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Design of a Website-Based Information System for Monitoring Prohibited Items and Random Checks at Radin Inten II Airport Lampung

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Abstract

Manual recording of random checks and prohibited items by Aviation Security personnel is considered ineffective due to the risk of data loss, limited accessibility, and slow documentation processes. This study designed a web-based digital system as a solution, using the Research and Development (R&D) method with the ADDIE development model. In the analysis phase, interviews were conducted with security personnel to identify system requirements. The system design refers to the theory of fit between task and technology (Goodhue & Thompson, 1995), which emphasizes the importance of alignment between technology and user tasks. The developed system includes features such as user login, inspection data entry, prohibited item logging, and reports in the form of graphs and tables. Testing using the black box method showed that all features functioned properly. The system has proven capable of efficiently, accurately, and accessibly replacing manual logbooks, thereby meeting the need for digital security record-keeping.

1 INTRODUCTION

Aviation security is a crucial aspect in airport management, including at Radin Inten II Airport Lampung, which serves as one of the main gateways for air transportation in Lampung Province. Currently, the recording of random checks and prohibited items by Aviation Security (Avsec) personnel is still carried out manually using paper logbooks. This practice is considered ineffective due to the high risk of data loss, limited accessibility during audits, and slow documentation processes, as also observed in other manual systems within the transportation and government sectors [1], [19], [22].

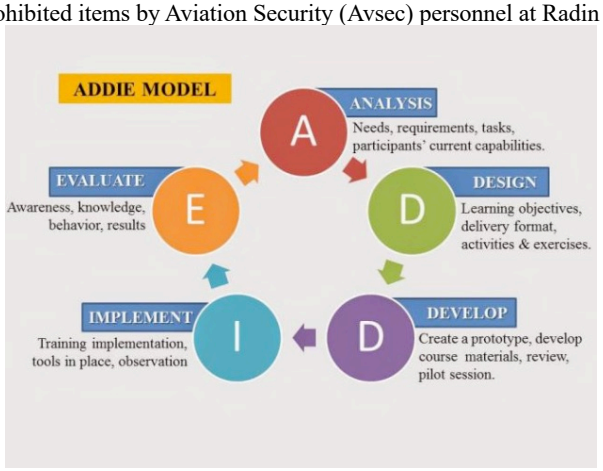
In the digital era, the need for an information system that supports speed, accuracy, and data integrity has become urgent—not only for effective supervision but also for improving work productivity and accountable data governance [17], [21], [24].

Various studies have supported the use of information technology to enhance service efficiency and data accuracy. Kurniawan [11] developed a daily Avsec report system based on AppSheet that proved effective at Adi Soemarmo Airport, while Firdaus et al. [7] demonstrated that the ADDIE model can produce a structured and user-friendly attendance system in educational settings. Support for web technology efficiency is also shown by Christanto & Ramos [3], who developed a warehouse inventory system using Laravel to improve data recording efficiency. The increasing workload of Avsec personnel also requires digital systems, as described by Cahyani & Budiarto [2].

However, no previous research has specifically developed an information system for recording random checks and prohibited items at the PSCP of Radin Inten II Airport Lampung. This study offers a novelty in the form of a web-based information system specifically designed to support airport security recording activities, based on the ADDIE model and the theory of Fit Between Task and Technology (Goodhue & Thompson, 1995), which has been proven effective in system development across various sectors such as education, government, and healthcare [7], [20], [10].

2 METHOD

This study uses a Research and Development (R&D) approach with the ADDIE development model, which consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation. This model was chosen because it provides a systematic framework for designing information systems based on user needs, particularly in the context of airport security operations [7], [23]. The main focus of this study is to design and develop a web-based information system used to record and monitor random checks and prohibited items by Aviation Security (Avsec) personnel at Radin Inten II Airport Lampung [22].



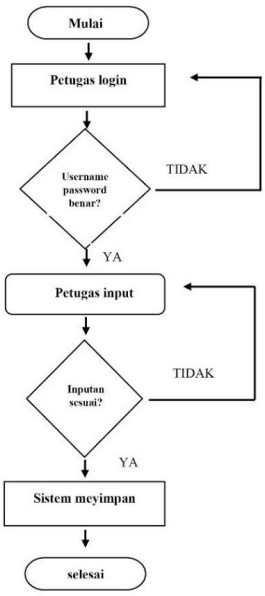
Picture 1. ADDIE Model

The conceptual model in this study refers to the theory of Fit Between Task and Technology proposed by Goodhue and Thompson (1995) [10]. This theory states that the effectiveness of an information system is largely determined by the degree of alignment between the technology used and the tasks that users must perform. In the context of this study, the primary task of the users is to accurately and efficiently record and report security activities, while the technology being developed is a web-based information system. Therefore, the system is designed to directly meet the operational needs of Avsec, both in terms of features and ease of access.

The subjects in this study are Avsec personnel assigned to the Passenger Security Check Point (PSCP) area at Radin Inten II Airport Lampung. The main informants in the initial data collection consist of the supervisor, assistant chief, and chief of Avsec, who have firsthand experience with the limitations of manual record-keeping and the need for a digital system [25].

