The Influence of AI Training Programs on Employee Performance: The Mediating Role of Employee Engagement

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ABSTRACT

The aim of this study was to investigate the impact of AI Training Programs on Employee Performance and Employee Engagement, and to explore the mediating effects of Employee Engagement between AI Training Programs and Employee Performance. With an increasing number of organizations incorporating artificial intelligence technologies, it is crucial to empower workers with proper training to maximize the utilization of the technology and enhance their performance. A structured questionnaire was used for data collection and partial least squares structural equation modeling (PLS-SEM) was applied for data analysis. The results indicated that AI Training Programs had a significant positive impact on Employee Performance and Employee Engagement. The results also indicated that Employee Engagement positively influenced Employee Performance. In addition, Employee Engagement was found to be statistically significant to mediate the relationship between AI Training Programs and Employee Performance, indicating that AI training programs have an indirect effect on Employee Performance through employee engagement. The results underscore the need for investing in AI training initiatives to build employees' skills, boost engagement levels, and enhance overall job performance. The study adds to the existing literature on the application of AI in HRD and offers valuable insights to organisations looking to optimise AI implementation efforts through employee training and engagement initiatives.

Keywords: AI Training Programs, Employee Engagement, Employee Performance, Artificial Intelligence, PLS-SEM.

INTRODUCTION

Artificial Intelligence (AI) is a technology that has been transforming organizational operations, the capabilities of its workforces and its business performance (Jarrahi, 2018; Dwivedi et al., 2023). By leveraging AI, companies can make more informed decisions, streamline mundane work, and optimize operations, thereby transforming the future of work and organizational competitiveness (Jarrahi, 2018; Dwivedi et al., 2023). With the ongoing digital transformation efforts of organizations, AI Training Programs have gained significance as a means to enhance the knowledge, skills, and competencies of employees to navigate the digital landscape successfully. By improving the skills of employees in using AI tools effectively, preparing them for changes in technology, and ensuring their contributions to the organization's productivity, effective AI training contributes to the overall success of the business. In addition, the organisations are spending billions of dollars on AI-related reskilling and upskilling efforts to meet new skills shortages and ensure employees are ready for the use of AI (IBM Institute for Business Value, 2023).

The Malaysian Electrical and Electronics (E&E) manufacturing industry is one of the industries where AI technologies are being used more and more to enhance production efficiency, quality control, operational accuracy, and decision-making processes. With the growing adoption of AI, workers are also projected to develop fresh technical skills and learn to adjust to the changing needs of the workplace. AI Training Programs are thus strategically integrated into the organizational plan to improve the readiness of the

workforce and to optimize the use of AI. In the past, it has been found that training and development programs have a positive effect on the skills and abilities of employees, their job satisfaction and performance. Furthermore, Employee Engagement has been identified as a positive psychological state at work that is associated with Vigor, Absorption and dedication, and is important for Employee motivation, commitment and productivity (Schaufeli et al., 2002; Schaufeli et al., 2006). Highly engaged employees are more likely to demonstrate their excellence in performance and make a positive contribution to organizational results (Bakker & Demerouti, 2008; Gallup, 2026).

While the field of AI adoption and digital transformation continues to expand, there are some gaps in literature. First, existing empirical research examining the effectiveness of AI Training Programs in the Electrical and Electronics (E&E) manufacturing industry in Malaysia remains limited. Previous studies have largely focused on AI adoption, organisational transformation, and the strategic implications of AI implementation (Jarrahi, 2018; Dwivedi et al., 2023), providing limited insights into employee-related outcomes within manufacturing settings. Second, although previous studies have examined the effects of AI-related initiatives on employees and organisations, limited attention has been given to the underlying mechanisms through which AI Training Programs are associated with Employee Performance. Specifically, the mediating role of Employee Engagement remains underexplored in the AI training literature, particularly within the E&E manufacturing industry. Third, existing AI research has predominantly focused on technological and organisational dimensions, while comparatively less attention has been given to human capital development and employee-related outcomes arising from AI adoption. Accordingly, significant theoretical, contextual, and empirical gaps remain, warranting further investigation into the relationships among AI Training Programs, Employee Engagement, and Employee Performance within the Malaysian E&E manufacturing industry.

Therefore, the purpose of this study is to investigate the relationship between AI Training Programs, Employee Engagement, and Employee Performance among employees in E&E manufacturing industry in Malaysia. More specifically, the effect of AI Training Programs on employee performance, the effect of AI Training Programs on employee engagement, the effect of employee engagement on employee performance, and the mediation of the relationship between AI Training Programs and employee performance through employee engagement are examined.

LITERATURE REVIEW

AI Training Programs

Artificial Intelligence (AI) Training Programs are organized initiatives aimed at expanding its employees' knowledge, skills and abilities in the application of Artificial Intelligence (AI) technologies in the workplace environment. With the increasing integration of AI-powered systems and digital technologies in the workplace, employee training has become a pivotal element in preparing workers for the demands of AI adoption and ensuring their readiness. Employees benefit from AI-related training, gaining technical skills, expanding digital literacy, and boosting their confidence in using AI tools to aid in decision-making and task efficiency (Jarrahi, 2018; Dwivedi et al., 2023).

