance and safety in the moderate-to-adequate range, but a sizable minority (20–25%) have neutral or negative opinions about the quality of safety implementation, highlighting the discrepancy between formal policy and felt experience. Given the evidence that safety accounts for 57.5% of performance variance, closing this gap through standardized SOPs, required refresher training, equitable budget allocation, and supervisor accountability for PPE compliance is not only a regulatory requirement but also the most direct route to organizational effectiveness that management can take in this situation.

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