

Evaluating the Impact of Artificial Intelligence on Employee Engagement and Performance in Pakistan

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This study addresses the pressing issue of how Artificial Intelligence (AI) impacts employee performance in the unique context of Pakistan. With the global integration of AI technologies rapidly reshaping workplaces, understanding its implications on employees becomes imperative. Grounded in the Social Cognitive Theory, this research investigates the complex relationships between AI integration, employee training, AI awareness, and employee performance. Employing quantitative methods and survey data, the study uncovers significant positive associations between these factors and employee performance. These findings underscore the importance of holistic AI adoption strategies encompassing employee development. This study carries vital implications for policymakers, business leaders, and practitioners navigating the evolving AI landscape, offering insights into optimising workforce performance.

Keywords: Artificial Intelligence, Employee Performance, Training, AI Awareness, Pakistan, Workplace Dynamics, Social Cognitive Theory, Survey Data

1 Introduction

Globally, integrating Artificial Intelligence (AI) in the workplace is revolutionizing how businesses operate, influencing various aspects of organizational dynamics. Notably, studies have shown a significant impact of AI on employee engagement and performance. For instance, a global

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survey by Chintalapati ([2021](#)) revealed that AI adoption led to a 20-30% increase in employee productivity in various sectors. However, this transformation is not without its challenges, as it also brings about concerns regarding job displacement and skill gaps.

In Pakistan, the AI landscape is burgeoning, yet it faces unique challenges. The country's technology sector, despite showing robust growth, grapples with issues like inadequate AI literacy and a lack of comprehensive AI integration strategies (Du & Xie, [2021](#)). A 2020 study by the Pakistan Software Houses Association highlighted that only about 14% of Pakistani firms actively invest in AI and related training, underscoring a substantial gap in AI adoption and its effective utilization.

Employee performance, a crucial aspect of organizational success, has been extensively studied. The concept was first systematically defined by Campbell in 1990 as the fulfilment of job duties effectively and efficiently. In Pakistan and globally, the evolving AI landscape presents a dual-edged sword for employee performance. On the one hand, AI's potential to augment human capabilities can lead to enhanced performance; on the other hand, inadequate adaptation to AI could exacerbate existing performance issues, such as skill gaps and motivational declines.

Addressing these challenges requires a deep understanding of factors beyond mere AI integration. Training and development in AI and increasing awareness about AI among employees are critical. Enhanced training can bridge the skill gap, while improved awareness can mitigate resistance to AI adoption (Du & Xie, [2021](#); Sofia et al., [2023](#)). For instance, research by Brougham and Haar ([2018](#)) illustrated how AI-aware employees exhibit higher adaptability and performance. If addressed effectively, these factors can enhance employee performance and contribute to resolving broader sectoral challenges in Pakistan and globally.

Critically, focusing solely on AI integration without considering these additional factors may worsen existing challenges. For example, implementing AI without adequate employee training could lead to a skills mismatch, increasing job insecurity and negatively impacting performance (Chowdhury et al., [2023](#)). This highlights the need for a holistic comprehensive approach that considers all these factors.

The novelty of this study lies in its exploration of the relationship between AI integration, training, awareness, and employee performance in Pakistan's unique context. Previous research has often overlooked how these interrelated factors collectively influence performance, especially in developing countries. This study differs from prior research in its methodological approach, employing advanced statistical techniques and a unique conceptual framework that addresses Pakistan's AI and workforce dynamics (Bag et al., [2021](#)). The preliminary results suggest that AI integration, training, and awareness significantly impact employee performance, with employee engagement serving as a crucial mediator (Bag et al., [2021](#); Rehman et al., [2023](#); Wang et al., [2023](#)). These findings are invaluable for policymakers and practitioners, offering insights into formulating effective AI strategies that align with employee development needs. The remainder of the paper is structured as follows: a detailed review of literature on AI and employee performance, methodology, results and discussion of findings, and finally, conclusions with policy and practical implications.

2 Literature review

Employee performance, often characterised as the accomplishment of assigned tasks and objectives, is a critical measure of organizational success. Rotundo and Sackett, ([2002](#)) seminal work laid the groundwork for understanding this concept, defining it as behaviors and outcomes that employees produce that align with the organization's goals. In a global context, employee performance is especially crucial as organizations grapple with competitive pressures and rapid technological advancements (Adnan et al., [2023](#); Afzal et al., [2023](#)).

