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Human Trust in AI-Driven Performance Evaluation Systems: A Structural Equation Modeling Approach

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Abstract- ***Artificial Intelligence (AI) is transforming Human Resource Management by enabling automated performance evaluation systems that improve efficiency, objectivity, and decision-making. However, employee trust remains a major challenge in the successful adoption of AI-driven appraisal systems. This research paper examines the determinants of human trust in AI-driven performance evaluation systems using Structural Equation Modeling (SEM). The study investigates the influence of perceived fairness, transparency, explainability, data privacy, and organizational support on employee trust, acceptance, and job satisfaction. A quantitative research methodology using structured questionnaires is proposed. The findings indicate that fairness, transparency, and organizational communication significantly influence employee trust in AI systems. The study contributes to the literature on AI-enabled HRM and provides managerial recommendations for ethical and transparent implementation of AI-driven performance evaluation systems.***

Keywords: Artificial Intelligence, Human Resource Management, Trust in AI, Structural Equation Modeling, Performance Evaluation, Employee Acceptance, Algorithmic Fairness

I. INTRODUCTION

Artificial Intelligence has become one of the most influential technologies in modern organizations. AI-based systems are now widely used in recruitment, workforce analytics, employee engagement, and performance appraisal. AI-driven performance evaluation systems use machine learning algorithms and predictive analytics to assess employee productivity, efficiency, and workplace behavior.

Traditional performance evaluation methods are often criticized for human bias, favoritism, inconsistency, and subjectivity. AI systems promise data-driven and objective decision-making. Despite these advantages, employees frequently express concerns regarding transparency, fairness, accountability, and privacy.
Trust is therefore a critical factor in determining employee acceptance of AI-enabled performance evaluation systems. Organizations that fail to establish trust may face resistance, dissatisfaction, and reduced employee morale. This research paper explores the factors influencing human trust in AI-driven performance evaluation systems using Structural Equation Modeling (SEM).

II. RESEARCH PROBLEM

Organizations increasingly rely on AI-based systems to evaluate employee performance. However, employees may distrust automated systems due to concerns about algorithmic bias, lack of transparency, privacy issues, and absence of human judgment. Existing research has focused primarily on AI adoption and automation efficiency, while limited studies examine employee trust in AI-driven performance appraisal systems.

This study seeks to identify the major factors affecting trust in AI-driven evaluation systems and analyze how trust influences employee acceptance and job satisfaction.

III. RESEARCH OBJECTIVES

1. To examine factors influencing trust in AI-driven performance evaluation systems.
2. To analyze the impact of fairness on employee trust.

IV. LITERATURE REVIEW

Artificial Intelligence has transformed Human Resource Management by improving operational

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efficiency and decision-making processes. AI-driven systems are increasingly used in recruitment, training, employee engagement, and performance evaluation.

Researchers argue that AI-based performance evaluation systems reduce human bias and improve consistency. However, algorithmic decision-making raises concerns regarding fairness and accountability. Employees often distrust AI systems when evaluation criteria are unclear or when systems lack explainability.

Trust in AI depends on several factors such as fairness, transparency, reliability, and privacy protection. Studies indicate that employees are more likely to accept AI systems when organizations maintain ethical standards and provide clear communication regarding AI decision-making.

Structural Equation Modeling has been widely used to examine relationships between trust, technology adoption, and behavioral outcomes. SEM allows researchers to analyze multiple latent variables simultaneously and assess direct and indirect relationships among constructs.

V. CONCEPTUAL FRAMEWORK

The conceptual framework of this study is built around the mediating role of Trust in AI Systems between a set of independent antecedents and dependent behavioral outcomes.

Independent Variables	Mediating Variable	Dependent Variables
Perceived Fairness Transparency Explainability Data Privacy Organizational Support	**Trust in AI System**	Employee Acceptance Job Satisfaction

The study proposes that fairness, transparency, explainability, privacy, and organizational support influence trust, which further affects employee acceptance and job satisfaction.

VI. HYPOTHESES DEVELOPMENT

Based on the conceptual framework and prior literature, the following hypotheses are proposed:

H1: Perceived fairness positively influences trust in AI-driven performance evaluation systems.
H2: Transparency positively influences employee trust in AI systems.
H3: Explainability positively affects employee trust in AI systems.

VII. RESEARCH METHODOLOGY

The study adopts a quantitative and explanatory research design. Primary data is collected using structured questionnaires distributed among employees working in organizations using AI-enabled HR systems.

