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Digitalization of Aviation Security Logbook Recording at Mutiara Sis Al-Jufri Airport, Palu

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Abstract

Aviation Security (AVSEC) is an important part of the aviation security system, including in the cargo terminal area. At Adi Soemarmo Boyolali Airport, the recording of AVSEC's daily activities is still carried out manually using a physical logbook, which has weaknesses such as being prone to loss, difficult to trace, and inefficient reporting. Therefore, a website-based system was designed to replace the manual recording and improve work efficiency. The formulation of the problem raised in this study is how to design and build a website-based Aviation Security Logbook system using the ADDIE method. The type of research used is applied research by design, which aims to produce digital recording media that is effective and easily accessible by AVSEC personnel. The results of the study show that the developed logbook website can be used well and smoothly by users. Based on validation tests by experts, the system obtained a score of 95% and was declared "valid" because it ≥ 61%. Meanwhile, the usability test results reached 94%, which was in the interval of 81–100% and was categorized as "Very Feasible". Thus, it can be concluded that this website-based Aviation Security Logbook system is suitable for use as a digital recording medium that is useful in supporting operations and security in the cargo terminal area.

1 INTRODUCTION

Transportation plays a very important role in supporting the progress of a country, especially in the economic field [1]. Transportation can be interpreted as the process of moving people and goods from the original location to the destination. Broadly speaking, transportation modes are categorized into three that are considered effective because they have advantages and are more sophisticated than land or sea. Nowadays air transportation is all widely known by the public because of the long distance travel in a relatively short time. Aviation is a part of the transportation system that has characteristics, uses advanced technology, requires investment, is managed with professional management, and requires a high level of safety and security. Air transportation is regulated based on Law No. 1 of 2009 concerning the implementation of flights, airworthiness, use of airspace, flight navigation, aircraft operation, as well as maintenance facilities and others [2]. This regulation aims to ensure the safety, security, and smooth running of air transportation in Indonesia. Adi Soemarmo Boyolali Airport, which is managed by PT Angkasa Pura Indonesia or InJourney Airports, serves several flight routes starting from domestic and international. Cargo terminals serve as transit points for goods that have high value and have the potential to understand security and systematic management [3].

Based on PM 41 of 2011 concerning the Organization and Work Procedures of Airport Operational Offices, airports have the task of organizing operations and services, providing facilities, implementing Standard Operating Procedures (SOP), and airport licensing personnel. The Aviation Security Unit is responsible for maintaining security and comfort in the aspects of aviation safety and security. In accordance with Decree of the Minister of Transportation of the Republic of Indonesia No. 39

of 2024 concerning the National Aviation Security Program, point 8.5.6 letter H, "ensure that every activity/incident at the Security Checkpoint is recorded in a logbook." Currently, Adi Soemarmo Airport in Boyolali still uses manual paper logbooks in the Cargo Terminal area.

BRIEF THEORY

Based on the technical theory of this final project, some brief material is presented as follows:

a. Website

A website is a collection of pages that contain certain information and can be accessed by users widely through the internet network The Website is composed of pages, where the collection of pages is referred to as the homepage or homepage [4]. The homepage is placed at the top, while the other related pages are at the bottom. In addition, website groupings are more focused on functions, characteristics or styles, as well as the programming language used.

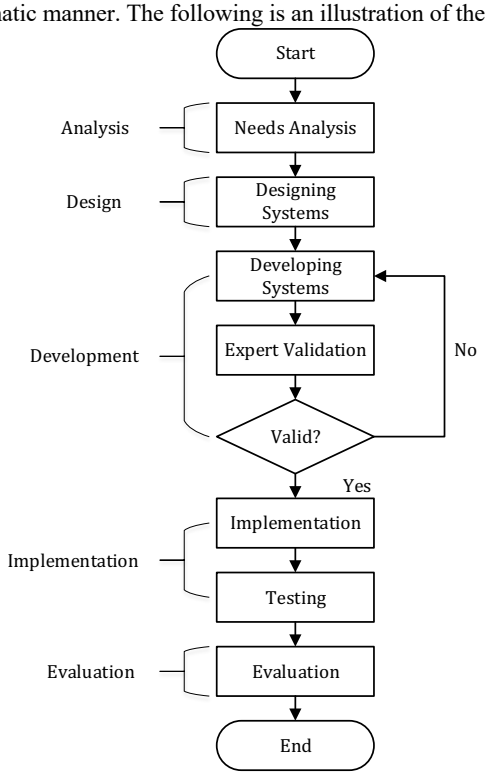
b. Aviation Security

Based on the Regulation of the Director General of Civil Aviation Number: SKEP/160/VIII/2008 concerning the Certificate of Proficiency of Civil Aviation Security Personnel, civil aviation security officers are aviation security and safety service personnel who are authorized to carry out security service activities at airports. The civil aviation security personnel in question are Aviation Security officers (AVSEC) who are required to have a license or Officer Proficiency Certificate (SKTP) [5].