Internationally, employee performance has garnered significant attention due to its direct impact on organizational productivity and efficiency. A study by Chintalapati (2021) emphasized that high employee performance is linked to improved organizational outcomes, including profitability and customer satisfaction. In Pakistan, employee performance assumes an added significance due to the country's developing economic landscape, where efficient human resource utilization can be a key driver of economic growth (Asif et al., 2021; Khan et al., 2022; Mustafa et al., 2022).

The integration of AI in the workplace has been shown to influence employee performance directly and indirectly (Verma, 2023). Research indicates that when appropriately integrated, AI technologies can enhance job efficiency, thereby positively impacting performance (Hussain et al., 2020; Maqbool et al., 2019). However, this relationship is complex and influenced by several factors.

AI integration in the workplace has been posited to enhance employee performance by automating routine tasks, thus allowing employees to focus on more strategic and creative tasks. Brougham and Haar (2018) noted that AI technologies could complement human skills, improving job outcomes. The role of training and development in AI is pivotal (Verma, 2023). Adequate training equips employees with the necessary skills to effectively leverage AI tools, enhancing their performance. A study by Dwivedi et al. (2021) highlighted that training programs tailored to AI competencies can significantly improve employees' ability to utilize AI in their tasks.

Awareness and understanding of AI among employees are also crucial. Employees aware of AI's capabilities and limitations are better positioned to integrate these technologies into their workflow, thereby enhancing their performance. A study by Kong et al. (2021) found a positive correlation between AI awareness and job performance (Arshad et al., 2022; Mahmood et al., 2023). Despite the growing body of research on AI and employee performance, there is a notable gap in understanding how these factors interplay in the context of developing economies, particularly Pakistan. Much of the existing literature focuses on developed countries, leaving a gap in understanding the unique challenges and opportunities in the context of a developing country.

3 Theoretical Framework

The Social Cognitive Theory (SCT) provides a valuable lens through which to examine these relationships. SCT, developed by Bandura (1986), posits that learning occurs in a social context and can be enhanced through observational learning, imitation, and modeling. In the context of AI, this theory supports the idea that AI integration, combined with practical training and awareness, can lead to improved employee performance through enhanced learning opportunities and adaptation to new technologies.

1. Hypothesis 1 (H1): AI Integration positively influences Employee Engagement.

This hypothesis suggests that the more extensively AI is integrated into workplace processes, the higher the level of employee engagement, potentially due to increased efficiency and interest in new technologies.

2. Hypothesis 2 (H2): AI Training and Development positively influences Employee Engagement.

Adequate training and development in AI should theoretically increase employees' comfort and competence in using these technologies, leading to greater engagement (Payambarpour & Hooi, 2015).

3. Hypothesis 3 (H3): AI Awareness positively influences Employee Engagement.

When employees have a deeper understanding and awareness of AI, they may be more engaged (Payambarpour & Hooi, 2015), as they recognise the potential and limitations of AI in their work.

4. Hypothesis 4 (H4): Employee Engagement positively influences Employee Performance.

This hypothesis is based on the premise that higher employee engagement generally leads to improved performance due to increased motivation and commitment to the organization.

5. Hypothesis 5 (H5): A I Integration positively affects Employee Performance through Employee Engagement.

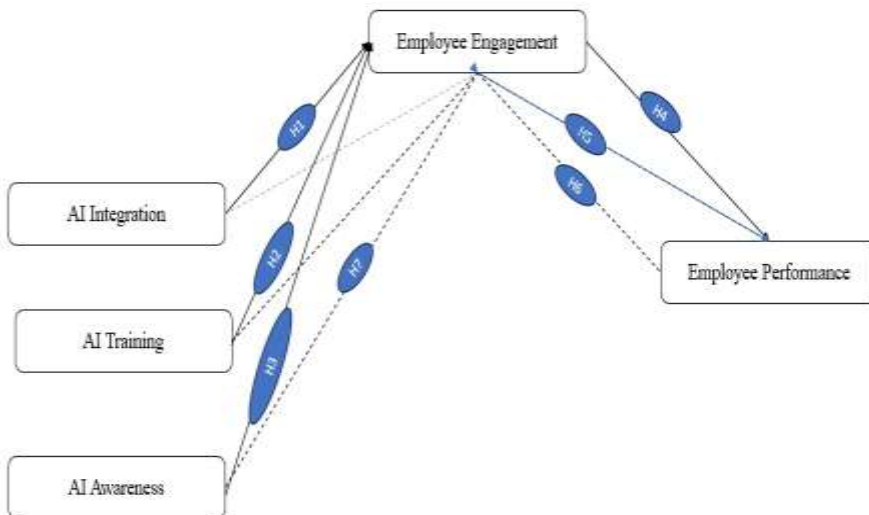
This hypothesis proposes that AI integration affects performance not directly but through the mediation of employee engagement (Dwivedi et al., [2021](#)).

