

The Effect of Training and Competency Development on Employee Productivity

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ABSTRACT

This research investigates the relationship between training, competency development, and employee productivity. Conducted at PT GMF Aeroasia, specifically within the Line Maintenance department in Denpasar, this study addresses the high-stakes operational environment where technical precision and efficiency are paramount. The primary objective is to evaluate how structured human capital interventions contribute to overall organizational productivity. The study employed a quantitative research design. Data were gathered through the distribution of structured questionnaires to employees, ensuring a representative sample of the technical workforce. The analytical framework utilized Structural Equation Modeling-Partial Least Square (SEM-PLS) to test the hypothesized relationships between the variables. This method allowed for a robust assessment of both direct effects and the measurement model's validity. The empirical results reveal a nuanced picture of human resource dynamics. Training was found to have a positive and significant influence on employee productivity, suggesting that targeted skill acquisition and technical instruction directly translate into better operational output. In contrast, the analysis indicates that competency development does not have a significant impact on productivity in this specific context. This discrepancy suggests that while immediate technical training is effective, broader competency-based programs may not be optimally aligned with the immediate productivity demands of line maintenance operations. These findings provide important practical implications for management. The study highlights the necessity of prioritizing investment in continuous training programs to maintain high performance standards. Furthermore, it suggests that current competency development frameworks require a strategic reassessment to ensure better integrated with functional job requirements to effectively drive future productivity.

INTRODUCTION

The post-COVID-19 pandemic period (new normal) has had an extraordinarily significant impact on the global economy, particularly on the aviation industry, as stated by the International Civil Aviation Organization (ICAO) in 2020. This unprecedented situation has drastically affected organizational performance, primarily due to the sharp decline in aviation activities (Sun et al., 2020). Since the beginning of the new normal era, organizations around the world have faced major challenges in maintaining employee productivity. Travel restrictions, social distancing measures, and changes in work patterns have fundamentally transformed the operational landscape of organizations. For example, many companies have shifted to remote working models, which require new capabilities in time management, virtual communication, and online collaboration (Błaszczyk et al., 2023).

As a Maintenance, Repair, and Overhaul (MRO) service provider, GMF AeroAsia faces aviation industry dynamics that have significantly affected its operations, particularly within the Denpasar Line Maintenance division of GMF AeroAsia (Asia, 2024). According to the 2024 Integrated Report of PT GMF AeroAsia, the company has implemented a series of strategic policies to strengthen its services. These measures include the continuation of partnership policies, expansion into international markets with a focus on the airframe maintenance segment, investments in technologies that enhance MRO services, and improvements in effective corporate governance practices.

Employee training and competency development are important considerations because they can affect employee productivity. These efforts aim to ensure that employees remain relevant, skilled, and productive in responding to the continuously evolving work environment, particularly through the adoption of technology and adjustments in work patterns required to address the challenges arising in the post-pandemic period (Sutrisna & Aprilyani, 2021). To support the achievement of organizational objectives, the Company continues to effectively implement human resource development programs designed to strengthen both hard and soft competencies, thereby enhancing the productivity of individual employees.

Competency development as a means of improving productivity is also promoted alongside the implementation of employee performance through knowledge management. This is based on the role of knowledge management in facilitating the dissemination of knowledge and best practices among employees, thereby minimizing work redundancy, accelerating decision-making processes, and fostering sustainable operational innovation (Anggraini & Ansori, 2025). This integration is important because knowledge management enables organizations to document and disseminate individual expertise as collective intellectual capital, which directly strengthens employees' ability to adapt to technical changes in the workplace and enhances overall work efficiency (Simbolon et al., 2026).

These competency development and knowledge management efforts have faced significant challenges due to the uncertain labor dynamics in the post-pandemic period. In 2022, PT GMF

AeroAsia in the Denpasar operational area experienced substantial changes in its organizational structure, with the number of male employees decreasing to 67 individuals. This figure represents a 36.2% decline compared to the pre-pandemic period, a contraction that compelled the organization to optimize its remaining human resources to continue meeting the operational standards of the aviation industry. This reduction in personnel is presented in detail in Table 1, which illustrates the shift in workforce capacity at the location throughout the transition period.

