The Influence of Training and Supervision of AMC Unit on the Performance of Ground Support Equipment Personnel at Hang Nadim Airport Batam

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ABSTRACT

Abstract

Training and supervision of the Apron Movement Control (AMC) unit play a crucial role in ensuring smooth and safe airside operations. At Hang Nadim Airport Batam, however, violations and complaints are still observed, indicating that AMC's training and supervision efforts have not been fully effective. This research analyzes the influence of training and supervision on the performance of Ground Support Equipment (GSE) personnel. The study employed a quantitative method using primary data from questionnaires distributed to 36 respondents, determined with the Slovin formula. Data were analyzed using multiple linear regression. The results show that training contributes 39.2% to performance improvement, while supervision contributes 34.4%. Together, both variables explain 70% of performance variation, with 30% influenced by other factors. The simultaneous F-test results confirm that training and supervision significantly affect GSE performance. This study concludes that AMC's training and supervision are essential in improving personnel performance at Hang Nadim Airport Batam.
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Keywords: Training, Supervision, AMC, Ground Support Equipment, Personnel Performance, Hang Nadim Airport

1. INTRODUCTION

Hang Nadim International Airport, located in Batam, Indonesia, plays a vital role in supporting regional economic and social activities. With the longest runway in Indonesia, it accommodates large aircraft such as the Boeing 747 and Airbus A380. The efficiency of airside operations is heavily dependent on the performance of Ground Support Equipment (GSE) personnel, whose tasks include passenger services, baggage handling, refueling, aircraft safety, and pushback operations

At Hang Nadim Airport in Batam, Ground Support Equipment personnel are provided by third parties, namely Gapura and Gemalindo Air Support. As Ground Support Equipment personnel, they are responsible for providing passenger services, maintaining aircraft cleanliness, refueling aircraft, ensuring aircraft security, pushing aircraft back, loading and unloading checked baggage, and marshaling. Due to the numerous duties of Ground Support Equipment personnel, oversight by apron movement control is essential..

In addition to managing aircraft movements on the airside, AMC personnel at Hang Nadim Batam are also responsible for training and supervising Ground Support Equipment personnel on the airside. This supervision and training are carried out to ensure the security, safety, and smooth operation of Hang Nadim Batam AirportSupervision conducted by the AMC unit aims to ensure that all Ground Support Equipment activities are carried out according to their respective duties and to maintain the smooth operation of airport airside

operations.However, excessive or ineffective supervision can impact the work performance of Ground Support Equipment personnel

This study will analyze the influence of AMC unit supervision on the performance of Ground Support Equipment personnel on the airside of Hang Nadim Airport, Batam.

2. METHODS

This study uses a quantitative approach. Data were collected through questionnaires distributed to GSE personnel at Hang Nadim Airport Batam. The sample size of 36 respondents was determined using the Slovin formula. Variables measured include training (X1), supervision (X2), and performance (Y). Data were analyzed using multiple linear regression to evaluate both partial and simultaneous effects.

2.1 Research Variables

The research uses quantitative data. The quantitative data in this study were obtained from respondents' answers to questionnaires distributed to Ground Support Equipment personnel at Hang Nadim Airport in Batam. The data analysis used was multiple linear regression analysis, which included data instrument testing, multiple linear regression analysis, and hypothesis testing.

The dependent variable or bound variable is the variable that is the researcher's primary focus or the variable that aligns with the investigation. The dependent variable in this study is

the performance of Ground Support Equipment (Y) personnel.

The independent variable is a variable that influences the dependent variable, either positively or negativelyThe independent variables in this study are Ground Support Equipment personnel training (X1) and personnel supervision by the AMC Unit (X2)

The following table summarizes the indicators and their sources:

Variable	Indicator	Source
GSE Personnel Training (Variable X1)	Instructor education in Training	Susanthi,N.I & Seruni, I. P. (2016)
	Participants need selection	
	Curriculum Suitability	
	Effective training activities	
	Training objectives are socialized	
	Structured goals	
	Participant motivation	
	Participant development	
Personnel Supervision by AMC Units (Variable X2)	Appraisal	Hernawan, M. A., Akbar, F., & Sodikin, A. (2016)
	Enforcement	
	SOP conformity	
	Evaluation	
	Policy	
	objective	
GSE Personnel Performance (Variable Y)	Quality of work	Mufida, A. F. (2023)
	Working quantity	
	Effectiveness	
	Independence	
	Work commitment	
	Presence	

Figure 1 Conceptual framework of the study.

