

Design of a Website-Based Daily Inspection Checklist System for Terminal Units, Hygiene and Sanitation at Mutiara Sis Al-Jufri Palu Airport

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Abstract

Daily inspection activities at the Terminal Hygiene and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu are currently still conducted manually using paper forms. This process is considered inefficient as it requires more time, has the potential for recording errors, and complicates the data recapitulation and reporting process. To address these issues, a website-based daily inspection checklist system was developed utilizing HTML, CSS, JavaScript, PHP (Laravel), and MySQL technologies. This system is designed to facilitate the checklist completion process by field officers, data validation by administrators, and the automatic and structured presentation of inspection recapitulation data. The system is also equipped with login authentication to maintain data security, as well as search features and time period filters to facilitate inspection activity monitoring. After the development process was completed, the system was hosted to be accessible online and in real-time by all relevant parties. Test results show that the system runs well, is responsive across various devices, and is user-friendly. Furthermore, the implementation of this system has proven capable of improving work efficiency, minimizing recording errors, and accelerating the reporting and documentation process of daily inspection results. Therefore, this system can serve as an effective solution in supporting the digitalization of operational activities in the airport environment.



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1 INTRODUCTION

Air transportation plays a crucial role in supporting public mobility and driving economic growth, particularly in areas that are difficult to access via land routes [1]. One mode of transportation that is widely favored by the public is air transportation, as it offers several advantages such as speed, comfort, and extensive Mutiara SIS Al-Jufri Airport Palu, as a Class I airport, plays a strategic role in supporting air connectivity and public services in Central Sulawesi Province.

Facilities are everything provided to facilitate the implementation of activities in order to achieve certain objectives [3]. In the airport environment, supporting facilities play an important role in ensuring operational smoothness and efficiency. Components such as terminals, aprons, taxiways, and various other supporting facilities must be managed in an organized manner and well-maintained to provide comfort, security, and satisfaction to all airport service users [4]. One crucial aspect is

terminal cleanliness, which influences passenger perceptions of airport service quality. Therefore, supervision of public facilities, including cleanliness and sanitation, becomes the responsibility of the Terminal Inspection Service (TIS) unit and the Hygiene and Sanitation unit, as stipulated in Ministry of Transportation Regulation No. 41 of 2023 and Ministry of Health Regulation No. 44 of 2014 [5]. At Mutiara SIS Al-Jufri Airport Palu, both units are merged into the Terminal, Hygiene, and Sanitation Unit to create work synergy and supervision effectiveness.

In carrying out its duties, this unit uses a daily inspection checklist system to monitor facility conditions and maintain terminal cleanliness. This checklist includes various elements such as toilets, waiting areas, curbside areas, and other supporting facilities. However, the main problem that arises is that the checklist completion process is still conducted manually, causing several major obstacles: (1) completion requires printing and collecting physical forms, (2) document storage is inefficient and prone to damage, and (3) the absence of a digital monitoring system causes weak progress tracking and coordination between officers. This directly impacts the speed of response to field problems and the accuracy of supervision data.

2 METHOD

This research employs the Research and Development (R&D) method, which aims to produce or improve a product and test its effectiveness [6]. This approach was chosen because it not only generates theoretical findings but also produces applicable products that can be directly utilized by relevant institutions. The R&D method is considered relevant in promoting innovation, particularly in the field of information technology that supports service quality improvement.

The development model used in this research is the *Four-D (4D)* model, which consists of four systematic stages: *Define* (needs analysis), *Design* (model and system design), *Develop* (development and feasibility testing), and *Disseminate* (implementation or dissemination of product results) [6]. This model was selected to ensure that the development process proceeds in a directed manner and produces an effective system according to user needs. The following is a flowchart or diagram of the research process to be conducted:

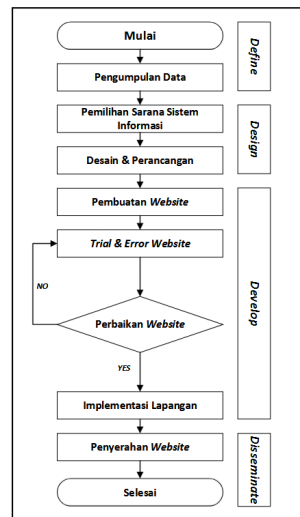


Figure 1 Research Workflow

1. Define Phase

- a. **Initial Analysis:** Conducted to identify problems occurring in the daily inspection process at the Terminal, Hygiene, and Sanitation Unit. Direct observation was performed during On the Job Training (OJT) at Mutiara SIS Al-Jufri Airport Palu to examine the workflow and weaknesses of the manual system still being used.
- b. **Needs Analysis:** Aimed at understanding user requirements related to system development, both in terms of software, hardware, and required features [7]. This process was conducted through interviews with the Head of Service and Cooperation Section and officers from related units.

2. Design Phase

The second stage in the 4D development model is Design, which includes media selection, format determination, and initial system design preparation. *This step aims to ensure that the designed system can function optimally according to user needs* [8].