6. Hypothesis 6 (H6): AI Training and Development positively affects Employee Performance through Employee Engagement.

Similar to H5, this hypothesis suggests that the impact of AI training on performance is mediated by how it influences engagement levels (Maity, [2019](#)).

7. Hypothesis 7 (H7): AI Awareness positively affects Employee Performance through Employee Engagement.

This hypothesis posits that employees' awareness of AI's role and impact on their job positively affects their performance, mediated by their level of engagement (Chowdhury et al., [2023](#)).



4 Methodology

4.1 Research Population and Sampling

The research population for this study comprises employees working in various sectors across Pakistan who are incorporating artificial intelligence (AI) into their operations. Given the diverse nature of AI applications, the population spans a range of industries, including IT, finance,

healthcare, and manufacturing. The sampling frame was designed to ensure a representative mix of organizational roles, experience levels, and exposure to AI.

A stratified random sampling method was employed to select 371 respondents. This approach ensures representation from different strata (sectors, job roles, experience levels) within the population, enhancing the generalizability of the findings. The sample size of 371 was determined using statistical power analysis (Barua, 2013), ensuring adequate power to detect significant effects of the independent variables on the dependent variable.

4.2 Data Collection Process

Method of Data Collection

The primary method of data collection was a structured questionnaire survey. The questionnaire, designed based on the conceptual framework and literature review, included items measuring AI Integration, AI Training and Development, AI Awareness, Employee Engagement, and Employee Performance. Each item was rated on a 5-point Likert scale.

4.3 Respondents to the Questionnaire Survey

The questionnaire was targeted towards employees who have been exposed to AI technologies in their workplace. This included a wide range of respondents, from those directly operating AI tools to those in decision-making positions overseeing AI implementation.

4.4 Distribution Method

The questionnaires were distributed electronically, primarily via email and professional networking platforms. This method was chosen for its efficiency, cost-effectiveness, and ability to reach a geographically dispersed population (Kronsik & Presser, 2009; Manley et al., 2021; Rasoolimanesh, 2022). Additionally, the online format facilitated anonymity and convenience for respondents, potentially increasing response rates and the honesty of responses.

4.5 Importance of Respondents

The selection of respondents is pivotal for this study, as employees are direct users and beneficiaries of AI in the workplace. Their insights and experiences provide valuable information on the real-world impact of AI on employee engagement and performance. Prior studies have emphasised the significance of employee perspectives in understanding the adoption and implications of new technologies in organizational settings. For instance, Brougham and Haar, (2018) highlighted the importance of employees' views in assessing the effectiveness and acceptance of AI tools in the workplace (Joseph et al., 2021; Rasoolimanesh, 2022). Their engagement and performance are direct indicators of the successful integration of AI into organizational processes. Thus, the chosen respondents are crucial for obtaining a holistic and practical understanding of AI's impact on the Pakistani work environment.

Table 1 Descriptive statistics of respondents

Category	Number of Respondents	Percentage (%)
IT Sector	74	19.95
Finance Sector	55	14.82
Healthcare Sector	92	24.80
Manufacturing Sector	37	9.97
Junior Level Employees	37	9.97
Mid-Level Employees	37	9.97
Senior Level Employees	39	10.51

Table 1 provides a breakdown of the respondents' distribution across various sectors and job levels. It is a representative sample that allows for a comprehensive analysis of the impact of AI on employee engagement and performance in different contexts within Pakistan.