Human Capital Theory states that the investment of employees in training are what lead to the build-up of knowledge and skills of the employees which are helpful in improving the productivity and organizational performance of the employees (Becker, 1964). Training programs can help staff members to adapt to technological changes and learn new skills to continue to be effective in digitally transformed work environments, in the context of AI adoption. Additionally, organizations around the globe are still undertaking reskilling and upskilling programs related to AI to fill in new skills gaps and improve workforce competitiveness (IBM Institute for Business Value, 2023). As a result, AI Training Programs have emerged as a strategic tool for enhancing the capabilities of the workforce and the effectiveness of organizations.

AI Training Programs and Employee Performance

Employee Performance is the efficiency with which employees carry out their work functions and achieve

organizational goals (Campbell, 1990). The past studies have consistently shown that training and development programs have a positive impact on employees' performance, which is related to the increase of knowledge, competence, and work-related skills (Aguinis & Kraiger, 2009).

The Human Capital Theory is based on the premise that training is an investment in employees that pays off with benefits in productivity and performance (Becker, 1964). AI Training Programs are aimed at building technical skills, problem-solving capabilities, and trust in using AI-driven systems among employees. Staff with higher degrees of AI knowledge can handle tasks more efficiently and meet evolving job demands. As a result, AI Training Programs should have a positive impact on Employee Performance.

H1: AI Training Programs positively influence Employee Performance.

Employee Engagement

Employee Engagement can be described as a positive and satisfying state with reference to work, marked by three components: vigor, dedication and absorption (Schaufeli et al., 2002). Active involvement of employees is reflected in their positive attitude, willingness to participate and commitment to their work activities. These employees more likely will be willing to do more than required within the job requirements, willing to put extra effort into the organization, and willing to help the organization achieve its objectives.

Given its positive effect on employee attitudes and organizational outcomes, employee engagement has been the subject of much organizational research. Saks (2006) suggested that employees who are engaged are more motivated, more committed to the organization and more satisfied with their jobs. Likewise, Bakker and Demerouti (2008) proposed that employees' psychological resources are improved when they are engaged in their work, which in turn allows them to perform well when facing challenging work situations. In the Malaysian setting, Megat and Krishnan (2023) discovered that organizational leadership and effective communication play a significant part in employee engagement in the manufacturing industry. They have found that those who feel their organization supports them and offers opportunities for growth are more likely to be engaged. Thus, it is still relevant to enhance individual and organizational performance by focusing on employee engagement.

AI Training Programs and Employee Engagement

AI Training Programs can help positively impact Employee Engagement by boosting employee confidence, competence, and preparedness for a tech-driven work environment. With proper training, workers can feel more competent in their ability to keep up with new technology requirements and adjust to change in the organization. It can be understood by means of the Social Exchange Theory (Blau, 1964) which maintains that employees in turn respond positively to good treatment by the organization. Training opportunities may often be viewed as part of the organization's support, as they are a message from the organization that it values the growth and career development of its employees. Consequently, the employees will be more committed, motivated and engaged (Saks, 2006).

In addition, it has been found that learning and development opportunities are important factors in employee engagement (Megat & Krishnan, 2023). Therefore, employees who are trained in AI can have a stronger psychological bond with their organizations and be more engaged in their work activities.

H2: AI Training Programs positively influence Employee Engagement.

Employee Engagement and Employee Performance

It has always been known that Employee Engagement has been linked to Employee Performance. A dedicated, concentrated, and persistent approach towards the completion of work-related tasks by employees is likely to lead to better performance outcomes (Schaufeli et al., 2002).

According to Bakker and Demerouti (2008) engaged workers have more energy and motivation, which leads them to be more productive and effective in their work. Similarly, Saks (2022) highlights that employee

engagement creates a positive attitude among employees, leading to greater discretionary effort and commitment to organizational success. This relationship is also supported by empirical evidence in Malaysia. According to Malik (2024), employee engagement factors like the meaningfulness, availability, and safety aspect are significant contributors of employee performance. Those workers who are more engaged are more committed, proactive, and focused on their responsibilities and perform better.

H3: Employee Engagement positively influences Employee Performance.

Mediating Role of Employee Engagement

Employee Engagement is a possible avenue by which an AI Training Program can impact Employee Performance. As employees engage in AI Training Programs, they gain valuable knowledge and skills, and they also experience greater organizational encouragement for their professional development and growth.

According to Social Exchange Theory, if an employee feels that the organization invests in him, he is likely to return the favor by showing a greater psychological attachment and engagement (Blau, 1964). The resultant increase in engagement, in turn, encourages workers to give more effort and dedication to the organization's objectives. Several previous studies have confirmed that employees who are engaged are more likely to perform well in their jobs, as they are more motivated, enthusiastic and willing to contribute to organizational success (Bakker & Demerouti, 2008; Schaufeli et al., 2002). Thus, it can be hypothesized that Employee Engagement will mediate the relationship between AI Training Programs and Employee Performance.

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

CONCEPTUAL FRAMEWORK

This study is based on two theories: Human Capital Theory (Becker, 1964) and Social Exchange Theory (Blau, 1964). Human Capital Theory holds that investments in employee development leads to an improvement in knowledge, skills and competence, which in turn results in an improvement in performance outcomes. Thus, it is expected that AI Training Programs will directly boost Employee Performance by enhancing AI-related skills of the employees.

