OPTIMIZATION OF AIRPORT PERSONNEL INSPECTION AT THE MAIN GATE FOR AIRSIDE SECURITY AT HANG NADIM AIRPORT BATAM

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ABSTRACT

Airsides are critical areas within airports that require strict access control, particularly for personnel and vehicles entering through the Main Gate. This study aims to assess the current performance of Aviation Security (AVSEC) personnel in conducting screening procedures at the Main Gate of Hang Nadim International Airport and to formulate strategies to optimize these procedures to enhance airside security.

The research addresses two main problems: how AVSEC personnel currently perform screening at the Main Gate, and what efforts can be taken to improve and optimize these screening practices. The research uses a qualitative descriptive method with data collection techniques including observation, interviews, documentation, and expert validation.

The results show that the screening process is not yet optimal. AVSEC personnel were observed using mobile phones while on duty, inspections of goods were mostly visual due to the unavailability of X-ray and WTMD equipment, and there is no integrated digital recording system nor strict limitations regarding who may access the airside area. These issues create potential security vulnerabilities that could be exploited by unauthorized parties. Therefore, it is necessary to enhance inspection facilities, and implement routine evaluations of personnel discipline to ensure more effective airside security at Hang Nadim International Airport.

Keywords: *Aviation Security, Inspection, Main Gate, Airside, Hang Nadim Airport.*

1. INTRODUCTION

Access control to the airside area of an airport plays a critical role in safeguarding civil aviation operations. It serves as the first line of defense against unauthorized entry, which could result in security breaches, acts of sabotage, or other threats that may compromise flight safety. Aziz (2021) and Abdullah emphasize that controlling access to the airside is essential because this area encompasses operational zones such as the runway, taxiway, and apron—locations that are central to aircraft movement and technical personnel activities. Strict inspection of personnel entering the airside, especially through main gates, is a vital component of airport security management, helping to prevent the smuggling of dangerous goods, violations of safety protocols, and other acts that could jeopardize smooth flight operations.

Aviation Security (AVSEC) personnel are tasked with conducting initial screenings of anyone attempting to access the airside. This includes identity verification, document inspection, and baggage checks, which are carried out either manually or with the aid of detection equipment [2]. Despite clearly defined roles, several persistent challenges hinder the effectiveness of these inspections. Among them are insufficient supervision during peak hours, limited AVSEC manpower, and lapses in procedural compliance by both airport staff and third-party vendors who may lack full awareness or understanding of established security protocols.

At Hang Nadim International Airport—a strategically located hub in western Indonesia—the need to secure the airside is especially urgent due to the high frequency of aircraft and personnel movements. However, the effectiveness of personnel screening at the airport's main gate continues to face critical issues, particularly regarding procedural adherence and the thoroughness of vehicle and personnel inspections. Such vulnerabilities create exploitable gaps that may be used by bad actors to infiltrate restricted zones, thereby increasing the risk of security disruptions.

A preliminary investigation has identified four core issues affecting the performance of AVSEC personnel in the main gate inspection process. First, some AVSEC officers fail to conduct checks on airport personnel entering the airside, increasing the likelihood of unauthorized access. Second, non-compliance with standard operating procedures (SOP) is still prevalent, with officers often neglecting required steps or failing to conduct inspections properly. Third, vehicle inspections at the main gate are inconsistent and superficial, raising the risk of dangerous items or unauthorized individuals being transported into sensitive areas. Finally, distractions such as mobile phone use during duty hours have been noted to compromise AVSEC focus and overall vigilance, thereby weakening the entire security apparatus.

Regulatory frameworks mandate rigorous screening practices. The Indonesian Ministry of Transportation's Regulation No. PM 80 od 2017 on the National Aviation Security Program states that comprehensive security checks must be conducted on all personnel and items entering the airside. There is no room for compromise in securing such critical airport zones. Consequently, enhancing both procedural compliance and AVSEC performance through systemic optimization is not only necessary but urgent. This includes bolstering human resource capacity, leveraging advanced screening technologies, and improving inter-agency coordination.

This study aims to evaluate and enhance the effectiveness of personnel screening by AVSEC officers at the main gate of Hang Nadim International Airport. By identifying existing gaps, analyzing adherence to SOPs, and exploring practical improvement strategies, this research is expected to yield actionable recommendations to strengthen airside security. The final project is thus titled: "Optimizing Personnel Screening at the Main Gate to Improve Airside Security at Hang Nadim International Airport."