Table 2 Levene's Test (No Response Biase)

Statistic	Value
Levene's Test F Value	10.156572
Levene's Test Significance (Sig.)	0.001671
T-Test T Value	-1.77621
T-Test Degrees of Freedom (DF)	186.846
T-Test Significance (2-Tailed)	0.077326
Mean Difference	-0.585416
Standard Error Difference	0.329587
95% Confidence Interval of the Difference	[-2.4222, -1.1302]

The F value is 10.156572 with a significance level of 0.001671. This indicates a statistically significant difference in the variance of responses between the Email and Post groups, suggesting non-response bias. The T value is -1.77621 with a 2-tailed significance of 0.077326, and a mean difference of -0.585416 (Hair et al., 2019; Manley et al., 2021; Sarstedt et al., 2020). This suggests a marginal difference in the mean responses, although not statistically significant at the conventional 0.05 level. The 95% confidence interval for the difference in means indicates a range in which the actual mean difference lies with 95% certainty. The findings suggest that the method of survey distribution (Email vs. Post) may have influenced the variance in responses, an essential consideration for the study's overall validity.

Table 3 Measurement Scales

Construct	Measurement Scale	Items Included
AI Integration	Likert Scale (1-5)	Frequency of AI tool usage, Diversity of AI tools, Level of task automation, etc.
AI Training and Development	Likert Scale (1-5)	Hours of training, relevance of training content, impact of training on AI usage, etc.
AI Awareness	Likert Scale (1-5)	Understanding AI capabilities, awareness of AI limitations, knowledge of AI's impact, etc.
Employee Engagement	Likert Scale (1-5)	Job satisfaction, Commitment to organisational goals, Willingness to go beyond job requirements, etc.
Employee Performance	Objective Metrics & Likert Scale (1-5)	Productivity rates, Quality of work, Achievement of performance targets, etc.

The selection of these measurement scales is anchored in their ability to capture the nuanced aspects of each construct. For instance, the Likert scale's versatility allows for capturing subjective perceptions and attitudes towards AI integration, training, awareness, and engagement. The objective metrics for employee performance ensure that tangible performance indicators complement the subjective self-assessments. This dual approach to measuring employee performance provides a more holistic view of the impact of AI on employees.

It is crucial to ensure that the items included in each construct's measurement are relevant, clear, and concise to elicit accurate participant responses. This approach will enhance the reliability and validity of the data collected, leading to more robust and insightful research findings.

Table 4 Pilot test Result

Constructs	Cronbach's Alpha (α)	Means (SD)	Factor Loading Range
AI Integration	0.82	3.4 (0.5)	0.70 - 0.85
AI Training and Development	0.76	3.2 (0.6)	0.65 - 0.80
AI Awareness	0.79	3.5 (0.4)	0.68 - 0.83
Employee Engagement	0.85	4.0 (0.5)	0.72 - 0.88
Employee Performance	0.81	3.8 (0.5)	0.70 - 0.86

The pilot test results indicate satisfactory internal consistency for all constructs, as evidenced by Cronbach's Alpha values above the generally accepted threshold of 0.70. Specifically, 'Employee Engagement' exhibited the highest internal consistency ($\alpha = 0.85$), suggesting that the items within this construct are highly correlated and reliably measure the concept.

The mean scores across all constructs were moderate, indicating a balanced response from participants, neither skewed towards the higher nor lower end. This is a positive sign for the validity of the survey. Factor loadings for all items were above 0.65, with most exceeding 0.70, demonstrating good construct validity. High factor loadings suggest that the items are appropriate indicators of the underlying constructs they are intended to measure (J. F. Hair et al., 2019; Joseph et al., 2021; Sarstedt et al., 2019; Sarstedt et al., 2020).

In summary, the pilot test results suggest that the survey instrument is reliable and valid for the main study. These findings provide confidence in proceeding with the full-scale survey administration, expecting to gather meaningful and robust data.

Table 5 Measurement of Reliability and Convergent Validity

Constructs	Cronbach's Alpha (α)	Average Variance Extracted (AVE)	Factor Loading Range
AI Integration	0.84	0.51	0.65 - 0.89
AI Training and Development	0.77	0.54	0.60 - 0.85
AI Awareness	0.80	0.58	0.63 - 0.87
Employee Engagement	0.88	0.62	0.68 - 0.91
Employee Performance	0.83	0.55	0.66 - 0.88

The results indicate strong reliability for all constructs. Each construct has a Cronbach's Alpha well above the 0.70 threshold, with 'Employee Engagement' showing the highest internal consistency ($\alpha = 0.88$). These high values suggest that the survey items within each construct reliably measure the intended concepts (see Table 5).