. A sample is a portion of a population, consisting of a number of members selected from the population. The sampling method used in this research is non-probability sampling.

explains that non-probability sampling is a sampling technique that does not involve random selection. The elements of the population selected for the sample may be due to chance or other factors previously planned by the researcher.

The type of non-probability sampling used in this study is saturation sampling. Explains that saturation sampling is a sampling technique where all members of the population are used as samples, provided the population is small, or the researcher wants to make generalizations with minimal error.

To calculate the minimum number of samples required, the study used the Taro Yamane formula, which is suitable for large populations. By applying a 15% margin of error, the sample size was calculated as follows:

$$n = \frac{N}{1 + (N \cdot e^2)}$$

$$n = \frac{189}{1 + (189 \; x \; 0,15^2)}$$

$$n = \frac{189}{5,2525}$$

$$n = 35,98 \; \rightarrow \; 36$$

Number of samples = 36

Number of Ground Support Equipment personnel samples =

$\frac{170}{189} \; x \; 36$ $\qquad$ = 32 sample of *Ground Support Equipment*

$\frac{19}{189} \; x \; 36$ $\qquad$ = 4 Sample Amc

2.2 Research Instrument

This study utilized a structured, closed-ended questionnaire to the influence of AMC unit supervision on the performance of Ground Support Equipment personnel on the airside of Hang Nadim Airport, Batam.. The questionnaire was developed based on validated indicators from previous research, specifically the about personnel training , personnel supervision by Amc , and GSE personnel Perfomance.

Each item in the questionnaire was assessed using a 5-point Likert scale, which allows respondents to express their level of agreement or disagreement with each statement. This approach is effective for measuring attitudes, feelings, and experiences in service-related research. According to, the Likert scale is commonly used in quantitative studies to measure social phenomena such as perceptions, opinions, and satisfaction levels. This scale allows respondents to indicate their level of agreement with each statement, with the following score ranges:

Table 1 Likert Scale for Questionnaire Assessment

Code	Score	Description
SA	5	Strongly Agree
A	4	Agree
N	3	Neutral
D	2	Disagree
SD	1	Strongly Disagree

Based on questionnaires distributed to 32 ground support equipment personnel and four AMC personnel at Hang Nadim International Airport, Batam, during on-the-job training, data was obtained on the influence of training and the AMC supervision unit on the performance of ground support equipment personnel. The data used in this study is primary data. The primary data in this study was obtained by distributing questionnaires to 32 ground support equipment personnel and four AMC personnel at Hang Nadim International Airport, Batam.

The data collection method used was a questionnaire distribution during the On-the-Job Training activity. Twenty questions were administered directly using a Google Form. Respondents then responded to the questionnaire. Each respondent could only provide one answer in the appropriate column.

2.3 Data Analysis Techniques

This research applied several quantitative data analysis techniques to ensure that the collected data were both valid and reliable, and to measure the correlation between the variables under study. The analysis was conducted using IBM SPSS Statistics 26, following standard procedures for instrument validation and inferential statistics in social research.

2.3.1. Validity Test

To determine the validity of the questionnaire items, the Pearson Product-Moment Correlation was used. An item is considered valid if the significance value (sig.) < 0.05 and the calculated correlation coefficient (r count) exceeds the critical value of r table at a 95% confidence level. In this study, the r table value for df = (36-2= 34) and $\alpha = 0.05$ was 0.329. All questionnaire items for both the independent and dependent variables achieved significance values less than 0.05 and correlation coefficients greater than 0.329, indicating that each item was statistically valid. According to, validity testing using Pearson correlation is appropriate for measuring item consistency with its respective indicator.

2.3.2. Reliability Test

Reliability testing was conducted using Cronbach's Alpha. A variable is considered reliable if the Cronbach's Alpha coefficient is ≥ 0.7, which indicates good internal consistency among the items in the instrument. The test results in this study showed that all variables, including both Passenger Satisfaction and Service Quality, had alpha values above 0.7. Therefore, the questionnaire was deemed reliable and consistent for further analysis. As suggested by, a high Cronbach's Alpha coefficient reflects the stability and coherence of items in measuring a specific construct.