2 METHOD

Research and development is the process of creating or improving a product [6]. This is important for information systems or technology. Researchers at adi soemarmo airport need information about materials, regulations, and skills to develop a website-based logbook in accordance with applicable sops.

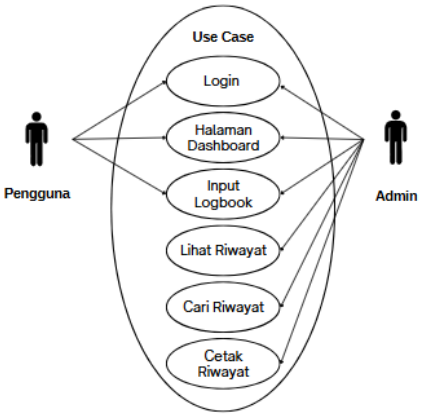
In this study to design and build a logbook website, the method that needs to be carried out is in accordance with research and development (Research and Development) with the use of the ADDIE (Analysis, Design, Develoment, Implementation, Evaluation) development model. The development applied is a design that is easier to understand and apply so that Research and Development (R&D) services are processes or stages that are carried out to create new products to improve existing products. In the design concept, this research has developments in new technologies, products, services, and systems that can then be arranged in a related and systematic manner. The following is an illustration of the research's conceptual framework:



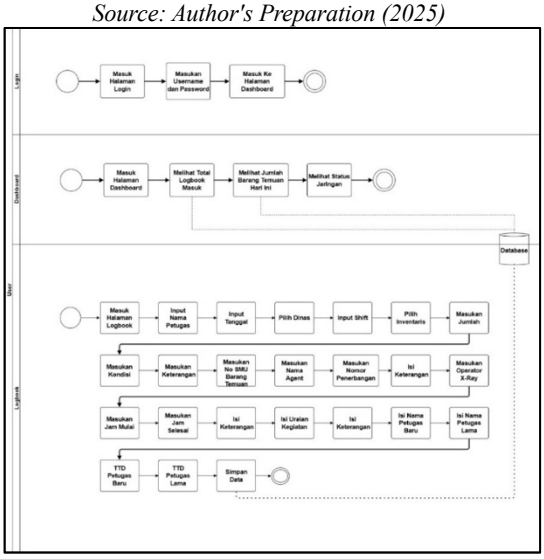
Picture 1. Research Flow Chart
Source: Author's Preparation (2025)

The development of the web-based Aviation Security Logbook system was carried out through five structured phases using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). In the **analysis phase**, field observations and interviews were conducted with AVSEC personnel at the cargo terminal of Adi Soemarmo Airport. These activities aimed to identify the limitations of the existing manual logbook, such as difficulty in retrieving past records and

inefficiency in daily documentation. The results of this stage served as the foundation for defining system requirements and user needs, which was then presented in the form of a flowchart in Figure 1, use case diagrams, and business process models (BPMN) as follows:



Picture 2. Use Case Diagram
Source: Author's Preparation (2025)

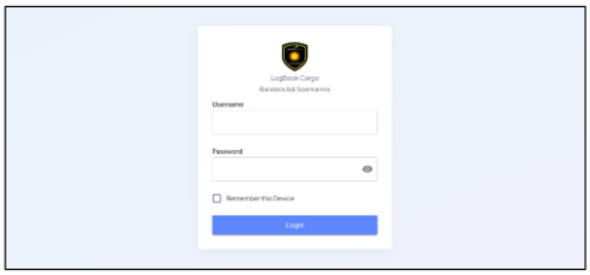


Picture 3. BPMN
Source: Author's Preparation (2025)