Additionally, Social Exchange Theory suggests that if employees believe that the organization is supporting them through training and development, they will respond positively and give back favours in the form of positive attitudes and behaviours, particularly engagement. Hence, AI Training Programs are anticipated to boost Employee Engagement, ultimately leading to improved Employee Performance. Theoretically, based on these arguments, Employee Engagement is suggested as a mediating variable between the variables of AI Training Programs and Employee Performance. This research study hence suggests both direct & indirect relationships between the study variables.

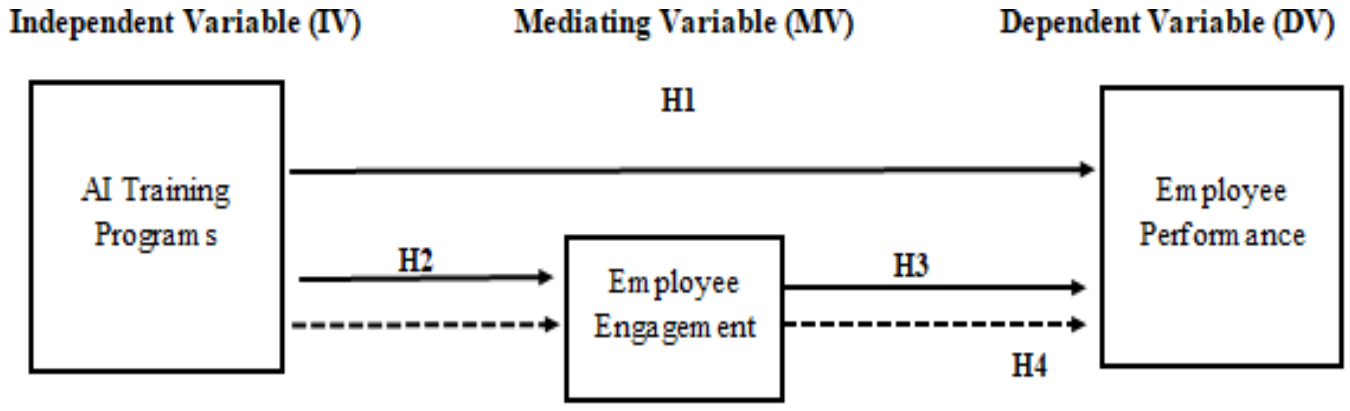


Figure 1: The Research Model

METHODOLOGY

Research Design

This study was conducted in a quantitative research approach with a cross-sectional survey design in order to investigate the relationship between the AI Training Programs, Employee Engagement and Employee Performance. The quantitative approach was deemed suitable because it allowed the hypothesized relationships to be tested, and empirical data to be gathered on the proposed conceptual framework. The study considered the independent variable to be AI Training Programs, the mediating variable to be Employee Engagement, and the dependent variable to be Employee Performance.

Population and Sample

The target population was employees from Electrical and Electronics (E&E) manufacturing industry of Malaysia who had undertaken the training programmes related to Artificial Intelligence (AI) in their respective organisation. To ensure that respondents had the necessary experiences in AI training initiatives and AI-enabled work processes, a non-probability purposive sampling technique was used.

The sample size requirement was calculated using the guidelines of the Partial Least Squares Structural Equation Modelling (PLS-SEM). Overall, 198 valid questionnaires were retrieved and kept for statistical analysis, which was found to be sufficient for testing the proposed research model and mediation. The final sample of 198 valid responses exceeded the minimum sample size recommendations for PLS-SEM analysis, thereby ensuring sufficient statistical power for hypothesis testing and structural model assessment.

Research Instrument

Data were collected using a structured questionnaire consisting of three constructs: AI Training Programs, Employee Engagement, and Employee Performance. The instrument contained 19 measurement items adapted from established studies and modified to suit the AI context within the E&E manufacturing industry. All items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire consisted of four sections. Section A collected respondents' demographic information, while Sections B, C, and D measured AI Training Programs, Employee Engagement, and Employee Performance respectively.

Table 1: Measurement Constructs and Sources

Construct	Code	No. of Items	Original Source
AI Training Programs	AT1-AT5	5	Noe (1986); Tharenou et al. (2007)
Employee Engagement	EE1-EE9	9	Schaufeli et al. (2006)
Employee Performance	EP1-EP5	5	Williams and Anderson (1991); Campbell (1990)

Source: Adapted from Noe (1986), Tharenou et al. (2007), Schaufeli et al. (2006), Williams and Anderson (1991), and Campbell (1990).

All measurement items were adapted from previously validated scales. Minor wording modifications were made to ensure relevance to AI-related training initiatives and the operational context of the Malaysian E&E manufacturing industry. The adapted items were reviewed for clarity and suitability prior to data collection. The questionnaire was also reviewed to ensure content validity, clarity, and appropriateness within the context of AI implementation in the E&E manufacturing industry.

AI Training Programs were measured using items assessing employees' perceptions of the quality, relevance, and effectiveness of AI-related training initiatives provided by their organisations. Employee Engagement was measured using items capturing employees' vigour, dedication, and absorption at work. Employee

Performance was measured using items assessing employees' perceived effectiveness, productivity, and achievement of assigned job responsibilities and organisational objectives.