Table 1. Total Number of Employees of PT GMF AeroAsia

Description	2024			2021		
	Male	Female	Jumlah	Male	Female	Jumlah
Jakarta	3.394	449	3.843	3.917	474	4.391
Denpasar	67	2	69	105	4	109
Surabaya	49	5	54	77	5	82
Kualanamu	30	0	0	39	4	43
Makassar	42	2	44	66	3	69
Other Regions (Indonesia)	133	2	135	159	6	165
Total	3.715	460	4.175	4.363	496	4.859

Source: PT GMF AeroAsia Integrated Reports 2024 and 2021

As part of its strategic response to these conditions, the Company has sought to increase the number of employees under the age of 40 who possess a strong work ethic, creativity, and high productivity. This initiative is also aligned with the regeneration program aimed at ensuring the transfer of knowledge from employees approaching retirement. Knowledge transfer is carried out from employees with higher educational backgrounds to those with lower educational backgrounds.

The educational backgrounds of PT GMF AeroAsia employees vary, ranging from school-level education to doctoral-level education. In 2021, the distribution of employees by educational level was as follows: school-level education (1,221 employees), Diploma (D3) (2,199 employees), Bachelor's degree (S1) (1,286 employees), Master's degree (S2) (154 employees), and Doctoral degree (S3) (2 employees). In 2024, changes were observed in several educational categories, with the number of employees recorded as follows: school-level education (862 employees), Diploma (D3) (1,763 employees), Bachelor's degree (S1) (1,387 employees), Master's degree (S2) (123 employees), and Doctoral degree (S3) (2 employees). A detailed breakdown of employee educational levels, including gender specifications, is presented in Table 2.

Table 2. Educational Levels of PT GMF AeroAsia Employees

Description	2024			2021		
	Male	Female	Jumlah	Male	Female	Jumlah
Doctoral Degree (S3)	2	0	2	2	0	2
Master's Degree (S2)	123	38	161	114	40	154
Bachelor's Degree (S1)	1.124	263	1.387	1.032	254	1.286
Diploma Degree (D3)	1.636	127	1.763	2.044	155	2.199
Senior High School (SMA)	830	32	862	1.174	47	1.221
Total	3.715	460	4.175	4.365	496	4.861

Source: PT GMF AeroAsia Integrated Reports 2024 and 2021

Based on the data presented in Table 2 regarding employee educational levels, improvements in employee competencies are reflected in the changing distribution of employees by educational attainment, with the proportion of employees holding bachelor's, master's, and doctoral degrees increasing compared to the previous year. Therefore, employee training and development programs are implemented to strengthen organizational commitment, enhance job satisfaction, reduce absenteeism and turnover, and improve overall productivity. It is also important to consider differences in employee competencies when assigning personnel to positions to ensure that the expected level of work productivity can be achieved effectively and efficiently.

A study by Yertas (Yertas, 2024), entitled "The Role of Training and Continuous Development in Improving Employee Productivity and Its Impact on Company Financial Performance", demonstrated that training significantly enhances both technical and non-technical skills, thereby strengthening employee adaptability and work output. The adoption of digital transformation initiatives, such as virtual simulations, has also been shown to effectively improve the scale and relevance of these development programs.

Previous research conducted by (Mikołajczyk, 2020) explored the transformation of employee development strategies within organizations during the post-COVID-19 pandemic (new normal) period. Qualitative approach and in-depth interviews involving 19 HR managers revealed that changes occurred not only in training methodologies but also in the content and competencies desired by employees. Key findings indicated declining employee engagement and the emergence of digital fatigue resulting from the excessive intensity of online-based development initiatives.

Learning and Development (L&D) practitioners are encouraged to adopt more agile approaches in designing programs that are aligned with individual needs. Future strategies should emphasize learning models that balance self-directed flexibility with meaningful real-world interaction. Effectiveness of human resource development in the new era largely depends on companies' ability to integrate information technology wisely. Therefore, this study focuses on the production department, materials section, and production planning support unit at PT GMF AeroAsia Denpasar as the primary units of analysis. Selection of these departments was

conducted purposively because these units represent the frontline of the Company's operations and possess the most measurable and objective productivity indicators. Production departments differ from administrative functions in that they have clearly defined performance parameters, including fluctuations in output volume, efficiency in material utilization, and adherence to production schedules. Concentrating the study on areas characterized by explicit performance benchmarks allows the impact of training and competency development programs on employee productivity to be evaluated with greater precision and empirical rigor.