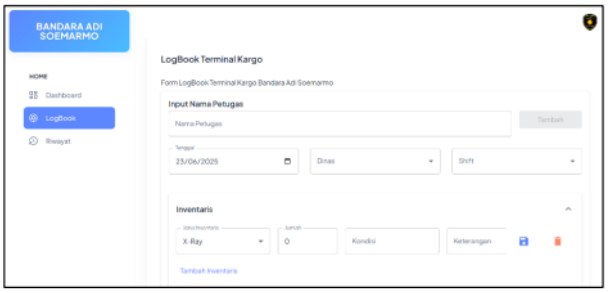
The **design phase** focused on developing the interface, system architecture, and database structure. Data tables were outlined to represent how logbook data would be displayed, stored, and interconnected. Key features such as record input, archival access, and reporting tools were also planned during this stage. During the **development phase**, the application was built using JavaScript and the Next.js framework. Initial system validation was conducted to ensure the core features worked properly. In the **implementation phase**, the system was deployed in the actual work environment and tested by AVSEC officers. Operational testing confirmed that the system functioned smoothly and was accessible. Finally, the **evaluation phase** involved collecting user feedback to assess the system's performance and identify any areas for improvement. The system was deemed effective and ready for operational use based on usability scores and expert validation.

RESULTS

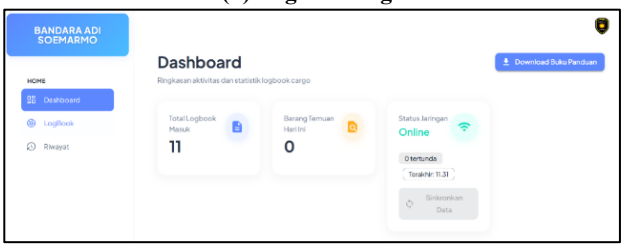
The implementation stage is the final stage of the development of a logbook system that is designed and tested before being used in a work environment. The goal is to ensure that the system can run properly and meet the needs of recording and security reporting at the Adi Soemarmo Boyolali Airport Cargo Terminal. An evaluation by the Assistant Chief of Airport Security shows that the system has an excellent appearance and ease of access. The system can be accessed via a smartphone or other internet-connected device, at https://logbookcargo.my.id .



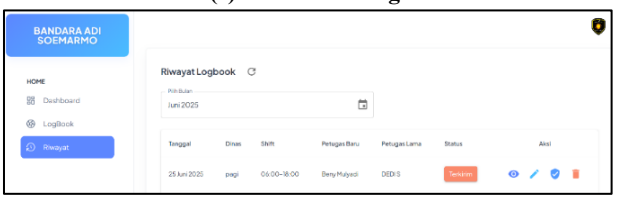
(a) Log In Page



(b) Logbook Page



(c) Dashboard Page



(d) History Page

Picture 4. App Main Menu
Source: Author's Preparation (2025)

Validation tests are very important in the development of the AVSEC logbook website for the Adi Soemarmo Airport cargo terminal. The goal is to assess the quality of the system and ensure that the features are in accordance with operational needs. This process will examine elements such as interface, functionality, and data alignment, involving Aviation Security and information systems experts. The test was carried out by two experts from the relevant airport. Here are the result of the test:

Table 1. Expert Test Results Data
Source: Author's Preparation (2025)

Assessment Aspects	Score Obtained		Maximum Score	Note
	Materials Expert	Media Expert		
User Interface (UI)	9	9	10	Very good and effective
Functionality	10	10	10	
Usability	10	10	10	
Accessibility and Responsiveness	5	5	5	
System Security	4	4	5	
TOTAL	38	38	40	

Based on the table above, the avsec e-logbook system obtained a score of 38 from material experts and 38 from media experts, which was categorized as "excellent and effective". These results show that the system is feasible to use and supports digital daily recording at the Adi Soemarmo airport cargo terminal. The following methods are used to process expert test data:

Table 2. Expert Test Result Processing
Source: Author's Preparation (2025)

Assessment Aspects	Percentage of Score Obtained (%)		Accumulated Score Percentage	Note
	Materials Expert	Media Expert		
TOTAL	95	95	**95**	Very good and effective

Based on the data in table, the average validation of the design of the avsec log book website area of Adi Soemarmo airport by material experts and media experts is 95% and is declared "valid" because the accumulated value ≥ 61% [7]. Then the Process evaluation was carried out by involving Aviation Security personnel at Adi Soemarmo Boyolali Airport as respondents. The assessment includes interface, usage flow, and speed of data access. Data was collected through Google Forms from 20 AVSEC personnel to get objective input.