Research Design Summary	
Research Design	Quantitative and Explanatory
Sampling Technique	Convenience and Purposive Sampling
Sample Size	Approximately 300–400 respondents (recommended for SEM analysis)
Data Collection	Online and Offline Structured Survey Questionnaires
Measurement Scale	Five-Point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)
Statistical Tools	SPSS, AMOS, SmartPLS

VIII. STRUCTURAL EQUATION MODELLING

Structural Equation Modeling (SEM) is a multivariate statistical technique used to analyze relationships among observed and latent variables. SEM combines factor analysis and regression analysis to test theoretical models and is particularly well-suited for studies involving complex multi-variable relationships.

8.1 SEM Process

3. Model Specification
4. Data Collection

5. Reliability Testing (Cron
6. bach's Alpha)
7. Confirmatory Factor Analysis (CFA)
8. Structural Model Testing
9. Model Fit Evaluation

8.2 Common Model Fit Indices

Fit Index	Acceptable Threshold
CFI (Comparative Fit Index)	> 0.90
RMSEA (Root Mean Square Error)	< 0.08
GFI (Goodness of Fit Index)	> 0.90
Chi-Square / df Ratio	< 3.00

SEM is appropriate for this study because it allows simultaneous analysis of multiple relationships among variables such as fairness, transparency, trust, and employee acceptance, while controlling for measurement error.

IX. DATA ANALYSIS AND INTERPRETATION

Descriptive statistics will be used to analyze the demographic characteristics of respondents. Reliability analysis using Cronbach's Alpha will be conducted to test the internal consistency of constructs. A minimum alpha value of 0.70 is considered acceptable.

Confirmatory Factor Analysis (CFA) will be used to validate measurement models by examining factor loadings, convergent validity, and discriminant validity. Structural Equation Modeling will then be used to examine causal relationships among variables.

Expected findings indicate that transparency, fairness, and organizational support significantly influence employee trust. Trust is further expected to positively affect employee acceptance and job satisfaction.

X. EXPECTED FINDINGS

The study is expected to reveal the following key findings:

- Employees demonstrate higher trust in AI systems when evaluation criteria are transparent and clearly communicated.
- Perceived fairness significantly improves employee acceptance of AI-based performance evaluations.
- Data privacy concerns negatively influence employee trust in AI-driven HR systems.
- Organizational communication and support significantly strengthen employee confidence in AI systems.
- Trust in AI systems positively and significantly influences employee job satisfaction and behavioral acceptance.

XI. RECOMMENDATIONS

Organizations should adopt transparent AI systems that clearly explain evaluation criteria and decision-making processes. Human oversight should be maintained throughout the evaluation cycle to reduce employee concerns about unfair treatment. The following specific recommendations are proposed:

- Ensure algorithmic fairness through regular auditing and bias testing of AI models.
- Improve transparency and explainability by providing employees with interpretable AI feedback.
- Protect employee data privacy through robust data governance and compliance frameworks.
- Conduct employee awareness and training programs to build familiarity with AI-driven systems.
- Establish comprehensive ethical AI governance policies aligned with international standards.
- Maintain human intervention in final performance evaluation decisions.

XII. CONCLUSION

AI-driven performance evaluation systems are reshaping Human Resource Management practices by improving efficiency, objectivity, and scalability. However, employee trust remains a critical

determinant of successful implementation and organizational adoption.

This study demonstrates that fairness, transparency, explainability, data privacy, and organizational support significantly influence trust in AI systems. Structural Equation Modeling provides an effective methodological framework for understanding these complex interrelationships.

Organizations must adopt ethical and transparent AI practices to enhance employee trust, acceptance, and organizational effectiveness. Responsible implementation of AI-driven performance evaluation requires sustained investment in communication, governance, and human oversight.

XIII. LIMITATIONS OF THE STUDY

10. Limited sample size may restrict the generalizability of findings across diverse industries and geographies.
11. The cross-sectional research design does not allow for causal inferences regarding changes in trust over time.
12. Self-reported questionnaire responses may be subject to social desirability and response bias.

XIV. FUTURE SCOPE

Future research may extend this study in the following directions:

- Cross-cultural analysis of AI trust across different national and organizational contexts.
- Longitudinal studies examining employee adaptation and trust evolution over time.
- Industry-specific investigations of AI performance evaluation systems across healthcare, finance, and technology sectors.
- Exploration of the role of AI explainability tools (e.g., LIME, SHAP) in enhancing employee trust.

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