RESEARCH METHODS

This study employed a saturated sampling technique, in which all members of the population comprising 67 employees of PT GMF AeroAsia Denpasar were involved as respondents. Inclusion of the entire population was undertaken due to the relatively small and limited population size, thereby enabling the findings to comprehensively represent the organizational conditions.

Sample size determination was conducted using purposive sampling and the Slovin formula with a margin of error of 0.05% (Hartati, 2021). Total respondents included in this study comprised 57 employees of PT GMF AeroAsia Denpasar. Questionnaires were distributed to respondents through a link and covered employee demographic characteristics, such as age and educational background, as well as competency development aspects, including training.

Table 3 presents the distribution of respondents by department. Fifty respondents were drawn from the production division, representing 87% of the total respondents. Five respondents originated from the production planning support division, accounting for 9%, while two respondents came from the materials division, representing 4%.

Table 3. Distribution of Samples by Unit

	Department	Sample
1	Production	50
2	Production Planning Support	5
3	Materials	2
Total		57

Source: Research Data (processed), 2022.

Selection of the production department, materials section, and production planning support unit as the focus of this study was based on the availability of objective and measurable productivity parameters. These departments possess clearly defined Key Performance Indicators (KPIs), enabling the effectiveness of training programs to be evaluated directly through fluctuations in production output and efficiency in material utilization. Concentrating the study on these units allows the relationship between improvements in technical competencies resulting from training and actual organizational outcomes to be analyzed more accurately and empirically.

The analysis stage in this study involved the application of the Partial Least Squares (PLS) approach for data processing and analysis. This approach enables the development of component-based or variance-based Structural Equation Modeling (SEM). Formation of causal models describing cause-and-effect relationships among construct variables is specifically facilitated through this approach (Wijaya, 2019). PLS-SEM analysis consists of two main models. First, the outer model, also known as the measurement model, illustrates how observed variables represent the latent variables being measured. Second, the inner model, or structural model, explains the strength of the relationships among latent variables and their constructs (Ghozali & Latan, 2014).

PLS-SEM calculations in this study employed the PLS Algorithm and Bootstrapping procedures. Partial Least Squares-Structural Equation Modeling (PLS-SEM) is a nonparametric method that does not require assumptions regarding data distribution. Application of PLS-SEM is possible for non-normally distributed data because the PLS algorithm transforms non-normal data through the central limit theorem (Marliana, 2020). The PLS algorithm generates information related to construct validity and reliability (convergent validity), discriminant validity, R-square, F-square, and multicollinearity. Bootstrapping procedures in multiple regression produce path coefficients (direct effects) aimed at determining whether independent variables exert significant direct effects on dependent variables. Direct effects refer to the direct influence of an exogenous latent variable on an endogenous variable (Ilahia et al., 2023).

Evaluation was conducted in two main stages, namely outer model (measurement model) testing and inner model (structural model) testing. Outer model evaluation included convergent validity testing with criteria of Loading Factor values > 0.70 and AVE values > 0.50 . Discriminant validity was subsequently assessed using the HTMT criterion with values < 0.90 , followed by reliability testing using Cronbach's Alpha and composite reliability with criteria values > 0.70 . Inner model evaluation employed four main criteria, namely multicollinearity assessment with VIF values < 10 indicating the absence of multicollinearity, R-square values with thresholds of 0.25, 0.50, and 0.75 representing weak, moderate, and strong models, respectively, F-square (effect size) values with thresholds of 0.02, 0.15, and 0.35 indicating small, medium, and large effects, respectively, and path coefficient (direct effect) testing with P-values < 0.05 indicating significant effects, whereas P-values > 0.05 indicate non-significant effects (Ilahia et al., 2023).

