The Effect of Control and Supervision of Aviation Security on Flight Safety at Kualanamu International Airport North Sumatra

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Abstract

This study aims to identify, analyze, and assess the impact of aviation security control and supervision on flight safety at Kualanamu International Airport in North Sumatra. Using a quantitative approach and correlational methods, data were collected from 80 respondents selected through random sampling techniques. A questionnaire was used to gather data on the variables of aviation security control, supervision, and flight safety. Multiple linear regression was employed to analyze the data. The results of the partial analysis showed that aviation security control significantly affects flight safety at Kualanamu International Airport, with a t-value (tcount) of 3.290, higher than the t-table value of 1.664, and a significance level of 0.002 (< 0.05). Likewise, aviation security supervision also significantly affects flight safety, with a t-value (tcount) of 8.101, greater than the t-table value, and a significance level of 0.000 (< 0.05). Simultaneously, both control and supervision significantly impact flight safety, with an F-value (Fcount) of 82.109, exceeding the F-table value of 3.12, and a significance of 0.000 (< 0.05). The determination coefficient of 67.2% indicates that the control and supervision variables explain most of the variations in flight safety. This study recommends enhancing security control through regular evaluations, improved training based on realistic threat simulations, and strengthened teamwork. Increasing the frequency of supervision with specialized teams and expanding monitoring systems with additional CCTV in under-monitored areas are also essential to ensure optimal security at the airport.

Keywords: *Security Control, Security Surveillance, Aviation Safety*

INTRODUCTION

Civil aviation safety is a fundamental element in the global aviation industry. Various countries and international organizations, such as the International Civil Aviation Organization (ICAO), continually update regulations and policies to maintain and improve aviation safety. This has become increasingly important with the rise of global air traffic and associated risks, such as threats of terrorism and sabotage.

The International Civil Aviation Organization, through the Chicago Convention first held in 1944, established internationally applicable aviation safety standards. One of the regulations is Annex 17, which focuses on aviation security. This regulation covers various security aspects, including access control to restricted areas, passenger and baggage screening, and the training of aviation security personnel. All ICAO member countries, including Indonesia, are required to adopt these standards to ensure optimal aviation safety.

Indonesia, as an ICAO member state, has adopted these international regulations into national law through Law Number 1 of 2009 on Aviation, followed by derivative regulations such as Minister of Transportation Regulation Number PM 21 of 2015 concerning aviation safety standards and Minister of Transportation Regulation Number KM 14 of 2009 on civil aviation safety regulations.

Law Number 1 of 2009 on Aviation emphasizes the importance of aviation security control and supervision to minimize risks that could threaten flight safety. In terms of control, the law requires each airport to implement strict screening procedures for passengers and luggage, including the use of scanning technology and manual checks by aviation security personnel (Avsec). Additionally, regular supervision by the Ministry of Transportation's airport authority is necessary to ensure that all security procedures are properly executed.

Kualanamu International Airport, one of the largest airports in Indonesia, plays a significant role in air traffic in the Sumatra region and beyond. As an international airport, Kualanamu serves not only domestic but also international flights, making it a major gateway for tourists and international business. In maintaining aviation safety, Kualanamu Airport has adopted various security control systems involving the screening of passengers, luggage, and access to restricted areas. The technology used includes scanning devices (x-ray) and

manual inspections by aviation security.

However, challenges in security control remain. Research conducted by Chan and Li (2023) found that the professional experience level of security personnel in control operations affects their safety attitudes, while research by Skorupski et al. (2018) highlighted that technological limitations could hinder the security control process.

One phenomenon that frequently occurs is the passing of prohibited passengers or items, such as sharp objects or hazardous materials, through the screening process. This issue reflects the limitations of the technology used and the lack of thoroughness by security personnel in conducting inspections. In addition, reports from several aviation security officers at Kualanamu indicate that the training they receive is often inadequate, especially in terms of situational analysis and response to dynamic security threats. Officers feel that their training focuses more on the use of technical equipment than on dealing with more complex security threats.