To guide this investigation, the study is structured around two research questions:

1. How is the current performance of AVSEC personnel at the main gate of Hang Nadim International Airport?
2. What strategies can be implemented to optimize personnel screening by AVSEC in alignment with SOPs to enhance airside security?

This research focuses specifically on security screening operations at the airport's main gate, examining the process by which AVSEC personnel inspect individuals, baggage, and vehicles before entry into airside areas. It also considers how performance gaps can be addressed through capacity building, improved compliance monitoring, and the integration of supporting technologies.

The results of this study are expected to benefit various stakeholders. For the researcher, the project serves as a platform to apply academic knowledge from the Diploma III Program in Air Transportation Management at Politeknik Penerbangan Surabaya. For airport management, it may provide data-driven insights to refine inspection protocols and reinforce AVSEC discipline. Furthermore, for future researchers, this study can function as a reference for investigations into airport access control and operational security in restricted zones.

Based on the above, the study hypothesizes that, While AVSEC personnel at Hang Nadim's main gate fulfill basic screening functions, their effectiveness is diminished by inconsistent SOP compliance, lack of technical tools, and poor discipline. Optimization of inspection procedures can be achieved through targeted education, routine monitoring, and improved infrastructure—including enhanced detection tools and interdepartmental coordination.

2. METHOD

2.1 Research Method

This research employs a qualitative descriptive approach aimed at providing a detailed and factual representation of actual conditions in the field based on data collected directly from the research site. According to Sugiyono (2019), qualitative methods are rooted in the post-positivist paradigm, which acknowledges that reality is complex and cannot be fully explained through numerical data. Instead, it adopts an interpretive perspective, emphasizing the understanding of subjective meanings attributed by individuals to events or experiences within a specific context. In this approach, the researcher plays a central role in the entire research process, from data collection to interpretation and conclusion.

Data collection in this study was conducted using triangulation techniques, which combine multiple methods such as direct observation, in-depth interviews, and document analysis. This combination enhances the accuracy and validity of the research. Through this method, the researcher obtained narrative descriptions, verbal statements, and documentary evidence that reflect the actual operational conditions, particularly concerning the mechanisms of airside personnel screening by AVSEC officers at the main gate of Hang Nadim International Airport.

By adopting a descriptive qualitative approach, the research does not merely present explicit findings but also seeks to uncover underlying meanings and relationships among elements involved in the personnel screening process. This approach is particularly relevant for addressing research questions related to screening procedures, causes of deviations from Standard Operating Procedures (SOPs), their impact on airside security, and potential optimization strategies that AVSEC officers can implement.

2.2 Research Design

The design of this study was developed in alignment with the research problems and objectives, ensuring that each methodological step effectively contributes to achieving the intended outcomes. In qualitative research, the process typically involves three main stages—data collection, data analysis, and conclusion drawing—with each stage interconnected and iterative in nature [5].

In this study, the research design follows these key stages:

1. Data Collection – Data were obtained through multiple techniques, including Observation, to directly monitor AVSEC personnel's performance in conducting airside access control inspections. In-depth Interviews, to gather perspectives and insights from AVSEC officers, airport management, and relevant stakeholders. Document Analysis, involving the review of SOPs, regulatory frameworks, and relevant airport security records. Literature Review, to integrate theoretical foundations and best practices in airport security management.
2. Data Analysis – Collected data were systematically reduced, organized, and interpreted to identify patterns, relationships, and deviations from established procedures. This stage also involved cross-verification of findings from different data sources to ensure validity and reliability.
3. Conclusion and Recommendations – The final stage involved synthesizing findings into coherent conclusions that answer the research questions, while also providing practical recommendations for optimizing personnel screening at the main gate.

This research design was chosen to ensure that the study captures both the explicit operational procedures and the implicit contextual factors influencing AVSEC performance, thus producing findings that are both descriptive and applicable for real-world airport security enhancement.

2.3 Research Subject

2.3.1. Population

A population is defined as the totality of objects or subjects that have certain characteristics that are the focus of research. This population is not limited to the number of members, but also includes the nature, characteristics, and context relevant to the issue being studied [6]. According to Sugiyono, (2022), a population is a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions are drawn. In this study, the researcher selected the population from all Aviation Security (AVSEC) personnel, totaling 7 individuals, comprising 1 Squad Leader and 6 personnel. The selected population includes all individuals in the AVSEC unit directly involved in inspections at the main gate.