Common Method Bias Assessment

Since all study variables were collected using a single self-administered questionnaire, the possibility of common method bias (CMB) was assessed. Following Kock (2015), a full collinearity assessment was conducted using variance inflation factor (VIF) values. As presented in Table 11, the VIF values ranged from 2.18 to 2.41, which were below the recommended threshold of 3.3. This finding indicates that common method bias was unlikely to be a serious concern in this study. Therefore, the observed relationships among AI Training Programs, Employee Engagement, and Employee Performance were not substantially affected by common method variance.

Measurement of Variables

AI Training Programs were evaluated using items that tapped into employees' perceptions of the availability, quality, and effectiveness of their organization's AI training. Employee Engagement was assessed using the Vigor, Dedication and Absorption dimensions. Employee Performance was assessed based on employees' perceptions of their productivity, work quality, efficiency and work success.

Data Collection Procedure

The questionnaire was sent online via online survey platforms. The involvement of the respondents was voluntary, and they had been told of the aim of the research before they filled in the questionnaire. Completed questionnaires were inspected for missing data and consistency of responses before analysis to ensure data quality. All answers were kept confidential and confidential for research purposes.

Data Analysis

The data were analysed with the help of SmartPLS 4.0. The analysis consisted of two stages which were the measurement model and the structural model.

Indicator reliability, internal consistency reliability, convergent validity, and discriminant validity were used to assess the measurement model. The internal consistency reliability was calculated by Cronbach's Alpha (CA) and Composite Reliability (CR) which were found to be higher than 0.70, considered as satisfactory (Hair et al., 2022). The outer loadings and Average Variance Extracted (AVE) were used to evaluate convergent validity, with the outer loadings exceeding 0.708 and the AVE values exceeding 0.50 indicating good convergent validity (Hair et al, 2022). Discriminant validity was determined by the Heterotrait-Monotrait Ratio (HTMT) which was used to determine the ratio of below 0.90 is acceptable (Henseler et al., 2015).

The structural model was evaluated after the measurement model assessment. The Variance Inflation Factor (VIF) was used to check for multicollinearity and values less than 5 were considered to represent no multicollinearity problem. The bootstrapping procedure with 5000 resamples was used to test the hypotheses. Path coefficients (β), t-values, p-values and confidence intervals were used to determine the significance of the proposed relationships. Furthermore, mediation analysis was performed to explore the indirect effect of the Employee Engagement on the association between the AI Training Programs and Employee Performance.

Ethical Considerations

All ethical principles in research were followed in this study. The respondents were asked to participate voluntarily, and informed consent was obtained before the collection of data. There was an assurance of anonymity and confidentiality, and no personally identifiable information was collected from the respondents. Any data collected was only for academic and research purposes. Participants also could leave the study at any time without penalty.

RESULTS AND DISCUSSION

Respondents' Profile

Respondents' Age Profile

Table 2: Respondents' Age Profile

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 29	35	17.7	17.7	17.7
	30 - 39	72	36.4	36.4	54.1
	40 - 49	61	30.8	30.8	84.9
	50 and above	30	15.1	15.1	100
	Total	198	100	100	

The age profile of the respondents is shown in Table 2. Most respondents were in the 30-39 age group (36.4%) and the 40-49 age group (30.8%). This finding indicates that a substantial proportion of respondents were in their mid-career stage, thereby providing representation from employees with varied professional experience within the E&E manufacturing industry.

Respondents' Gender Profile

Table 3: Respondents' Gender Profile

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	92	46.5	46.5	46.5
	Male	106	53.5	53.5	100
	Total	198	100	100	

The results of the gender profile of the respondents are displayed in Table 3. Males made up 53.5% and females 46.5% of the respondents. The results show an even distribution of the respondents by gender.

Respondents' Education Level

Table 4: Respondents' Education Level

Level of education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	47	23.7	23.7	23.7
	Bachelor's Degree	104	52.5	52.5	76.2
	Master's Degree	37	18.7	18.7	94.9
	Doctorate Degree	10	5.1	5.1	100
	Total	198	100	100	

It can be seen from Table 4 that 52.5% of the respondents held Bachelor's Degree, 23.7% had a Diploma, 18.7% had Master's Degree and 5.1% held Doctorate Degree. The results indicate that respondents possessed diverse educational backgrounds, with the majority holding at least a bachelor's degree. This demographic characteristic reflects the educational diversity of the sampled workforce.

Respondents' Working Experience

Table 5: Respondents' Working Experience

Years of work experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	18	9.1	9.1	9.1
	1 - 5 years	56	28.3	28.3	37.4
	6 - 10 years	69	34.8	34.8	72.2
	More than 10 years	55	27.8	27.8	100
	Total	198	100	100	

As shown in Table 5, majority of the respondents have a working experience of 6 to 10 years (34.8%), 1 to 5 years (28.3%) and over 10 years (27.8%). The findings demonstrate that the sample included employees with varying levels of work experience, allowing perspectives from both relatively new and experienced employees to be represented.

Respondents' Position Level

Table 6: Respondents' Position Level

Position		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Operator	68	34.3	34.3	34.3
	Supervisor	49	24.7	24.7	59
	Executive	54	27.3	27.3	86.3
	Manager	27	13.7	13.7	100
	Total	198	100	100	

The respondents' position levels are shown in Table 6. The top group consisted of operators (34.3%), then Executives (27.3%), Supervisors (24.7%) and Managers (13.7%). This distribution is based on representation from different organizational levels in the E&E manufacturing industry.