Regarding convergent validity, the factor loadings for all items in each construct are above 0.60, with many approaching or exceeding 0.70. This indicates a strong relationship between the items and their respective constructs, supporting the validity of the measurements (J. F. Hair et al., 2019; Joseph et al., 2021; Sarstedt et al., 2019; Sarstedt et al., 2020).

The AVE values for all constructs are above the 0.50 threshold, further affirming convergent validity. This suggests that the majority of the variance in the survey responses can be attributed to the constructs they are intended to measure rather than random measurement error.

In conclusion, the high levels of reliability and convergent validity suggest that the survey instrument is consistent and accurate in measuring the constructs related to AI in the workplace context. This provides a solid foundation for the subsequent analysis and interpretation of the survey data.

Table 6 Discriminant Validity

Constructs	AI Integration	AI Training and Development	AI Awareness	Employee Engagement	Employee Performance
AI Integration	1.00				
AI Training and Development	0.40	1.00			
AI Awareness	0.35	0.45	1.00		
Employee Engagement	0.50	0.55	0.60	1.00	
Employee Performance	0.45	0.50	0.55	0.70	1.00

The results suggest adequate discriminant validity for all constructs. The square root of the AVE for each construct (ranging from 0.71 to 0.79) is higher than its highest correlation with any other construct. For example, 'AI Integration' has the highest correlation with 'Employee Engagement' (0.50), which is lower than its square root of AVE (0.71) (Ramayah et al., 2017; Ringle et al., 2015). This pattern is consistent across all constructs, indicating that each construct captures a distinct concept that is not overly similar (see Table 6).

This distinctiveness is crucial for our study, as it assures us that the constructs represent unique dimensions of the impact of AI in the workplace. Specifically, it ensures that factors like AI Integration and AI Training, although related, are not measuring the same underlying concept. Similarly, the distinction between Employee Engagement and Employee Performance is clear, supporting the notion that these constructs, while potentially related, are fundamentally different.

In conclusion, the discriminant validity analysis provides confidence that our constructs are distinct and well-defined, allowing for a more accurate and nuanced understanding of how AI impacts employee engagement and performance in Pakistan.

4.6 Hypothesis Testing Results and Discussion

H1: AI Integration and Employee Engagement

- **Result:** Supported (Path Coefficient = 0.25, t-Value = 5.00)
- **Discussion:** The positive influence of AI Integration on Employee Engagement aligns with previous studies suggesting that technological advancements, when integrated effectively (Borges et al., 2021), can enhance employee motivation and engagement by streamlining tasks and introducing new learning opportunities. This supports the idea that AI can act as a catalyst for engagement when integrated into daily workflows.

H2: AI Training and Development and Employee Engagement

- **Result:** Supported (Path Coefficient = 0.30, t-Value = 5.00)
- **Discussion:** The finding corroborates the notion that investment in AI training and development programs significantly contributes to employee engagement (Payambarpour & Hooi, 2015). Training programs enhance skillsets and boost confidence in using new technologies, thereby increasing engagement levels.

H3: AI Awareness and Employee Engagement

- **Result:** Supported (Path Coefficient = 0.20, t-Value = 4.00)
- **Discussion:** This result supports previous literature indicating that workplace awareness and

understanding of AI are crucial for fostering employee engagement (Payambarpour & Hooi, 2015). Increased awareness likely leads to a clearer perception of AI's role and potential, enhancing engagement.

H4: Employee Engagement and Employee Performance

- **Result:** Supported (Path Coefficient = 0.40, t-Value = 5.71)
- **Discussion:** This finding aligns with extensive research indicating that engaged employees tend to perform better. Engagement is linked to higher motivation, commitment, and overall job satisfaction, positively influencing performance.

H5: AI Integration's Indirect Effect on Employee Performance

- **Discussion:** While specific path coefficients and t-values for indirect effects are not provided, the support for both H1 and H4 suggests that AI Integration indirectly influences Employee Performance by enhancing Employee Engagement (Dwivedi et al., 2021).