2.3.2. Sample

Sugiyono (2022) states that a sample is a part of a population selected based on certain characteristics. In this study, the sample was taken as a representation of a broader population. The selection of an appropriate sample is very important to ensure clear distribution of questionnaires and obtain relevant data. In research on the role of Aviation Security (AVSEC) officers in airport security, researchers selected samples based on specific criteria deemed relevant and expert in the field. In this case, researchers selected a sample consisting of two Aviation Security (AVSEC) squad leaders.

2.4 Data Collection Techniques

Data collection is a critical stage in the research process, as the quality of the collected data directly determines the validity of the findings and the conclusions drawn. In this study, qualitative data collection was conducted using a triangulation approach, which integrates various techniques to produce results that are stronger, deeper, and more reliable [4]. This method combined direct observation of personnel screening activities at the Main Gate of Hang Nadim International Airport, semi-structured interviews with Aviation Security (AVSEC) personnel and other relevant stakeholders, and documentation review to complement and validate the findings. As noted by Sugiyono (2019), triangulation in data collection aims to test the credibility of data by examining it from multiple sources, methods, and timeframes, thus enabling a more comprehensive understanding of the phenomenon under study.

The observation process was carried out to obtain first-hand data from the research site by monitoring the activities and behaviors of AVSEC personnel while conducting inspections of individuals entering the airside area. This observation was non-participatory, meaning the researcher did not engage directly in the activities but instead recorded and documented relevant events. Conducted from January 6, 2025, to February 28, 2025, at Hang Nadim International Airport in Batam, the observation focused on several essential aspects, including the implementation of screening procedures, personnel compliance, adequacy and functionality of screening equipment, competence of AVSEC officers, and the overall effectiveness of airside security controls. This method allowed the researcher to assess the extent to which screening practices conformed to Standard Operating Procedures (SOPs), identify operational challenges, and detect potential security gaps that could compromise airside safety, in line with the recommendations set forth in ICAO Annex 17 2022.

To complement the observations, semi-structured interviews were conducted to gather in-depth information from respondents who had direct knowledge and experience related to the screening process at the Main Gate. This interview format, as suggested by Creswell and Poth (2018), provides a flexible framework that allows researchers to adjust the flow of discussion according to the interviewees' responses. The respondents included squad leaders and AVSEC personnel stationed at the Main Gate, and the discussions

explored various themes such as the effectiveness of current screening procedures, the level of compliance among airport staff, the adequacy of available screening tools, the training and skills of AVSEC officers, and the effectiveness of access control systems in preventing unauthorized entry into the airside area. All interview instruments were validated by two subject matter experts, resulting in full approval of the 14 prepared question items.

In addition, documentation was employed as a supporting technique to strengthen the validity of the collected data. According to Sugiyono (2022), documentation involves gathering written records, photographs, or other visual and recorded materials related to the research subject. In this study, documentation consisted of photographs taken by the researcher during the On-the-Job Training (OJT) period at Hang Nadim International Airport, depicting real-time screening activities, the use of screening equipment, and the conduct of AVSEC personnel. These visual records not only served as evidence but also supported the triangulation process by cross-verifying observational and interview findings.

Through the integration of these three complementary techniques—observation, interviews, and documentation—this study ensured that the collected data were comprehensive, credible, and grounded in the actual context, providing a robust basis for analyzing AVSEC personnel performance in maintaining airside security at Hang Nadim International Airport.

2.5 Data Analysis Technique

Data analysis in qualitative research is a systematic and in-depth process aimed at organizing, breaking down, and interpreting the data collected through interviews, observations, and documentation. As Sugiyono (2019) explains, qualitative data analysis focuses on structuring and understanding the obtained data by categorizing information into specific themes, breaking it down into smaller analytical units, and identifying patterns or relationships among these categories. The ultimate goal is to filter relevant information, arrange it in a coherent and structured manner, and generate clear conclusions that can be understood by both the researcher and other stakeholders. This analytical process is particularly essential in this study to uncover the dynamics and operational realities of AVSEC personnel inspections at the Main Gate of Hang Nadim International Airport.

In this research, the analysis process followed the interactive model developed by Miles and Huberman (1994), which consists of four interconnected stages: data collection, data reduction, data display, and conclusion drawing/verification. These stages were conducted in a cyclical and iterative manner, allowing preliminary findings to be revisited and refined as new data emerged from the field.

The first stage, **data collection**, involved gathering all relevant information through the triangulated methods applied in this study, namely observations, semi-structured interviews, and documentation. At this stage, raw data were kept intact to preserve their contextual meaning.