Supervision of airport security procedures plays an equally important role in ensuring flight safety. Research conducted by Moghimiesfandabadi et al. (2023) indicated that civil aviation supervision in sensitive regions must be properly followed, and similarly, Arcúrio et al. (2020) emphasized that a culture of supervision for aviation safety is a critical element. At Kualanamu Airport, supervision is carried out by both the airport's internal authorities and external bodies such as the Ministry of Transportation. This supervision includes periodic inspections of the implementation of security standards and airport facilities. However, based on the perceptions of 20 aviation security officers at Kualanamu, supervision by management is often sporadic and formalistic. Inconsistent supervision leads to lapses in the implementation of security procedures, potentially endangering flight safety. Aviation security officers believe that more stringent and structured supervision would improve the quality of security control at the airport. In addition to motivating officers to work more carefully, intensive supervision also allows for the early identification of shortcomings in the security system.

Therefore, periodic evaluations of supervision procedures are essential to anticipate potential threats that could jeopardize flight safety. Civil aviation safety results from the synergy of various elements, including security control and supervision. Based on interviews with 20 Avsec officers at Kualanamu Airport, they revealed that the effectiveness of security control and supervision has a direct impact on flight safety. They emphasized that without strict control and consistent supervision, the risk of threats to flight safety will increase.

The officers also highlighted the importance of continuous training and technological upgrades to ensure that airport security systems can keep pace with evolving threats. According to them, improvements in control and supervision would contribute to a reduction in incidents that could jeopardize flights, such as the smuggling of dangerous objects or sabotage on board aircraft.

Based on the background explanation, the researcher is interested in further exploring the influence of security control and supervision on aviation safety at Kualanamu International Airport.

Literature Review
Aviation Safety

Aviation safety is a concept described by various experts, focusing on risk management and the implementation of safety standards. According to Key et al. (2023), aviation safety is a condition where the risk of accidents or incidents is minimized to an acceptable level through the use of technology, comprehensive procedures, and training, emphasizing the importance of careful planning and strict enforcement of safety regulations to prevent potential hazards. Stroeve et al. (2022) describe aviation safety as an ongoing effort to prevent incidents through a risk management approach that highlights the importance of crew training and proper risk control management to enhance operational safety.

Wipf (2020) defines aviation safety as depending on the presence of multiple layers of defense aimed at preventing system failures. Safety is achieved when human errors and system weaknesses are minimized through systematic risk management and mitigation of latent conditions within the aviation system. Schopf (2021) proposes that aviation safety is a complex and integrated system, where various factors such as technology, operational procedures, human behavior, and the environment work together to prevent accidents. This definition underscores that safety is not only influenced by equipment and technology but also by human behavior and policies.

According to Ayiei et al. (2020), aviation safety results from the collaboration of various elements, including regulatory oversight, good operational practices, and a strong safety culture within aviation organizations, emphasizing that safety should be a top priority throughout the aviation operational chain. In contrast, the Indonesian Law No. 1 of 2009 on Aviation defines aviation safety as a condition where safety requirements are met in the use of airspace for aviation, including aircraft operations, flight navigation, airports, and other supporting activities to ensure the prevention of accidents or incidents that could threaten aviation safety.

From these expert definitions, aviation safety can be summarized as a condition achieved through risk management, the use of adequate technology, continuous training, and the implementation of layered defense systems to prevent incidents and accidents. This safety encompasses various aspects, including human factors, technology, operational procedures, and policies that are comprehensively integrated.

Aviation Security Control

Pashchenko and Akhrameev (2021) stated that aviation security control is a crucial element in ensuring the smooth operation and safety of all aviation activities. Through the proper regulation and implementation of security policies, structured procedures, and advanced control systems, potential threats to aviation security can be significantly reduced. This control encompasses various aspects, from passenger and cargo screening, securing access to restricted areas, to protection against digital threats and cyber-attacks. Thus, aviation security control plays a vital role in ensuring a safe aviation environment, shielded from various risks that could disrupt the operational safety of flights.