Descriptive Statistics

Table 7: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
AI Training Programs	198	1	5	3.88	0.79
Employee Engagement	198	1	5	3.95	0.74
Employee Performance	198	1	5	4.03	0.69
Valid N (listwise)	198				

Table 7 gives descriptive statistics of the study variables. Employee Performance recorded the highest mean score (M = 4.03, SD = 0.69), followed by Employee Engagement (M = 3.95, SD = 0.74) and AI Training Programs (M = 3.88, SD = 0.79). The mean scores for each of the three factors (AI Training Programs, Employee Engagement, and Employee Performance) were all above the middle score on the five-point Likert scale, suggesting that respondents tended to have positive views on each of these aspects. The relatively low SD values also indicate consistency in the respondents' perceptions in terms of the study variables.

Measurement Model Assessment

Reliability Test

Table 8: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
AI Training Programs	0.918	0.942	0.764
Employee Engagement	0.935	0.949	0.756
Employee Performance	0.94	0.954	0.805

The reliability test results and convergent validity results are reported in Table 8. Cronbach's Alpha values had ranges between 0.918 and 0.940 and Composite Reliability values had ranges between 0.942 and 0.954, both of which were greater than the recommended value of 0.70. In addition, AVE values were high from 0.756 to 0.805 exceeding the recommended value of 0.50. All constructs have satisfactory internal consistency reliability and convergent validity.

Discriminant Validity

Table 9: Fornell-Larcker Criterion

Constructs	AI Training Programs	Employee Engagement	Employee Performance
AI Training Programs	**0.874**	0.648	0.594
Employee Engagement	0.648	**0.869**	0.683
Employee Performance	0.594	0.683	**0.897**

Note: Bold values represent the square root of AVE, while the off-diagonal values represent the correlations between constructs.

The Fornell-Larcker criterion was used to evaluate discriminant validity. The results indicate that the square root of AVE for AI Training Programs (0.874), Employee Engagement (0.869), and Employee Performance (0.897) was greater than the correlations with other constructs. This was the case for the square root of AVE in the AI Training Programs, which was stronger than the correlations with Employee Engagement (0.648) and Employee Performance (0.594). Likewise, square root AVE values of Employee Engagement (0.869) and Employee Performance (0.897) were higher than the inter-construct correlations.

Hence, Fornell-Larcker criterion was met, suggesting that the constructs of AI Training Programs, Employee Engagement, and Employee Performance are empirically separate constructs. The results give evidence of adequate discriminant validity and indicate that the measurement model is appropriate for analysis of the structural model and testing of hypotheses.

Table 10: HTMT Results

Construct	AI Training Programs	Employee Engagement	Employee Performance
AI Training Programs	-		
Employee Engagement	0.786	-	
Employee Performance	0.724	0.846	-

The results of the HTMT are provided in Table 10. All the HTMT values were below the recommended value

of 0.90 (Henseler et al., 2015) and ranged from 0.724 to 0.846. Thus, the discriminant validity was achieved; all constructs were empirically different and appropriate for the assessment of the structural model.

Structural Model Assessment

Collinearity Assessment

Table 11: Variance Inflation Factor (VIF) Values

Relationship	VIF
AI Training Programs → Employee Engagement	2.18
AI Training Programs → Employee Performance	2.41
Employee Engagement → Employee Performance	2.41

The results of the Variance Inflation Factor (VIF) to check for potential collinearity problems among the predictor constructs in the structural model are shown in Table 11. Hair et al. (2022) states that a VIF values of less than 5.0 is a good indicator that there is no significant multicollinearity among the predictor variables.

The results reveal that the VIF values were from 2.18 to 2.41. In detail, the VIF value for AI Training Programs and Employee Engagement was 2.18; and the VIF value for AI Training Programs and Employee Performance was 2.41; the VIF value for Employee Engagement and Employee Performance was 2.41. The values of all the variables were considerably lower than the suggested value of 5.0, so multicollinearity was not an issue in the structural model.

The relatively low VIF values for the AI Training Programs and Employee Engagement indicate that AI training programs make unique contributions to explaining the variance in Employee Engagement, with little overlap of variance explained by the other predictor constructs. Likewise, the VIF values for each of the items in the AI Training Programs and Employee Engagement factors show that the factors in these two groups can explain the variance in Employee Performance independently.

Thus, the structural model meets the criteria of the collinearity assessment and is deemed appropriate for further evaluation and testing of the structural model. Based on these results, it is concluded that there is no multicollinearity bias among the variables of the study, so that the path coefficients and relationships hypothesized in the model can be interpreted.

Hypothesis Testing

Table 12: Hypothesis Testing

Hypothesis	Relationship	β	t-value	p-value	Decision
H1	AI Training Programs positively influences Employee Performance.	0.52	8.321	< 0.001	Supported
H2	AI Training Programs positively influences Employee Engagement.	0.73	13.274	< 0.001	Supported
H3	Employee Engagement positively influences Employee Performance.	0.44	6.731	< 0.001	Supported
H4	Employee Engagement mediates the relationship between AI Training Programs and Employee Performance.	0.29	6.984	< 0.001	Supported

The results of the hypothesis testing are shown in Table 12. The results corroborate all four hypotheses. The most significant direct relationship was found between AI Training Programs and Employee Engagement ($\beta = 0.73$, $t = 13.274$, $p < 0.001$), followed by AI Training Programs and Employee Performance ($\beta = 0.52$, $t = 8.321$, $p < 0.001$), and Employee Engagement and Employee Performance ($\beta = 0.44$, $t = 6.731$, $p < 0.001$).