Data collection in this study was conducted through a combination of interviews, observation, and documentation. Interviews were conducted to gather information regarding the challenges of manual logging and expectations for the digital system to be developed. Observation was carried out to map out the workflow and interactions between officers and the logbook, while documentation was used to identify the structure of the data typically recorded, such as the type of prohibited item, time of inspection, and actions taken.

After the analysis stage, the system design process included developing the user interface scheme, system navigation flow, and database structure tailored to user needs [18]. The system was then developed using the Laravel framework with a MySQL database [3], [4]. The development process also included implementing user login features, data input forms, validation systems, and data presentation in visual forms such as graphs and tables [6].



Picture 1. ADDIE Model

Subsequently, the system was implemented in a limited scope within the Avsec work environment to test its functionality and ease of use.

The evaluation stage was conducted using the black box testing method to examine all the main features of the system without inspecting the internal code. This testing aimed to determine whether all functions operated as designed, including user login, inspection data entry, prohibited item processing, and report display.

Table 1. Black Box Test Form

NO	Test Activity	Expected Result	Test Result	Conclusion	Suggestion
1	Start on display	Navigate to login page	Successfully navigated to login page	[ ] Match [ ] Mismatch	
2	Email and password	Login and enter dashboard	Successfully logged in and entered dashboard	[ ] Match [ ] Mismatch	
3	Incorrect email or password	Display error message	Successfully displayed error message	[ ] Match [ ] Mismatch	
4	Leave login fields empty	Display validation "field is required"	Successfully displayed validation "field is required"	[ ] Match [ ] Mismatch	
5	Add data feature (random check with complete and valid data)	Data added to table	Data successfully added to table	[ ] Match [ ] Mismatch	
6	Empty fields	Validation appears and data is not saved		[ ] Match [ ] Mismatch	

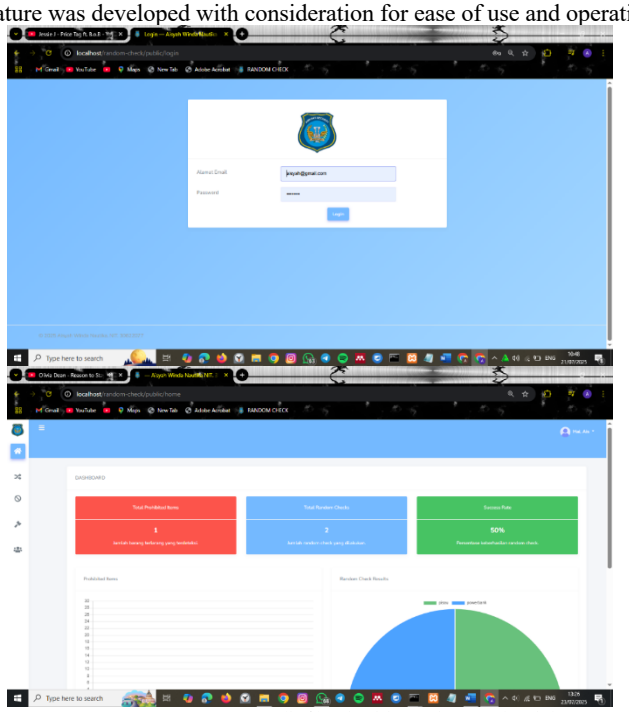
Test result data is analyzed descriptively to evaluate system performance in meeting user needs [24]. Further evaluation was conducted by collecting feedback from users (Avsec officers and IT supervisors) [15].

3 RESULTS

This study produced a web-based information system designed to support the recording and monitoring activities of random checks and prohibited items by Aviation Security (Avsec) personnel at Radin Inten II Airport Lampung [22]. The system was systematically developed using the ADDIE approach (Analysis, Design, Development, Implementation, Evaluation), which has been adapted in software development research [7]. The main outcomes of this study include system design, functional implementation, testing results, and user evaluation.

In the needs analysis stage, data were obtained through direct observation and interviews with Avsec personnel. It was found that the manual recording process using logbooks posed various challenges, such as difficulty in retrieving historical data, low efficiency in reporting, and a high risk of data loss. Therefore, a digital recording system is needed that can be accessed quickly, supports structured data entry, and facilitates the archiving and reporting of security activities.

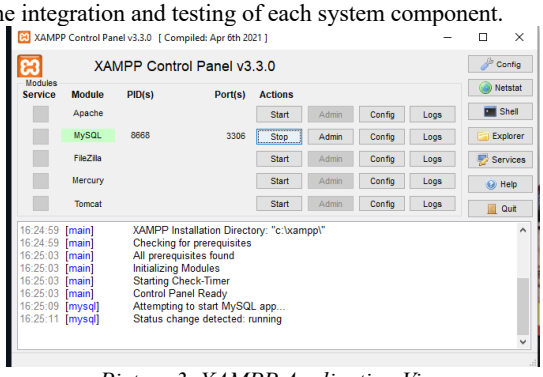
Based on these needs, the system was then designed as a web-based application consisting of several key features: user login, random check data entry, prohibited item entry, action logging, user management, and data presentation in the form of reports and statistical graphs. Each feature was developed with consideration for ease of use and operational efficiency.