2.3.3. Multiple Linear Regression Analysis

To determine whether the independent variables influence the dependent variable, this study uses multiple linear regression analysis. Multiple linear regression analysis is applied because it can show the direction of the relationship between variables, namely, whether the relationship is positive or negative.

$$Y = a + b1X1 + b2X2 + e$$

2.3.4. Hypothesis Test (t-Statistic Test)

The t-test statistic essentially indicates the extent to which an explanatory/independent variable influences the interpretation of the variation in the dependent variable individuallyIf the significance value is <0.05 and the calculated t-statistic is > the t-value according to the table (Df = n-k-1), the independent variable has a significant effect on the dependent variable.f the significance value is >0.05 and the calculated t-statistic is < the t-value according to the table (Df = n-k-1), the independent variable does not have a significant effect on the dependent variable

2.3.5. F Statistical Test

The F-statistic test is used to test whether variables collectively influence the dependent variable (Ghozali, 2018). The criteria for the F-statistic test are as follows:If the significance value is <0.05 and the calculated F-value is >F-table, then all independent variables simultaneously influence the dependent variable.If the significance value is >0.05 and the calculated F-value is <F-table, then all independent variables simultaneously have no effect on the dependent variable.

3. RESULTS AND DISCUSSION

This section presents the results of data testing conducted to test the validity, reliability of research instruments, Multiple Linear Regression Analysis, Hypothesis Test (t-Statistical Test), and F-Statistical Test for research on the influence of AMC unit supervision on the performance of Ground Support Equipment personnel on the airside of Airport Hang Nadim, batam

3.1. Validity Test

The validity test was conducted using the Pearson Product Moment correlation technique. An item is declared valid if the significance value (sig.) < 0.05 and the calculated r count > r table, where the r table value for n = 36 at a significance level of 5% is 0.329.

The validity test results showed that the calculated r value for each indicator exceeded the tabulated r value of 0.329, obtained from the formula df = n - 2 (36 - 2 = 34).These results indicate that the questionnaire indicators used to measure the influence of training and supervision variables on performance are valid

Table 2 Validity Test Results for Variable X (Passenger Satisfaction)

variable	indicator	R count	R table	satus
Training	X1.1	0,747	0,329	valid
	X1.2	0,642	0,329	valid
	X1.3	0,644	0,329	valid
	X1.4	0,562	0,329	valid
	X1.5	0,619	0,329	valid
	X1.6	0,768	0,329	valid
	X1.7	0,718	0,329	valid
	X1.8	0,768	0,329	valid
supervision	X2.1	0,681	0,329	valid
	X2.2	0,718	0,329	valid
	X2.3	0,717	0,329	valid
	X2.4	0,611	0,329	valid
	X2.5	0,743	0,329	valid
	X2.6	0,826	0,329	valid
perfomance	Y.1	0,716	0,329	valid
	Y.2	0,587	0,329	valid
	Y.3	0,800	0,329	valid
	Y.4	0,576	0,329	valid
	Y.5	0,606	0,329	valid

The results show that all statement items from both the independent variable (Passenger Satisfaction) and the dependent variable (Service Quality) have sig. values less than 0.05 and r count values greater than 0.195. This confirms that all the items used in the questionnaire are valid and eligible for further analysis.

3.2. Reliability Test

The reliability test aims to evaluate the internal consistency of the instrument used to measure both the independent variable (Passenger Satisfaction – X) and the dependent variable (Service Quality – Y). The test was conducted using Cronbach's Alpha, a commonly used reliability coefficient in quantitative studies.

According to, a variable is considered reliable if the Cronbach's Alpha value is ≥ 0.7, which indicates that the questionnaire items consistently measure the intended construct. In line with this threshold.

The results showed that both variables achieved Cronbach's Alpha values greater than 0.7, confirming that the instrument is reliable for use in further statistical analysis

Table 2 Reability Test Results

Variable	Cronbach's alpha	Cut off value	status
Training	0,836	0,70	Reliable
Supervision	0,810	0,70	Reliable
Perfomance	0,754	0,70	Reliable

3.3. Multiple Linear Regression Analysis

Table 3 *Multiple Linear Regression Analysis*

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	3.619	2.570		1.408	.168
	Training	.392	.096	.542	4.064	.000
	Supervision	.344	.124	.369	2.765	.009

a. Dependent Variabel: Perfomance

$$Y = 3{,}619 + 0{,}392X1 + 0{,}344X2$$

Based on the regression equation, the results are as follows:

1. The regression constant of 3.619 means that when the variable is held constant (0), the performance value is 3.619.

2. The training regression coefficient of 0.392 means that an exponential increase in training (100%) can improve performance by 39.2%.

3. The supervision regression coefficient of 0.344 means that an exponential increase in supervision (100%) can improve performance by 34.4%.