These findings indicate that successful AI training programs play a crucial role in promoting improved employee engagement and productivity.

The results suggest that AI Training Programs positively and significantly support the Employee Performance, which supports H1 ($\beta = 0.52$, $t = 8.321$, $p < 0.001$). This result suggests that employees who receive sufficient AI-related training are better equipped with the knowledge and skills required to perform their tasks effectively. By leveraging AI training, workers become more proficient with AI tools and their impact on the business, as well as better at solving problems and making decisions, which boosts productivity and work efficiency. Well-trained employees will be more likely to use AI applications effectively in their daily work, leading to better job performance.

This supports Khan, Soomro, and Pitafi (2024), who found that AI projects in the workplace have a profound impact on employee performance, with the potential to boost work engagement and knowledge-sharing behaviors. Similarly, Bashir (2024) presented a positive connection between AI usage and employee performance when backed by employee training and development programs, and how these developments lead to enhanced efficiency, skill utilization, and job effectiveness. The results indicate that companies that invest in AI Training Programs can boost their workforce's skills and boost employee performance in a digital workplace.

Likewise, Employee Engagement ($\beta = 0.73$; $t = 13.274$; $p < 0.001$) was supported by AI Training Programs in a positive and significant way, and thus, it is concluded that it supports H2. This was the highest direct correlation found in the research, showing the importance of the role of AI-related training in creating engaged employees. Employees are more likely to feel supported and invested in their growth by the organization when it offers them chances to acquire AI-related skills. Consequently, the employees are able to develop motivation, dedication and participation in their activities at work. The results indicate that AI training programs contribute to enhancing employee's confidence and readiness to embrace technological shifts, leading to higher engagement scores.

These findings align with Madanchian's (2024) view that AI-powered learning and development programs contribute to improved employee engagement through increased self-perceptions of organizational support and career advancement opportunities. Similarly, Kaur (2024) highlighted the role of AI in enhancing employee engagement by providing ongoing learning opportunities and employee development programs with the aid of technology. Thus, AI courses can not only enhance employees' technical skills but also boost their psychological connection and dedication to the company.

The results also showed that the Employee Engagement had positive and significant relationship with Employee Performance ($\beta = 0.44$, $t = 6.731$, $p < 0.001$), which supported H3. This discovery suggests that those workers who are engaged are more likely to be dedicated, enthusiastic and committed to their job. If employees are fully engaged, they are likely to put more effort behind reaching the company's goals, thereby improving their productivity and performance. The outcome reaffirms that employee engagement is an important element in the success of individuals and their organizations.

This aligns with the study done by Khan, Soomro, and Pitafi (2024), which showed that work engagement is an important factor in employee performance in AI-integrated workplaces. Employees who are engaged are more likely to be cognitively, emotionally and behaviourally involved in their work activities, which leads to increased productive and better job results. Therefore, companies should focus on efforts that will increase employee engagement to improve employee performance on an ongoing basis.

The mediation analysis also showed that there is a significant mediating role between AI Training Programs and Employee Performance in terms of “Employee Engagement” ($\beta = 0.29$, $t = 6.984$, $p < 0.001$), which supports H4. The fact that the indirect effect is significant suggests that the AI Training Programs have an impact on Employee Performance not only directly but also indirectly via a strengthening of the Employee Engagement. When staff members receive proper AI-related training, they will gain confidence in their skills, feel supported by their organizations, and be more engaged in their work. These positive outcomes then have an impact on job performance. This result suggests that the effectiveness of AI Training Programs extends bey-

ond the development of technical competencies. AI training also contributes to psychological and behavioural improvements that strengthen employee engagement, which subsequently enhances employee performance. Therefore, employee engagement serves as an important mechanism through which AI training initiatives generate positive organisational outcomes.

The indirect effect was also significant, indicating that there was partial mediation. Both the direct effect of the AI Training Programs on Employee Performance and the indirect effect via Employee Engagement were statistically significant, suggesting partial mediation. This discovery suggests that Employee Engagement is a crucial link between AI Training Programs and Employee Performance.

This result aligns with recent research emphasising the crucial mediating effect of employee engagement in AI-related interventions at work. Khan, Soomro, and Pitafi (2024) observed indirect positive relationship between AI and employee performance via the mediation of work engagement. Likewise, Madanchian (2024) proposed that employee development programs with the support of AI increase employee commitment and engagement, which in turn leads to better organizational performance results. As a result, organizations should not only invest in building employees' AI skills but also foster a workplace culture that promotes engagement to ensure their investments in AI training yield the best results.

Overall, the findings demonstrate that AI Training Programs play a crucial role in enhancing employee performance within the E&E manufacturing sector. The outcome shows that the training has a direct positive effect on the knowledge of employees, their technical skills, and the effectiveness of the work, and at the same time, enhances employee engagement. The mediating role of Employee Engagement was identified between the two variables of AI Training Programs and Employee Performance, indicating that Employee Engagement is a psychological variable that is critical for linking the AI Training Programs to employee performance. The results of this study align with the increasing body of research highlighting the need for digital transformation and the strategic relevance of employee development efforts focused on AI to create a competitive and sustainable workforce.