The definition of control, according to Indayani (2018), is a process that ensures the execution of activities aligns with the objectives, with control essentially revolving around observing, monitoring, investigating, and evaluating a series of management activities to achieve predetermined goals. Sugiyanto (2016) stated that control is about directing a set of variables (machines, people, equipment) towards achieving targets and objectives.

Rusydi (2020) mentioned that control is a crucial function as it plays a role in identifying errors and taking appropriate and firm actions, thereby reducing deviations from established standards and ensuring that organizational goals are achieved effectively. FAA Aviation Safety (2019) stated that control is a management process aimed at ensuring that all operational and security activities comply with established procedures. Through this control, operational and security performance is measured, evaluated, and compared with applicable safety standards. This enables airport authorities or security managers to take corrective actions if deviations occur, minimizing potential risks or threats. This control also ensures that resources, both personnel and technology, are used efficiently to optimally support aviation safety and security at airports.

According to Kumar (2024), aviation security is a process that includes identifying, evaluating, and mitigating risks related to aviation security. The goal is to ensure that existing security procedures are capable of preventing threats and disruptions to flight safety through appropriate preventive and responsive actions. Stroeve et al. (2022) mentioned aviation security control as a systematic effort to regulate and supervise all aspects of aviation security, including airport operations, flights, and passengers. This control involves the implementation of strict policies and continuous monitoring of security standards to ensure flight safety from potential threats and violations.

Ayiei et al. (2020) stated that aviation security control is an integral part of the aviation security management system aimed at minimizing threats and hazards, with an emphasis on continuous monitoring and evaluation of risks that could disrupt flight operations. Honcharenko et al. (2020) defined aviation security control as a mechanism that involves ongoing risk assessments and the implementation of appropriate mitigation measures to protect aviation from potential security threats, emphasizing that this control requires collaboration between airport authorities, flight operators, and government agencies related to aviation security.

Based on the experts' definitions, aviation security control can be concluded as a systematic process that includes identifying, evaluating, and mitigating risks that could threaten flight safety, requiring both preventive and responsive actions, as well as collaboration between airport authorities, flight operators, and related government agencies to ensure flight safety from potential threats that could disrupt operations.

Aviation Security Supervision

Al-Saad et al. (2019) state that aviation security supervision is a crucial element in maintaining operational safety and smoothness, both at airports and during flights. This process involves monitoring, evaluating, and enforcing security standards to ensure that all procedures comply with applicable regulations. According to Widiana (2020), supervision is an effort to determine what is being carried out by assessing the results or achievements attained, and if there are deviations from the predetermined standards, corrective actions are taken immediately to ensure that all results or achievements are in line with the plan. Monika (2016) mentions that supervision is a process of observing the implementation of all organizational activities to ensure that the work being carried out proceeds according to the predetermined plan.

According to Patma et al. (2016), supervision not only involves closely observing and reporting the results of oversight activities but also includes correcting and aligning actions to achieve the planned objectives. Rusydi (2020) argues that supervision focuses more on daily activities to ensure they stay on track, while control emphasizes the long-term strategic adjustments of the organization.

Carr et al. (2020) state that aviation security supervision is a series of processes involving continuous monitoring of flight and airport operations to detect and prevent potential security threats. This includes oversight of passengers, cargo, and airport personnel. According to Nowak et al. (2019), aviation security supervision is a systematic action aimed at identifying security risks through inspections, technology monitoring, and evaluation of compliance with international security standards. This supervision is vital in preventing incidents that threaten flight safety.

Zeballos et al. (2023) describe aviation security supervision as an integral part of airport risk management, involving direct monitoring by security authorities and the use of technology systems such as CCTV cameras and scanners. The focus is on early detection of potential threats to prevent undesirable events. Nowacki and Paszukow (2022) mention aviation security supervision as a multidimensional approach that includes operational monitoring and the enforcement of security regulations by various authorities, both at the airport and during flights. This involves security audits, regular inspections, and assessments of the performance of security systems. Abu Al-Haija and Al-Tamimi (2024) explain that aviation security supervision involves the use of advanced technology and cooperation between national and international authorities to ensure compliance with global security standards. This supervision is not only preventive but also reactive, responding to threats quickly and appropriately.