RESULT AND DISCUSSION

Respondent Profile. This study involved 67 respondents, all of whom were male employees at PT GMF AeroAsia Line Maintenance Denpasar. Collection of respondent profile data aimed to provide an overview of the characteristics of the human resources serving as research subjects, including educational level and age range. Data collected indicated that all respondents (100%) were male employees assigned to the Denpasar operational area. Educational backgrounds varied and included senior high school graduates, bachelor's degree holders (S1), master's degree holders (S2), and doctoral degree holders (S3). Diversity in educational attainment

indicates the presence of both technical and managerial personnel within the production department. Respondents were within the productive age range of 30 to 50 years. This age composition reflects a workforce possessing substantial levels of work experience and maturity within the aircraft maintenance industry.

Outer Model. Results of the analysis indicate that all variables in the outer model were found to be valid. Evidence for this conclusion is reflected in the Average Variance Extracted (AVE) values exceeding 0.50 for each variable, indicating that the variance explained by the observed indicators is greater than the variance attributable to measurement error. Each variable can therefore be considered to adequately represent the construct being measured. Convergent validity was also established, as demonstrated by significant and positive factor loading values for each indicator. These findings indicate that each indicator effectively measures the construct it represents.

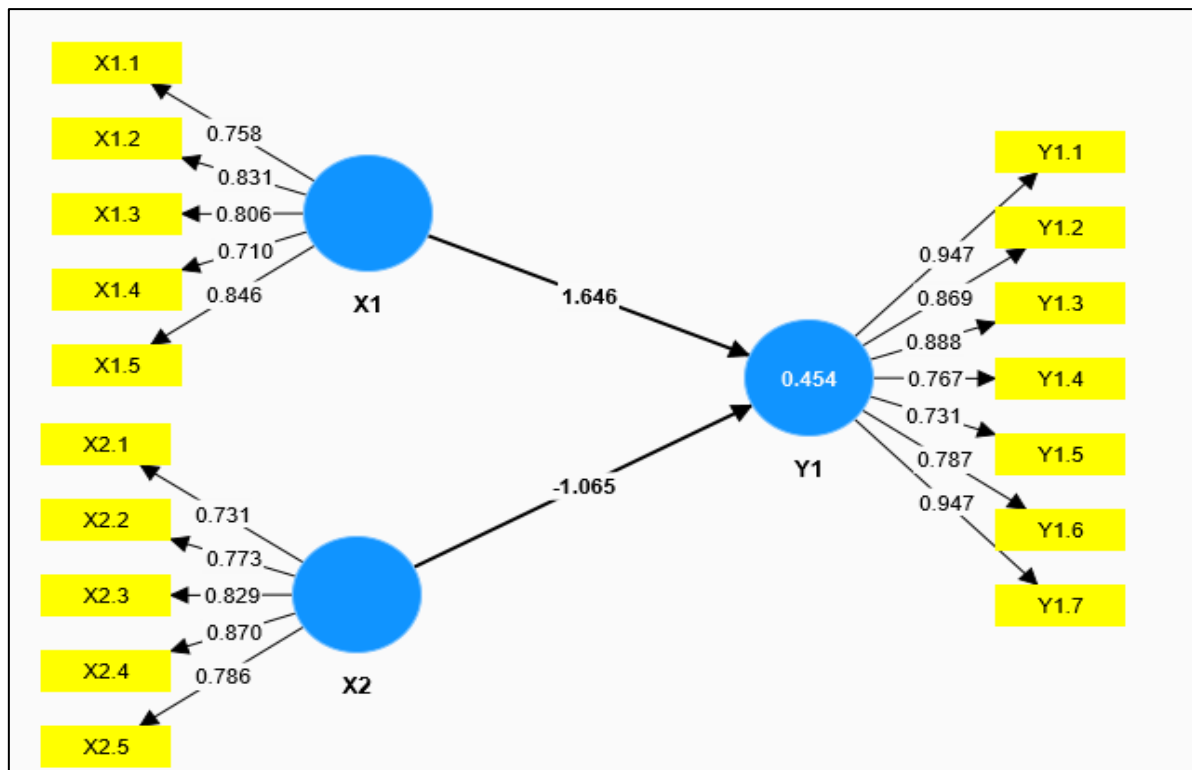


Figure 1. Factor Loadings

Source: Processed Research Data, 2023.