Summary of Mediation Analysis

Table 13: Indirect Effect

Relationship	**β**	**t-value**	**p-value**	**Decision**
AI Training Programs → Employee Engagement → Employee Performance	0.287	6.984	<0.001	Supported

Table 14: R^2 Results

Endogenous Construct	**R^2**
Employee Engagement	0.538
Employee Performance	0.718

The mediation analysis results are shown in Table 13. The results indicated that AI Training Programs had a significant indirect effect on Employee Performance through Employee Engagement ($\beta = 0.287$, $t = 6.984$, $p < 0.001$). Indirect effect: The significant indirect effect suggests that AI Training Programs have a positive influence on Employee Performance via Employee Engagement. When employees are provided with proper AI training, they build the knowledge, confidence, and skills to effectively leverage AI technologies, leading to increased engagement and productivity in the workplace.

Hair et al. (2022) indicated that a significant indirect effect was a sign of mediation between the predictor and outcome variables. Additionally, the direct effect of AI Training Programs on Employee Performance was still statistically significant, suggesting that the concept of Employee Engagement acted as a partial mediator. Partial mediation is the case when both direct and indirect effects are statistically significant, indicating that the pathways to improve Employee Performance (partial mediation) involve both Employee Engagement and the direct effects of AI Training Programs.

The coefficient of determination (R^2) for the endogenous constructs is shown in Table 14. The results revealed that the AI Training Programs accounted for 53.8% of the variance in the Employee Engagement ($R^2 = 0.538$). This indicates that the AI training programs have moderate predictive power with regard to Employee Engagement.

The same applies to AI Training Programs and Employee Engagement, which together accounted for 71.8% of the variance in Employee Performance ($R^2 = 0.718$). This finding shows high predicting power and a good explanation of the model for the Employee Performance. Hair et al. (2022) categorizes R2 values as substantial (0.75), moderate (0.50) and weak (0.25). Accordingly, an R^2 value of 0.36 can be assumed as moderate for the Employee Engagement equation and an R^2 value of 0.73 can also be considered substantial for the Employee Performance equation.

Overall, the results indicate that the model has the potential to be predictive and has significant support for the hypothesized relationships among AI Training Programs, Employee Engagement, and Employee Performance.

CONTRIBUTIONS OF THE STUDY DISCUSSION

Theoretical Contributions

In the context of Electrical and Electronics (E&E) manufacturing industry in Malaysia, this study offers empirical evidence and adds to the expanding literature on AI Training Programs, Employee Engagement, and Employee Performance. While past research has looked at the impact of employee training on work outcomes, few studies have focused specifically on the effects of employee training related to AI on employee performance and employee engagement in the E&E manufacturing sector in Malaysia. Given this, the present study adds to the existing knowledge by showing that Employee Engagement is a crucial factor that has a connection with the impact of AI Training Programs on Employee Performance.

In addition, the findings align with the Human Capital Theory which proposes that employee education, training and skill development investments can increase employees' skills, productivity and performance. The findings show that AI Training Programs have a positive impact on Employee Engagement and Employee Performance. This indicates that existing organizations in the Malaysian E&E manufacturing industry have the potential to enhance the effectiveness of their workforce by providing them with relevant knowledge and skills in AI to address the challenges posed by digital transformation.

The study also confirms the Social Exchange Theory (SET). Employees who experience organizational support and commitment to their professional development through AI-related training and professional development opportunities are more likely to view their organizations as supportive and committed to their careers. Consequently, staff are more likely to respond positively by working harder, being more committed and motivated. In conclusion, the presence of a significant mediating effect of Employee Engagement indicates the importance of SET in the field of understanding how organizational investments in AI training lead to better employee performance.

Moreover, the results support the Job Demands-Resources (JD-R) Theory which suggests that organisational resources are positively related to increased employee engagement and improved work outcomes. AI Training Programs serve an important organizational resource by providing employees with the technological skills needed to do their jobs, adjust to new technologies in the workplace, and then achieve a more effective performance. This means that the employees are more dedicated to their tasks and their performance is, in turn, improved.

The study provides a contribution to the theoretical framework of Employee Development related to AI, as it shows the direct and indirect impacts of AI Training Programs on Employee Performance via Employee Engagement. The study also examines employees in the Electrical and Electronics (E&E) manufacturing industry in Malaysia to gain industry-specific insights that broaden the scope of Human Capital Theory, Social Exchange Theory, and Job Demands-Resources Theory for AI-driven employee development and organizational performance.

Policy Implications

The implications for policy and organizations for improving workforce readiness and organizational performance in the world of digital transformation are significant. The findings show that AI Training Programs have a positive impact on Employee Engagement and Employee Performance, underscoring the value of employee development programs. Policymakers should thus facilitate the creation of structured training in AI-related topics and skills that should allow employees to learn how to use new technologies in a more effective way.

Government departments and relevant parties should create opportunities for funding, train and incentivize skills development, and offer professional development programs to support national digital transformation programs and related activities in the field of artificial intelligence. These can assist your workers learn how to use new tech and boost their productivity in meeting company goals.

Additionally, Human Resource Development professionals should incorporate AI Training Programs into their human resource development initiatives to make sure that employees consistently acquire skills that are pertinent to changing workplace needs. The results indicate that providing employees with training can enhance engagement levels and at the same time led to better performance results. Hence, it is important for organizations to offer ongoing learning opportunities, hands-on training sessions, and support structures to ensure that employees can implement their understanding and insights on AI in their daily tasks.