Based on the experts' definitions, aviation security supervision can be concluded as a process of monitoring and evaluation aimed at ensuring that all procedures, policies, and security standards are effectively implemented at airports and during flights. This supervision includes checking personnel compliance, security technology, and monitoring situations to detect and prevent potential threats. Thus, aviation security supervision focuses not only on technical aspects but also involves continuous preventive and corrective actions to ensure flight safety from security risks.

METHOD
Desain Study

This research is a quantitative study which, as explained by Abdullah et al. (2022), adopts scientific thinking with a systematic approach. In this study, the process of developing ideas and concepts is conducted rigorously, adhering to nomothetic principles and employing deductive logic. A correlational approach is used to identify and analyze the degree of relationship between various factors, where the correlation coefficient serves as a tool to measure the interrelation between these factors.
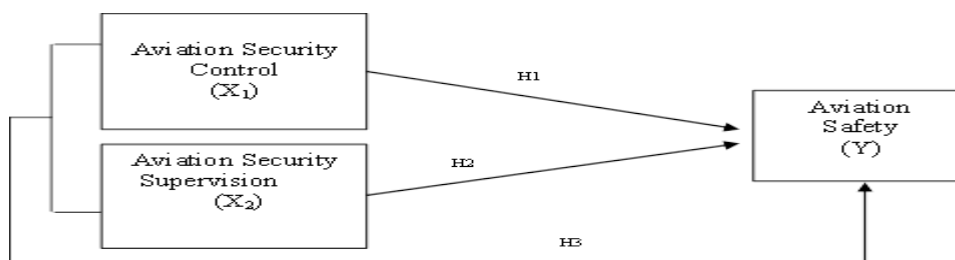

Figure 1. Research Framework

Hypothesis

According to Abdullah et al. (2022), a hypothesis proposes a prediction of the relationship between observed variables and can be empirically tested for validity, making it easy to express in an operational form that is evaluated based on the obtained data. The hypotheses proposed in this study are as follows:

H_1: It is suspected that aviation security control has a significant effect on flight safety at Kualanamu International Airport, North Sumatra.

H_2: It is suspected that aviation security oversight has a significant effect on flight safety at Kualanamu International Airport, North Sumatra.

H_3: It is suspected that both aviation security control and oversight have a significant effect on flight safety at Kualanamu International Airport, North Sumatra.

Population and Sample

According to Abdullah et al. (2022), the population is defined as the entire group of individuals who share specific characteristics that are intended to be studied, where each individual in the population is referred to as the unit of analysis. This unit of analysis can be an individual, institution, or other objects. In this study, the research subjects consist of 400 aviation security officers assigned to Kualanamu International Airport, North Sumatra.

According to Abdullah et al. (2022), a sample is a portion of the population that is selected based on specific characteristics that represent the entire population. In situations where the population size is too large to allow for a comprehensive study due to limitations in funding, manpower, or time researchers can use a sample. This sample is carefully selected to remain representative and accurately reflect the conditions of the population. The technique for determining the size or number of samples in this study uses the Slovin formula, which is as follows:

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

$$n = \frac{400}{1 + 400.0{,}1^2}$$

$$n = \frac{400}{5} = 80$$

Therefore, the sample size in this study is set at 80 respondents. This research employs random sampling techniques to ensure that each potential respondent has an equal chance of being selected as part of the sample. By applying this method, it is hoped that the data obtained can accurately and representatively reflect the population, allowing the results of this study to be generalized for broader applications within the population.