Picture 2. Home view (left); dashboard view (right)

The user interface was designed to be minimalist, responsive, and user-friendly so that it can be used by both administrators and field officers without technical difficulties. The dashboard page displays a summary of inspection activities and discovered items, along with data visualizations in the form of graphs to facilitate analysis and reporting. The data input feature is equipped with validation to ensure that users can only save complete and standardized data.

After the design process was completed, the development stage was carried out using the Laravel framework and a MySQL database [3], [4]. The system was developed and tested locally using XAMPP as the server [9]. Development was conducted in a modular fashion to simplify the integration and testing of each system component.



Picture 3. XAMPP Application View

The implementation stage was carried out in the Avsec work environment, starting from installation on operational computer devices to direct trial use by users [12]. Personnel were asked to test the system in real scenarios, such as entering inspection data and printing reports. The results of the implementation showed that the system could effectively replace the manual logbook and improve personnel work efficiency.

System testing was conducted using the black box testing method across 14 usage scenarios covering all main features [13]. The test results indicated that all features functioned as intended: the system could display validation if the input was incomplete, reject login attempts with incorrect data, and successfully save and display the entered data.

Table 2. Black Box Test Results

NO	Aktivitas Pengujian	Hasil yang diharapkan	Hasil Pengujian	Kesimpulan	Saran
1	Start on display	Navigate to login page	Successfully navigated to login page	[✓] Match [ ] Mismatch	
2	Email and password	Login and enter dashboard	Successfully logged in and entered dashboard	[✓] Match [ ] Mismatch	

3	Incorrect email or password	Display error message	Successfully displayed error message	[✓] Match [ ] Mismatch	
4	Leave login fields empty	Display validation "field is required"	Successfully displayed validation "field is required"	[✓] Match [ ] Mismatch	
5	Add data feature (random check with complete and valid data)	Data added to table	Data successfully added to table	[✓] Match [ ] Mismatch	
6	Empty fields	Validation appears and data is not saved		[✓] Match [ ] Mismatch	
7	Add data feature (Prohibited Item type entered)	Data saved with status	Displayed data saved with status	[✓] Match [ ] Mismatch	
8	Incomplete fields	Display error message	Successfully displayed error message	[✓] Match [ ] Mismatch	
9	Print Out feature	Display entered data ready to print	Successfully displayed entered data ready to print	[✓] Match [ ] Mismatch	
10	Edit profile feature (change name and valid email)	Update profile data	Profile data successfully updated	[✓] Match [ ] Mismatch	
11	Leave name/email empty	Validation appears, data unchanged	Successfully displayed unchanged data	[✓] Match [ ] Mismatch	
12	Correct current password, valid new password	Password changed	Password successfully changed	[✓] Match [ ] Mismatch	
13	Current password is incorrect	Error message is displayed	Successfully displays error message	[✓] Match [ ] Mismatch	
14	Password confirmation does not match	Validation appears	Successfully displays validation	[✓] Match [ ] Mismatch	

Further evaluation was carried out by collecting feedback from users (Avsec personnel and IT supervising lecturers). Most respondents stated that the system is easy to use, informative, and relevant to field requirements. The system was deemed suitable for use as a digital recording tool at the airport security checkpoint area.

In addition to its functional aspects, the evaluation results also revealed several advantages of the system, including ease of local access, a simple user interface, and the integration of interconnected features. The system supports multi-user access and includes security features such as user account login. Data visualization in the form of graphs also greatly assists in analyzing security activities. However, there are also some shortcomings, such as the absence of cloud-based access, lack of user activity logs, and limited input form validation.

Overall, the study results show that the developed system has successfully met user needs and can serve as an effective digital solution to replace manual record-keeping in airport security operations.

4 DISCUSSIONS

The research results show that the developed information system successfully addresses the research problem, namely designing a digital system for recording random checks and prohibited items efficiently and validly [3], [7]. The system not only functions on par with manual logbooks but also offers advantages in terms of accessibility, data security, reporting efficiency, and information visualization.

From a scientific perspective, the success of this system is reinforced by the principle of Fit Between Task and Technology (Goodhue & Thompson, 1995) [10], where there is alignment between the tasks required by Avsec personnel and the technological features provided by the system. The use of a simple interface, input validation system, and role-based access between users and admins demonstrates the implementation of this principle in practice.

These findings are consistent with previous studies by Firdaus et al. (2022), which showed that applying the ADDIE model can produce an effective and user-friendly attendance information system [7]. The study by Christanto & Ramos (2023) also supports these findings, where the use of Laravel and web-based systems was proven to improve the efficiency of data recording and inventory management [3]. However, this research offers novelty in its specific application to aviation security, which has not been widely discussed in previous literature.

The interpretation of the evaluation results also confirms that the system meets the indicators of functionality, ease of use, data security, and reliability [15], [16]. All users agreed that the system is feasible for use and ready for full implementation at Radin Inten II Airport Lampung. However, there are several limitations, such as the absence of online (cloud-based) access,

user activity logs, and advanced input validation. These issues represent opportunities for further system development in the future [5], [21].

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