Furthermore, an organisation needs to foster a learning climate which allows employees to participate in the learning process, share knowledge and continually improve. There's much more to it than simply giving employees the resources and training they need organisations must create environments that help them. It is possible to create an employee-focused culture that boosts employee confidence, engagement, and productivity. These may help to ensure the successful uptake of technology, while ensuring that an organization's investment in AI-related workforce development is maximised.

Overall, the findings suggest that strategic investments in AI Training Programs can contribute significantly to the development of a skilled, engaged, and high-performing workforce. Hence, employee education and training programs must be given special attention by policy makers and organizational leaders to improve the competitiveness, productivity, and sustainability of the organization in future.

Managerial Implications

Some conclusions and recommendations for managers and human resource practitioners are suggested in the study. First, managers should understand that adopting AI technologies isn't just about the technology or infrastructure, it's about involving employees. It is essential for organizations to develop on-going training initiatives that enhance staff knowledge, confidence and skill in AI technologies.

Second, managers need to actively involve staff in the assimilation of AI. Investigating employee engagement, motivation and satisfaction in relation to technological changes can have a positive effect on their willingness to adopt AI systems and make the best use of them. Creating awareness, participation and satisfaction among employees regarding technological change initiatives can positively affect employee readiness to embrace technological systems. Well communication, employee involvement in decision making, recognition strategies, and employee development opportunities are some of the things that can enhance engagement (Bakker & Albrecht, 2018).

Third, managers should foster an environment that is supportive to their staffs and open to collaboration with the use of AI, rather than seeing it as a replacement for their staff. Organizations can enhance employee acceptance and optimize performance benefits by using AI to complement employee capabilities, augmenting their workflows. The findings show that businesses that are able to adopt AI technology successfully and to correlate this with a high engagement rate have higher scores in employee performance and organizational effectiveness.

CONCLUSION AND FUTURE RESEARCH

This study examined the relationships among AI Training Programs, Employee Engagement, and Employee Performance in the Malaysian E&E manufacturing industry. The findings revealed that AI Training Programs were positively associated with Employee Performance and Employee Engagement. In addition, Employee Engagement was positively associated with Employee Performance. These findings suggest that AI-related training initiatives may contribute to employees' skills development, confidence, and work-related outcomes within organisations.

While the present study successfully established the reliability, validity, and structural relationships among the constructs, additional model assessment indicators such as the Standardized Root Mean Square Residual (SRMR), effect size (f^2), and predictive relevance (Q^2) were not included in the analysis. Future studies are encouraged to incorporate these measures to provide a more comprehensive evaluation of model fit, predictive capability, and the practical significance of the proposed relationships. The omission of these advanced assessment measures does not affect the validity of the current findings, as the study has fulfilled the fundamental PLS-SEM evaluation requirements through reliability analysis, convergent validity, discriminant validity, collinearity assessment, coefficient of determination (R^2), and hypothesis testing. Nevertheless, incorporating SRMR, f^2, and Q^2 in future investigations would further strengthen the robustness and predictive power of the model.

The study also confirmed that Employee Engagement significantly mediated the relationship between AI Training Programs and Employee Performance. This finding suggests that employees who perceive AI-related training initiatives as valuable may demonstrate higher levels of engagement, which are associated with improved work performance.

From a theoretical perspective, the study contributes to the existing literature by providing empirical evidence on the relationships among AI Training Programs, Employee Engagement, and Employee Performance. The findings provide support for Human Capital Theory, which emphasises the importance of employee training and skill development in enhancing organisational outcomes. The results also provide support for Job Demands-Resources (JD-R) Theory and Social Exchange Theory, suggesting that organisational investments in employee development are associated with higher levels of employee engagement and performance.

From a practical perspective, organisations may benefit from investing in AI-related training initiatives to support workforce development and organisational readiness for digital transformation. Providing continuous learning opportunities, professional development programmes, and supportive training environments may contribute to employee engagement and performance.

Several limitations should be acknowledged. First, the study employed a cross-sectional design, which limits the ability to establish causal relationships among the variables. Second, the study relied on self-reported data, which may be subject to response bias. Furthermore, the research was conducted within the Malaysian E&E manufacturing industry, which may limit the generalisability of the findings to other sectors and contexts.

Future studies may adopt longitudinal research designs to provide a deeper understanding of changes in employee engagement and performance over time. Future research may also examine additional factors such as organisational support, digital competence, leadership style, and job satisfaction. In addition, studies involving different industries and organisational settings would help enhance the generalisability of the findings. Future research may further strengthen PLS-SEM evaluation by incorporating additional indicators such as the Standardized Root Mean Square Residual (SRMR), effect size (f^2), and predictive relevance (Q^2) to provide a more comprehensive assessment of model fit, effect magnitude, and predictive capability.

The findings provide practical implications for organisations seeking to improve workforce performance through AI adoption. Investment in structured AI training programs can enhance employee engagement and ultimately contribute to improved employee performance, particularly within technology-driven working environments.

In conclusion, the findings highlight the importance of AI Training Programs and Employee Engagement in supporting Employee Performance within the context of digital transformation. Organisations seeking to maximise the benefits of AI implementation should consider employee training and engagement initiatives as important components of long-term workforce development strategies.

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