Furthermore, discriminant validity testing for X1 and X2 produced values greater than 0.80. These results indicate that the assumptions of discriminant validity have been satisfied, demonstrating strong relationships among the variables in the model, as presented in Table 4.

Table 4. Results of Reliability Testing for Latent Variables

No	Variable	Cronbach's Alpha	Composite Reliability	AVE
1	Training (X1)	0,852	0,893	0,627
2	Competency Development (X2)	0,860	0,898	0,639
3	Employee Productivity (Y)	0,938	0,948	0,726

Source: Processed Output Data, 2023.

Overall findings indicate that the outer model is valid, demonstrating that the measurement instruments employed in this study are reliable and provide an accurate representation of the constructs being measured.

Inner Model. Multicollinearity testing indicated that the Variance Inflation Factor (VIF) values for all variables in the model were below 10. These results, presented in Table 4, indicate the absence of multicollinearity among the variables.

These findings indicate the absence of multicollinearity issues among the variables included in the model. Low VIF values suggest that no variable exhibits a strong relationship with other variables in the model that could lead to unstable or unreliable estimates. Assumptions underlying the multicollinearity test were therefore satisfied. These results provide additional assurance regarding the reliability of the analytical model and demonstrate that each variable contributes uniquely without exhibiting excessive correlation with other variables in the model.

The R-square value of 0.454 indicates that the independent variables included in the model were able to explain 45.4% of the variation in the dependent variable Y1, while the remaining 54.6% was explained by factors outside the research model. Adjusted R-square value of 0.434 indicates that, after adjustment for the number of independent variables and sample size, the model explained 43.4% of the variation in Y1, whereas the remaining 56.6% was influenced by variables not included in the model. These findings suggest that the research model possesses moderate explanatory power, as nearly half of the variation in variable Y can be explained by the variables examined in this study.

Results of the F-square test indicate that the relationship between X1 and Y1 produced an f^2 value of 0.324. This value falls within the medium effect category, indicating that X1 contributes substantially to increasing the R^2 value of Y1. Relationship between X2 and Y1 generated an f^2 value of 0.135, which is classified as a small effect. These findings suggest that X1 exerts a relatively more dominant influence on Y1 than X2 within the tested research model. Detailed results of the F-square test are presented in Table 5.

Table 5. F-Square Test Results

	X1	X2	Y1
X1			0,324
X2			0,135
Y1			

Source: Processed Output Data, 2023.

The R-square value of 0.454 indicates that approximately 45.4% of the variability in the dependent variable can be explained by the independent variables included in the model. This result suggests that the model demonstrates a reasonably good level of fit in explaining variations in the data. Furthermore, the adjusted R-square value of 0.434 indicates that approximately 43.4% of the variability in the dependent variable can be explained by the independent variables after accounting for model complexity and goodness of fit.

The use of regression coefficients in this analysis refers to the contribution of independent variables to the dependent variable. Regression coefficients indicate the expected magnitude of change in the dependent variable resulting from a one-unit change in an independent variable while holding other variables constant. Regression coefficient values therefore provide information regarding the strength of the relationship between independent variables and the dependent variable within the model employed in this study.

Results of the F-square test indicate that variable X1 produced an F-square value of 0.324, which exceeds the threshold of 0.15. This result indicates that X1 has a significant effect on the dependent variable. Variable X1 can therefore be considered to make a substantial contribution to explaining variations in the dependent variable. Results for X2 indicate the absence of a significant effect on the dependent variable. Findings suggest that X2 does not provide a substantial contribution to explaining variations in the dependent variable within the context of the model employed. These results provide important insights into the relative contributions of each independent variable to the dependent variable and contribute to a deeper understanding of the relationships among variables in the analysis. Hypothesis testing was conducted using path coefficients generated through the bootstrapping method, as presented in Table 6.

Table 6. Hypothesis Testing Results

Path Coefficients				
	Original Sample (O)	Sample Mean (M)	t-statics (io/STDEV)	P value
X1 → Y1	1,646	1,297	3,167	0,002
X2 → Y1	-1,065	-0,622	1,488	0,137

Source: Processed Output Data, 2023.