Analytical Techniques and Research Instruments

The researcher uses a questionnaire instrument to collect the necessary data. This questionnaire is designed using a Likert scale, aimed at measuring the level of agreement or disagreement of respondents with the statements provided. The statements in this questionnaire focus on aspects of aviation security control and oversight, as well as their impact on flight safety at Kualanamu International Airport, North Sumatra. Data collection is conducted using the Likert scale, which provides five answer choices as a reference for respondents to assess their level of agreement or disagreement with statements related to the influence of security control and oversight on flight safety. The data analysis technique used in this study is multiple linear regression. Multiple linear regression is a statistical technique used to understand the relationship between one dependent variable and two or more independent variables. In this study, it aims to analyze the impact of aviation security control and oversight on flight safety at Kualanamu International Airport, North Sumatra.

RESULTS AND DISCUSSION
Multiple Linear Regression Analysis

Table 1. Results of the Coefficients Test for the Control and Supervision of Aviation Security on Flight Safety

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	**.685**	3.535		.194	.847
	Aviation Security Control	**.194**	.059	.262	3.290	.002
	Aviation Security Supervision	**.401**	.050	.644	8.101	.000

a. Dependent Variable: Aviation Safety

The results of the analysis indicate that flight safety has a constant value of 0.685, meaning that in the absence of aviation security control and supervision variables, flight safety, represented by Y, will remain constant at 0.685. The coefficient for aviation security control is 0.194, which is positive, indicating a direct relationship; thus, a 1-point increase in aviation security control will raise flight safety by 0.194. Conversely, a decrease of 1 point in aviation security control will reduce flight safety by 0.611, assuming that the aviation security supervision variable is considered zero. Meanwhile, the coefficient for aviation security supervision is 0.401, also positive, suggesting a similar direct relationship: a 1-point increase in aviation security supervision will enhance flight safety by 0.401. Conversely, reducing the aviation security supervision variable by 1 point will decrease flight safety by 0.401, again assuming that the aviation security control variable is considered zero.

Table 2. Multiple Linear Correlation Coefficient Test of Aviation Security Control and Supervision Variables on Flight Safety

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	**.825[a]**	.681	.672	2.759	.918

a. Predictors: (Constant), Aviation_Security_Supervision, Aviation_Security_Control
b. Dependent Variable: Flight_Safety

It is known that the results of the multiple linear correlation coefficient test for aviation security control (X1) and aviation security supervision (X2) against flight safety (Y) is 0.825, which falls within the coefficient interval of 0.80 – 1.00. The interval value of 0.80 – 1.00 is categorized as a very strong level of relationship. This means that aviation security control and aviation security supervision have a very strong relationship with flight safety at Kualanamu International Airport in North Sumatra.

The Significance of Individual Parameters (t test)

Table 3. Partial Significance Test

Model		t	Sig.
1	(Constant)	.194	.847
	Aviation Security Control	**3.290**	**.002**
	Aviation Security Supervision	**8.101**	**.000**

Based on table 3, the values of t-count and significance (Sig) for each variable are as follows:
1. The Impact of Aviation Security Control on Flight Safety at Kualanamu International Airport in North Sumatra
   The calculated t-value for the aviation security control variable (X1) is 3.290, and the table value (t-table)

is 1.664, which is obtained from the degree of freedom (df) = n (number of samples) – k (number of independent and dependent variables) = 80 – 3 = 77. Since 3.290 > 1.664, and the probability or significance level (Sig calculated) is 0.002 < 0.05, it can be concluded that the hypothesis (H1) in this study is accepted, indicating that aviation security control significantly affects flight safety at Kualanamu International Airport in North Sumatra. The acceptance of this hypothesis indicates that effective control practices in aviation security can directly contribute to enhancing safety in flight operations. Therefore, the importance of implementing strict policies and procedures in security control becomes highly relevant to minimize risks and threats to flight safety, thereby creating a safer environment for passengers and all personnel involved in the aviation industry.