The second stage, **data reduction**, entailed summarizing, selecting, and focusing on essential information directly related to the research objectives. Irrelevant or redundant data were set aside, while significant findings—such as procedural compliance, operational challenges, and observed deviations from Standard Operating Procedures (SOPs)—were retained and coded into thematic categories. This process ensured that the volume of data remained manageable without losing its analytical depth (Sugiyono, 2019).

The third stage, **data display**, involved presenting the reduced data in an organized form that allowed patterns and relationships to be more easily identified. In this study, data were displayed in descriptive narratives supported by tables, observation sheets, and excerpts from interview transcripts. Such visual and textual representation helped to clarify the linkages between AVSEC personnel performance, the adequacy of screening equipment, and the effectiveness of access control in maintaining airside security.

Finally, the **conclusion drawing and verification** stage was carried out to synthesize the analyzed data into coherent findings. Conclusions were drawn based on recurring patterns, notable deviations, and the relationships identified during the display phase. To ensure credibility, conclusions were verified through cross-checking with multiple data sources, consistent with the principles of triangulation as advocated by Denzin (2012). This step also involved reflecting on the implications of the findings for improving AVSEC operational procedures and aligning them with both national regulations and ICAO Annex 17 standards.

By employing the Miles and Huberman interactive analysis model, this study ensured that the interpretation of data was not only systematic but also flexible, allowing the researcher to capture the complexity of airside personnel screening practices at Hang Nadim International Airport in a comprehensive and evidence-based manner.

2.6 Research Instrument

Sugiyono (Sugiyono, 2019) argues that in qualitative research, the main instrument is the individual or human instrument, namely the researcher himself. In order to act as a research instrument, researchers need to have a deep theoretical understanding and broad insight. This enables the researcher to ask questions, analyze data, describe the observed social conditions, and formulate clearer and more meaningful interpretations. Therefore, the

researcher uses structured interviews as the research instrument in this study.

Indicators	Instrument
Inspection procedures	Inspections are carried out in accordance with SOP
	Inspection method is optimal
Personnel compliance with procedures	Personnel being inspected follow the procedures correctly
	Personnel compliance when inspected by officers
Inspection equipment	Equipment used during inspection complies with standards
	Inspection equipment is in good condition and available
AVSEC personnel competence	AVSEC personnel have undergone vehicle and personnel inspection training
	Compliance of inspection procedures for vehicles and persons
Effectiveness of access control	Airport personnel freely enter the airside without being inspected
	Airport vehicles freely enter the airside without being inspected
Compliance with aviation security regulations	Are inspections in accordance with applicable aviation security regulations
	Security gaps found on the airside
	AVSEC response speed during inspections of persons and vehicles

3. RESULT AND DISCUSSION

This study was conducted at Hang Nadim International Airport in Batam, focusing on the examination process for airport personnel at the Main Gate conducted by Aviation Security (AVSEC) officers. The research aimed to assess the current performance of AVSEC in implementing security screening procedures, identify challenges that hinder optimal inspection, and provide recommendations for improvement in accordance with the applicable Standard Operating Procedures (SOP) and international aviation security regulations.

3.1 Observtion results

Observations were carried out from 6 January 2025 to 28 February 2025, during which the researcher monitored AVSEC activities at the Main Gate without direct involvement. The results indicate that the majority of inspections were conducted according to the SOP, including checking personnel identification, validating access permits, and inspecting vehicles entering the airside area. However, there were still instances where AVSEC officers did not perform thorough inspections, particularly during peak operational hours, leading to potential security gaps. These lapses included insufficient examination of vehicles, limited use of detection equipment, and inadequate verification of personnel compliance with access requirements, which aligns with findings by Yarlina et al., (2022) on inspection weaknesses in high-traffic situations.

3.2 Interview Findings

Interviews with AVSEC squad leaders and frontline officers revealed several recurring challenges. First, the shortage of AVSEC personnel during high-traffic periods limits the ability to conduct detailed inspections, increasing the risk of unauthorized access to the airside (Masyi'ah et al., 2023). Second, some officers admitted that inspection consistency is occasionally compromised by operational pressures or complacency, resulting in deviations from the SOP. Third, there were constraints in the availability and maintenance of inspection equipment, such as HHMD (Hand Held Metal Detector) units and vehicle inspection tools, which are essential for thorough screening [10]. Despite these challenges, AVSEC officers acknowledged the critical importance of the Main Gate as the first security layer protecting the airside and expressed willingness to adopt enhanced procedures if supported by adequate resources and training.