Results of the analysis indicate that the p-value for variable X1 was 0.002, which is lower than the significance threshold of 0.05. These findings indicate that X1 exerts a significant influence on the dependent variable, namely employee productivity. In contrast, the p-value for X2 was 0.137, exceeding the significance threshold of 0.05. This result indicates that X2, representing competency development, does not have a significant effect on employee productivity. These findings provide further insights into the relative contributions of each independent variable to the dependent variable within the model employed. Such results may serve as a basis for more informed decision-making in efforts to enhance employee productivity.

Discussion. Research findings indicate that training (X1) has a positive and significant effect on employee productivity. These findings demonstrate that, for line maintenance mechanics, specific and continuous technical instruction constitutes a fundamental requirement. Within the highly regulated aviation industry, technical training is not merely an additional source of knowledge but rather an essential requirement for maintaining aircraft airworthiness (Sembiring et al., 2024).

Significance of training is closely related to the Resource-Based View (RBV) theory, in which continuously updated technical skills constitute strategic assets for the company (Anggriani & Inapty, 2025). Targeted training programs implemented at GMF AeroAsia Denpasar enable employees to work more efficiently while minimizing the occurrence of human error. These improvements directly contribute to increased daily work output within the production team. Relationship between training and productivity at the Denpasar facility also reflects the need for high efficiency following the 36.2% reduction in workforce. Current staffing levels of only 67 employees require each individual to demonstrate a high level of agility. Intensive technical training therefore serves as a solution that enables a leaner team to manage substantial workloads without compromising quality standards (Mariana et al., 2024).

This study found that competency development (X2) does not have a significant effect on productivity. This finding contrasts with the common assumption that all forms of human resource development necessarily improve performance (Munawaroh et al., 2023). Within the operational context of Denpasar, competency development programs that are general in nature or oriented toward long-term managerial capabilities appear to have not yet produced an immediate impact on daily work outcomes in the field.

Non-significant effect of competency development may be attributed to a mismatch between development materials and urgent frontline requirements. Competency development programs that are excessively broad often require considerable time to be fully internalized, whereas line maintenance operations demand rapid and real-time completion of technical tasks. These findings highlight the importance for management to re-evaluate the existing competency development curriculum.

Phenomenon of digital fatigue resulting from the large number of self-development initiatives introduced after the pandemic may also constitute an inhibiting factor. Competency development delivered through excessive online platforms without adequate practical guidance tends to generate employee fatigue and boredom. Employee attention becomes divided between fulfilling technical responsibilities on the airport apron and completing development modules that are predominantly theoretical in nature (Putri & Riana, 2025).

Knowledge management perspective suggests that knowledge distribution at GMF Denpasar is more effective when delivered through practical training pathways rather than abstract formal development programs. Best practices are more readily absorbed by mechanics when conveyed through direct demonstrations or technical simulations that produce immediate implications for aircraft operations (Junaidin et al., 2025).

Implications for future research highlight the need to explore moderating variables, such as organizational culture or leadership, that may strengthen the effect of competency development. Case of GMF Denpasar demonstrates that high-stakes work environments require more agile and highly personalized human resource development approaches tailored to the specific needs of each work unit.

Overall findings of this study confirm that strengthening technical training programs should become the primary priority for improving productivity in the post-crisis aviation industry. Management of GMF AeroAsia needs to recalibrate competency development programs to ensure that they do not merely become administrative burdens for employees, but are genuinely integrated with functional requirements that support the Company's long-term business sustainability.

CONCLUSION AND SUGGESTION

Technical training constitutes the primary driver that significantly enhances employee productivity at PT GMF AeroAsia Denpasar, particularly in addressing post-pandemic personnel limitations. Competency development, in contrast, was found to have no significant effect, indicating a misalignment between long-term development programs and the urgent operational requirements of aircraft maintenance activities. These findings confirm that, within the high-risk aviation industry, management should prioritize investments in practical training that directly improves work efficiency and recalibrate human resource development strategies to ensure greater alignment with functional demands in the field.

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