2. The Impact of Aviation Security Supervision on Flight Safety at Kualanamu International Airport in North Sumatra

The calculated t-value for the aviation security supervision variable ($X2$) is 8.101, and the table value (t-table) is 1.664, which is obtained from the degree of freedom (df) = n (number of samples) – k (number of independent and dependent variables) = 80 – 3 = 77. Since 8.101 > 1.664, and the probability or significance level (Sig calculated) is 0.000 < 0.05, it can be concluded that the hypothesis (H2) in this study is accepted, indicating that aviation security supervision significantly affects flight safety at Kualanamu International Airport in North Sumatra. The acceptance of this hypothesis highlights the crucial role of supervision in ensuring that all security procedures are strictly followed, as well as identifying and addressing potential threats that could jeopardize flight safety. With effective supervision, the risk of incidents can be minimized, thus providing better protection for passengers and crew. Therefore, strengthening the aviation security supervision system at this airport is vital to improving safety standards and public confidence in aviation services.

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Simultaneous Significance Test (F-Test)

Table 4. Results of the Simultaneous Significance Test (F-Test)
ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1250.255	2	625.127	**82.109**	**.000ᵇ**
	Residual	586.233	77	7.613		
	Total	1836.488	79			

a. Dependent Variable: Flight_Safety

b. Predictors: (Constant), Aviation_Security_Supervision, Aviation_Security_Control

Based on table 4 above, it is known that the calculated F-value obtained from the hypothesis test simultaneously, or the F-test for the impact of aviation security control and supervision together on flight safety, is 82.109. Meanwhile, the table F-value obtained from the simultaneous hypothesis test or F-test for the effect between the aviation security control and supervision variables collectively on flight safety is 3.12 (df1 = k-1 = 3-1 = 2, df2 = n-k = 80-3 = 77). Therefore, since the calculated F-value of 82.109 > the table F-value of 3.12, and the probability or significance level (Sig calculated) is 0.000 < 0.05, it can be concluded that the hypothesis (H3) in this study is accepted, indicating that aviation security control and supervision significantly affect flight safety at Kualanamu International Airport in North Sumatra. These results indicate that efforts made in the control and supervision of aviation security contribute positively to enhancing flight safety. Thus, the implementation of strict procedures and policies in control and supervision of security is crucial to minimizing risks and ensuring the safety of all parties involved in flight operations. This study emphasizes that good security factors benefit not only passengers but also the sustainability of the aviation industry as a whole.

Determination Test

Table 5. Determination Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.825ᵃ	.681	**.672**	2.759	.918

a. Predictors: (Constant), Aviation Security Control _Aviation Security Supervision_

b. Dependent Variable: Aviation Safety

Based on table 5 above, the Adjusted R Square value of 0.672 or 67.2% indicates that the variables of aviation security control and aviation security supervision can simultaneously explain the variability in aviation safety by up to 67.2%. This value falls within the interval of 51-99, indicating a high deterministic relationship between the independent variables and the dependent variable. In other words, aviation security control and supervision significantly impact the improvement of aviation safety. However, the remaining 32.8% of the variation in aviation safety cannot be explained by these two variables. This suggests that there are still other factors outside this study that influence aviation safety, such as the quality of training and competency of personnel, weather conditions, technical and mechanical factors related to the aircraft, airport infrastructure, and regulatory policies in place. Understanding and identifying these additional factors is crucial for developing further strategies to enhance overall aviation safety.

The control and oversight of aviation security are vital elements in maintaining operational safety at Kualanamu International Airport. Security control aims to ensure smooth operations and protect against various threats. Pashchenko and Akhrameev (2021) emphasize that effective control can reduce risks through appropriate policies and advanced control systems, including passenger and baggage screening and protection against digital threats.

Indayani (2018) defines control as the process of ensuring that all activities align with the established objectives through monitoring and performance evaluation. In this context, control helps organizations adapt to changing field situations. Aviation security, according to Kumar (2024), involves identifying and mitigating risks through systematic steps to assess threats and develop mitigation strategies. Stroeve et al. (2022) emphasize that control encompasses all operational aspects of the airport as an integral part of aviation security management.

Survey results indicate that while 47.5% of respondents agree they comply with security procedures, only 40% feel that the implementation of procedures by officers is consistent. This highlights the need for security training evaluation, where the training quality received an average score of 3.60. Enhancing the quality of more applicable training, including simulation-based modules, is expected to improve officers' readiness to face threats.