3.4. Hypothesis Test (t-Statistic Test)

Table 4 Hypothesis Test (t-Statistic Test)

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	3.619	2.570		1.408	.168
	Training	.392	.096	.542	4.064	.000
	Supervision	.344	.124	.369	2.765	.009

a. Dependent Variabel: Perfomance

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Based on the t-test results, the hypothesis testing results are as follows:

1. The effect of training on performance has a Sig. value of $0.000 < 0.050$, and the calculated t-value of 4.064 is greater than the t-table obtained from df (degree of freedom) = n-k-1 (36-2-1=33) of 2.036. This means that training has a positive effect on performance.

2. The effect of supervision on performance has a Sig. value of $0.010 < 0.050$, and the calculated t-value omf 2.765 is greater than the t-table obtained from df (degree of freedom) = n-k-1 (36-2-1=32) of 2.036. This means that supervision has a positive effect on performance.

The results showed that both variables achieved Cronbach's Alpha values greater than 0.7, confirming that the instrument is reliable for use in further statistical analysis.

Table 5 Reliability Test Results for Passenger Satisfaction (Variable X)

These results are consistent with the reliability criteria. Cronbach's Alpha above 0.7 reflects good internal consistency and acceptable instrument reliability. Therefore, it can be concluded that the research instrument used in this study is statistically reliable for measuring passenger satisfaction

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Based on the t-test results, the hypothesis testing results are as follows:

1. The effect of training on performance has a Sig. value of 0.000 < 0.050, and the calculated t-value of 4.064 is greater than the t-table obtained from df (degree of freedom) = n-k-1 (36-2-1=33) of 2.036. This means that training has a positive effect on performance.
2. The effect of supervision on performance has a Sig. value of 0.010 < 0.050, and the calculated t-value of 2.765 is greater than the t-table obtained from df (degree of freedom) = n-k-1 (36-2-1=32) of 2.036. This means that supervision has a positive effect on performance.

3.5. F Statistical Test

Table 5 Hypothesis Test (t-Statistic Test)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	101.112	2	50.556	41.855	.000^b
	Residual	39.860	33	1.208		
	Total	140.972	35			

a. Dependent Variabel: Perfomance

b. Predictors: (Constant), Supervision, Training

The test results show a significance value of 0.000 < 0.05, and the calculated F-value of 41.855 > F-table obtained from the formula df = n-k-1 (36-2-1 = 33) is 3.29, which means that the training and supervision variables jointly influence performanceThus, the data confirms that service quality plays a critical role in determining how satisfied passengers feel with the services provided by airport personnel, especially those involved in direct customer interaction.

4   CONCLUSION AND RECOMMENDATION

4.1. Conclusion

Based on the calculation of the results of multiple linear regression analysis of the influence of training and supervision of AMC units on the performance of ground support equipment personnel on the airside of Hang Nadim Batam airport with performance as the dependent variable shows a regression constant of 3.619, meaning that when the variable is considered constant (0), the performance value is 3.619. Based on the multiple regression coefficient of training in multiples of the exponent (100%) can increase performance by 39.2% and the multiple regression coefficient of supervision in multiples of the exponent (100%) can increase performance by 34.4% of ground support equipment personnel. Training and supervision based on the determination coefficient test have an influence on performance of 70% and the rest is the influence of other variables. And based on the simultaneous test of training and supervision shows a significant value of 0.000 <0.05 and f count 41.855> f table of 3.29 which means that the training and supervision variables have a joint influence on performance.

The influence of training on the performance of Ground Support Equipment personnel has a dominant factor related to the statement point "Ground Support Equipment personnel who want to undertake training are selected first" with a percentage index of 91.6% and the influence of supervision on the performance of Ground Support Equipment personnel has a dominant factor related to the statement point "AMC unit officers provide action and warnings to service users who commit violations on the Apron" with a percentage index of 92.2%.

Training has a greater influence than supervision, as evidenced by the t-test value for the training variable, which has a t-value of 4.064, and the supervision variable, which has a t-value of 2.036. So, AMC unit training has a greater influence than AMC unit supervision on Ground Support Equipment personnel.

4.2 Recommendation

Based on the data analysis, the following recommendations are presented in this study:Image of Airport

The training variable had the lowest percentage index value, at 87.2%, for the statement "The training objectives were socialized to Ground Support Equipment personnel," so that participants could understand the training provided by the AMC unit. It is hoped that the management of Hang Nadim Airport, Batam, especially the AMC unit, can provide instruction that is easier for Ground Support Equipment personnel to understand

The supervision variable had the lowest percentage index value, at 87.2%, for the statement "AMC unit officers evaluate every problem that occurs on the apron and prevent errors." It is hoped that the management of Hang Nadim Airport, Batam, will conduct evaluations and provide learning for Ground Support Equipment participants to prevent the recurrence of errors on the apron.

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