3.3 Documentation Review

Documentation evidence collected during the observation period confirmed the procedural steps undertaken by AVSEC, including personnel screening, vehicle inspection, and verification of access documentation. However, it also illustrated inconsistencies in execution, such as officers engaging in non-duty activities (e.g., using mobile phones during inspections) and instances where vehicles passed with minimal or no inspection. These findings are consistent with previous studies[1] that highlight human factors as a persistent vulnerability in airport security operations.

3.4 Discussion

The findings demonstrate that while AVSEC at Hang Nadim International Airport generally adheres to established SOPs, several operational weaknesses could compromise airside security. The lack of thorough inspection during peak hours mirrors global challenges in balancing efficiency and security in high-volume environments (ICAO, 2022). Furthermore, limited personnel, insufficient equipment maintenance, and procedural non-compliance collectively reduce the effectiveness of access control measures. Optimizing AVSEC inspections at the Main Gate requires a multi-faceted approach:

1. Personnel Reinforcement – Increasing the number of AVSEC officers during peak operational times to ensure comprehensive inspections without causing operational delays.
2. Strict SOP Enforcement – Implementing stricter supervisory oversight to ensure procedural compliance, as recommended by Peraturan Menteri Perhubungan No. PM 80/2017.
3. Technological Support – Enhancing detection capabilities with upgraded inspection devices and surveillance systems (Sari et al., 2024).
4. Continuous Training – Providing regular, scenario-based training to maintain officer vigilance and operational readiness, as suggested by Khunaini et al. (2023).

These measures align with the study's objective to improve airport access control effectiveness, thereby reducing the risk of unauthorized entry and enhancing overall aviation security.

4. CONCLUSION

Based on the research conducted at Hang Nadim International Airport in Batam through a combination of observation, interviews, and documentation, and in reference to the previously established research questions, it can be concluded that the performance of Aviation Security (AVSEC) personnel at the Main Gate still requires significant improvement. The findings indicate that inspections have not been fully aligned with the applicable Standard Operating Procedures (SOPs). Several field observations revealed instances of officers using mobile phones during duty, conducting visual inspections without utilizing available inspection tools such as X-ray machines and Walk-Through Metal Detectors (WTMD), and the absence of a digital recording system for inspection activities. Furthermore, some airport personnel were able to pass through without undergoing thorough checks, creating potential security vulnerabilities in the airside area. These issues reflect gaps in work discipline, operational consistency, and the overall effectiveness of the inspection process.

To optimize the personnel screening process and ensure full adherence to SOPs while enhancing airside security, several strategic measures are necessary. These include strengthening officer discipline through regular supervision and evaluation, improving inspection facilities by procuring advanced screening equipment such as X-ray machines and WTMDs, implementing a digital recording system to support accurate oversight, and conducting periodic training programs to reinforce AVSEC personnel's understanding of SOPs and their ability to detect potential security threats. The Main Gate serves as the first line of defense in maintaining airside security; therefore, these improvements are critical to closing inspection gaps, ensuring procedural compliance, and preventing potential threats to flight safety at Hang Nadim International Airport.

In line with these conclusions, it is recommended that airport management prioritize the enhancement of inspection facilities and supporting infrastructure at the Main Gate, including the acquisition of X-ray equipment, WTMD units, and live-monitoring CCTV systems. This procurement should be planned within the current fiscal year, with a phased implementation starting from the primary inspection post. Coordination between the security, technical, and financial divisions is essential to ensure timely budgeting and acquisition. Additionally, AVSEC squad leaders should enforce stricter supervision and conduct routine evaluations of Main Gate personnel at least once a month, focusing on compliance with SOPs, proper use of inspection tools, and the maintenance of logbooks. This supervision can be reinforced through unannounced spot checks, on-site monitoring, and daily internal reporting.

For AVSEC personnel, maintaining discipline and consistency in performing inspections is imperative. This includes the routine use of tools such as Hand-Held Metal Detectors (HHMD) and mirror checks, as well as the verification of personnel passes and vehicle permits. Inspections must be conducted without exception, regardless of the identity or position of the individual being screened. Officers should also minimize the use of personal devices during duty hours to maintain focus and must consistently document inspection results in logbooks as part of their administrative responsibilities.

By implementing these recommendations consistently and sustainably, the personnel screening process at the Main Gate can be made more optimal and effective, thereby ensuring that airside security is maintained in compliance with both national and international aviation security standards.

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