In terms of oversight, data shows good compliance with standard operating procedures (SOP), averaging 4.13. However, routine oversight only received a score of 3.68, indicating room for improvement. Effective oversight requires close collaboration among security authorities, airlines, and international agencies, such as ICAO and IATA (Abu Al-Haija & Al-Tamimi, 2024). By leveraging advanced technology such as CCTV and security sensors, potential threats can be detected more quickly and accurately.

Statistics show that the control and oversight of aviation security significantly influence safety. The t-value for security control reaches 3.290 with a significance level of 0.002, while oversight achieves a t-value of 8.101 with a significance of 0.000. This underscores the importance of implementing strict policies and procedures in both aspects, supporting Wahyudono's (2023) findings on the need for a good understanding of security procedures.

Overall, effective control and oversight of aviation security are essential for enhancing operational safety at Kualanamu. Improving the quality of training, frequency and scope of oversight, and strengthening collaboration among stakeholders will create a safer environment for passengers and personnel. With ongoing attention to evaluation and improvement, Kualanamu International Airport is expected to operate with high safety standards.

CONCLUSIONS

Based on the results of the research conducted, the following conclusions can be drawn:

1. Aviation security control significantly affects flight safety at Kualanamu International Airport in North Sumatra. The acceptance of the hypothesis in this study indicates that effective control practices in aviation security can directly contribute to improving safety in flight operations. Therefore, the importance of implementing strict policies and procedures in security control becomes highly relevant for minimizing risks and threats to flight safety, thereby creating a safer environment for passengers and all personnel involved in the aviation industry.

2. Aviation security oversight significantly affects flight safety at Kualanamu International Airport in North Sumatra. The acceptance of the hypothesis in this study highlights the crucial role of oversight in ensuring that all security procedures are strictly followed and in identifying and addressing potential threats that could jeopardize flight safety. With effective oversight, the risk of incidents can be minimized, providing better protection for passengers and crew members. Therefore, strengthening the aviation security oversight system at this airport is essential to enhance safety standards and public trust in aviation services.

3. Both control and oversight of aviation security significantly affect flight safety at Kualanamu International Airport in North Sumatra. This result indicates that the efforts made in controlling and overseeing aviation security positively contribute to the improvement of flight safety. Thus, the implementation of strict procedures and policies in both control and oversight of security is crucial for minimizing risks and ensuring the safety of all parties involved in flight operations. This study emphasizes that good security factors benefit not only passengers but also the sustainability of the aviation industry as a whole.

Recommendations

To enhance security control at Kualanamu International Airport, the aviation security team must focus on two main aspects: the quality of security training and cooperation among personnel. Currently, the quality of training needs improvement through the evaluation and revision of materials to make them more relevant to practical field needs. Adding simulation-based modules that mimic real threat scenarios will provide hands-on experience to officers, thereby increasing their readiness. Additionally, strengthening cooperation among personnel through team-building exercises and joint crisis simulations is essential, as these measures will clarify each team member's role and enhance communication between security units. Implementing an efficient communication system and conducting regular evaluations will help identify coordination challenges. Furthermore, to improve oversight and monitoring at the airport, several strategic steps should be taken. First, increasing the frequency of inspections and forming specialized oversight teams trained to thoroughly review every procedure according to Standard Operating Procedures (SOP) will enhance consistency and coverage. These teams should receive ongoing training to stay updated on best practices in security oversight. Additionally, the security monitoring system must be reassessed to ensure optimal coverage throughout the airport, and adding surveillance tools such as CCTV cameras in previously uncovered areas is crucial for improving monitoring effectiveness. It is also recommended that future research expand the study's scope by considering other factors beyond this research that significantly affect flight safety. These include the quality of training and personnel competence, particularly for technical and operational staff, which are vital for ensuring readiness and appropriate responses to various emergency situations. Moreover, the regulatory policies implemented by aviation authorities should be closely monitored and analyzed to ensure compliance with international safety standards.

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