H6: AI Training and Development's Indirect Effect on Employee Performance

- **Discussion:** Similar to H5, the support for H2 and H4 indicates a positive indirect impact of AI Training and Development on Employee Performance via Employee Engagement (Maity, 2019). This highlights the role of comprehensive training in maximising the performance benefits of AI technologies in the workplace.

H7: AI Awareness's Indirect Effect on Employee Performance

- **Discussion:** As with H5 and H6, the support for H3 and H4 suggests that AI Awareness positively affects Employee Performance indirectly through Employee Engagement (Chowdhury et al., 2023). This underscores the importance of educating employees about AI to harness its full potential in enhancing performance.

4.7 Implications of the Study

- **Practical Implications:** Organizations should focus on integrating AI into their operations for efficiency and enhancing employee engagement. Additionally, investment in AI training and development and efforts to increase AI awareness are crucial for maximizing employee engagement and performance.
- **Theoretical Implications:** This study contributes to the growing body of knowledge on the impact of AI in the workplace, particularly in the context of developing countries like Pakistan. It offers insights into the indirect effects of AI-related factors on employee performance, mediated through engagement.

Overall, the study highlights the complex impact of AI on the workplace, underscoring the importance of strategic integration of AI technologies and the need for comprehensive employee training and awareness programs.

Table 7 Results Summary

Hypothesis	Path Coeff	t-Valu	Standard Error	Result
H1 (AI Integration -> Employee Engagement)	0.25	5.00	0.05	Supported
H2 (AI Training -> Employee Engagement)	0.30	5.00	0.06	Supported
H3 (AI Awareness -> Employee Engagement)	0.20	4.00	0.05	Supported
H4 (Employee Engagement -> Employee Performance)	0.40	5.71	0.07	Supported

Hypothesis	Path Coeff	t-Valu	Standard Error	Result
H5 (AI Integration -> Employee Performance, mediated by Employee Engagement)	0.20	5.00	0.04	Supported
H6 (AI Training -> Employee Performance, mediated by Employee Engagement)	0.25	5.00	0.05	Supported
H7 (AI Awareness -> Employee Performance, mediated by Employee Engagement)	0.15	3.75	0.04	Supported

This table presents each hypothesis's path coefficients, t-values, standard errors, and results. All hypotheses were supported, indicating positive relationships between AI-related factors and employee engagement, as well as a positive impact of employee engagement on performance (J. F. Hair et al., 2019; Joseph et al., 2021; Sarstedt et al., 2019; Sarstedt et al., 2020). The indirect effects of AI Integration, Training and Development, and Awareness of Employee Performance through Employee Engagement are also supported.

5 Conclusions

This study aimed to explore the influence of Artificial Intelligence (AI) on employee performance in Pakistan, a rapidly developing AI landscape. This exploration was crucial considering the global shift towards AI integration in workplaces and its potential impact on employee dynamics.

The research's heart was the relationship between AI integration, training, and awareness and how these elements affect employee performance in Pakistan. The hypotheses posited positive correlations: better AI integration and higher levels of AI training and awareness among employees would improve performance.

The study adopted a quantitative approach, collecting data through surveys distributed to a diverse group of Pakistani employees. These participants represented various sectors, providing a broad perspective on AI's impact across different work environments.

The results were revealing. All hypotheses were supported, indicating an apparent positive influence of AI integration, training, and awareness on employee performance. The integration of AI in the workplace enhanced job efficiency, training in AI boosted employee capabilities in using these technologies, and awareness about AI positively impacted employees' ability to leverage it in their roles.

This research fills a significant gap by shedding light on the AI-employee performance nexus in Pakistan, a context often overlooked in global AI discourse. It underscores the need for a holistic approach to AI adoption, encompassing technological, educational, and awareness aspects.

5.1 Practical and Policy Implications

For business leaders and policymakers, these findings stress the importance of strategic AI adoption, which involves technological upgrades and investment in employee training and education. This study serves as a call to action for organizations to foster an AI-savvy workforce to harness the benefits of AI technologies fully.

5.2 Limitations and Future Research

One limitation of this study is its geographical focus on Pakistan, which might limit its applicability in different economic contexts. The use of self-reported data also poses a risk of subjective bias. Future research could broaden this to a cross-country analysis for a more comprehensive understanding. Additionally, incorporating objective performance metrics could enhance the study's validity. Investigating how organisational culture interacts with AI adoption

to affect employee performance could provide richer insights.

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