Table 3. Questionnaire Results Data
Source: Author's Preparation (2025)

No	Respondent Questionnaire Answer Score					Total Respondents	Total Questionnaire Score	Index %	Assessment Interval
	SS	S	C	TS	STS				
Performance									
1	17	3				20	97	97	Very Worth It
Information									
2	14	6				20	94	94	Very Worth It
Economics									
3	14	6				20	94	94	Very Worth It
Control									
4	13	6	1			20	92	92	Very Worth It
Efficiency									
5	11	7	2			20	89	89	Very Worth It
Service									
6	18	2				20	98	98	Very Worth It

From the table, it can be concluded that to determine the level of usability of the website-based AVSEC logbook system, questionnaires were distributed to 20 respondents:

a. The Performance aspect has a feasibility percentage of 97% so that for the performance of the system related to the suitability of the website link to input Aviation safety logbook data is considered very feasible with an index of 97%
b. The Information Aspect has a feasibility percentage of 94% so that for information and data suitability designed in the system with The need for recording aviation security logbooks is considered very feasible with an index of 94%.
c. The Economics aspect has a feasibility percentage of 94% so that the benefits of the system in terms of economics are considered very feasible with an index of 94%
d. The Control aspect has a feasibility value of 92% so that the convenience and maintenance system is considered very feasible with an index of 92%.
e. The Efficiency aspect has a feasibility percentage of 89% so that the efficiency of user features in the system is considered very feasible with an index of 89%.
f. The service aspect has a feasibility percentage of 98% so that for the convenience and access of the system using various devices is considered very feasible with an index of 98%.

$$\frac{Observed\ scores}{Expected\ score} \text{ X } 100$$

$$\frac{564}{600} \text{ X } 100$$

94 %

Overall, the average system performance is considered very feasible with an index of 94%.

The following are the results of the AVSEC logbook system usability questionnaire presented in the form of a bar chart or pie chart in Appendix H to illustrate the distribution of respondents' answers to each statement

a. Statement 1: System Performance Most respondents 85% strongly agree that the system has good performance in supporting the logbook recording process, and the remaining 15% agreed
b. Statement 2: Information (Information) Most respondents 70% strongly agreed that the information displayed in the logbook system is in accordance with AVSEC's record-keeping needs and is easy to understand
c. Statement 3: Economics (Economics) In terms of economic benefits, 70% of respondents stated that they strongly agree that the logbook system Website-based provides efficiency in terms of time and cost. The rest, namely 30% of respondents, also gave a positive assessment by stating that they agreed
d. Statement 4: Control System 65% of respondents strongly agreed that the system is easy to control and use, and the other 30% agreed
e. Statement 5: Efficiency 55% of respondents strongly agree that the use of features in the system is quite efficient, and 35% of respondents say they agree. However, there are 10% of respondents who choose enough, which indicates that the efficiency aspect can be improved
f. Statement 6: Services and Access (Services) Most respondents (90%) strongly agreed that the system can Easily accessed through various devices (such as computers, laptops, and smartphones)

Based on the assessment of data from 20 respondents of AVSEC personnel at Adi Soemarmo Boyolali airport to the AVSEC logbook website, the author concluded that the design of this website is considered very feasible and makes it easier for users to access the system and is expected to continue to be developed again to meet the expectations of users.

COVER

From the implementation and testing process of this final project, it can be concluded that the AVSEC web-based logbook system for the cargo terminal at Adi Soemarmo Airport was developed using the ADDIE method. The system integrates several essential features such as a simple and intuitive user interface, login functionality, data input forms, activity history, search tools, and options to print reports. These features were designed to meet the operational needs of Aviation Security personnel more effectively and efficiently.

The system workflow begins with a secure login, followed by data entry by AVSEC officers. Admins then validate the data, which is automatically stored in a centralized PostgreSQL database. Users can easily retrieve past logbook records when needed and generate reports in both PDF and Excel formats. Additionally, the system includes a digital signature feature that allows inter-shift handovers to be documented electronically, ensuring a traceable and accountable process.

Based on the results of expert validation and the usability questionnaire, the system received a validation score of 95% and a usability score of 94%. These results categorize the system as “very feasible” and indicate its readiness for implementation in real AVSEC operations at cargo terminal areas. Overall, the web-based logbook system significantly enhances data management, operational transparency, and coordination among AVSEC personnel.

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