- a. **Website System Design,** illustrates user interactions and system functions through use case diagrams, as well as the website structure arranged according to the workflow. There are two main users: officers who fill out daily checklists and administrators who manage data and archives. This design serves as a reference for developers so that the system is created according to needs and is user-friendly.

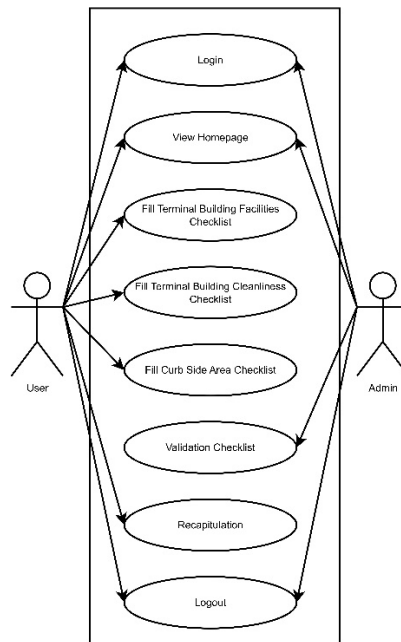


Figure 2 Use Case Diagram

- b. **Instrument Design**, conducted to illustrate the data and information that will be displayed in the checklist system. In this research, the instrument is designed using **flowcharts** for system flow and **tables** for data structure, adapted to the needs of the Terminal, Hygiene, and Sanitation Unit to support smooth daily inspections.

a) User Instrument Design

Table 1 User Instrument Design

Menu	Instrumen
Homepage	a) Display the number of completed and pending checklist b) Display information on active checklist periods c) Display checklist progress
Checklist	a) Input inspection date and time b) Select inspection area (location) c) Asses facility condition d) Add additional notes e) Upload dokumentation (optional)
Rekapitulation	a) View checklist results by period b) Filter by date, location, and personnel c) Export data to Excel

b) Admin Instrument Design

Table 2 Admin Instrument Design

Menu	Instrumen
Homepage	a) Display the number of completed and pending checklists b) Display information on active checklist periods c) Display checklist progress
Checklist Validation	a) View checklist data submitted by users b) Verify data completeness and condition c) Approve or reject checklist data

c) **Digital Form Instrument Design :**

- Digital Design Form for Terminal Building Facility Checklist

Table 3 Digital Form Design for Terminal Building Facility Checklist

Room	Condition				Description	Total Units	Documentation
	B	RK	H	SD			

- Digital Form Design for Terminal Building Cleanliness Checklist

Table 4 Digital Form Design for Terminal Building Cleanliness Checklist

Room	Condition	Description	Documentation
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	B	KB	K		

- Digital Form Design for Curbside Area

Table 5 Digital Form Design for Curbside Area

Room	Condition		Description	Documentation
	P	L		

d) Website Menu Structure

The website structure is designed to be simple and functional, consisting of home, checklist form, data recap, and settings menus. The menus are arranged according to user workflow so that the system is easy to use and supports the smooth process of daily inspections..

- User Display Menu Structure

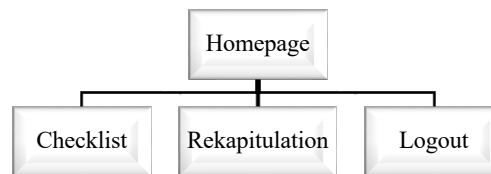


Figure 3 Website Menu Structure User

Figure 3 shows the main menu structure on the daily inspection *checklist website* for the Terminal, *Hygiene*, and Sanitation Unit. There are 3 main menus that can be accessed by users.

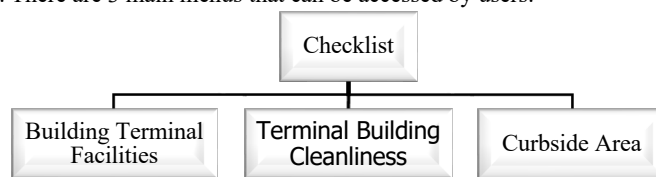


Figure 4 Website Menu Structure Checklist User

Figure 4 shows the sub-menu structure in the *Checklist* menu, where there are 3 sub-menus that will display *checklist* forms according to the selected sub-menu.

- Website Menu Structure Admin

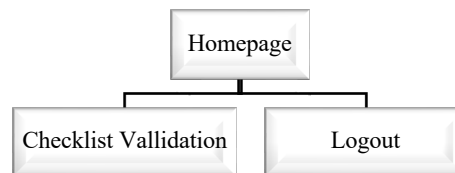


Figure 5 Website Menu Structure Admin

Figure 5 shows the *website* menu structure display on the admin side, where two sub-menus will be displayed consisting of the *checklist* validation sub-menu and the logout sub-menu.

3. Develop Phase

The *develop* or development stage aims to create a product that is ready for use [9]. This was conducted through direct testing of the checklist website features together with the Terminal, Hygiene, and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu. This testing aimed to ensure the system runs according to user needs. **During testing, several deficiencies in the system were identified, which were then used as the basis for improvements**, both in terms of functionality and interface, so that the system would be more optimal for field use.

4. Disseminate Phase

System socialization was conducted for the Terminal, Hygiene, and Sanitation Unit as end users. The system was delivered in the form of a website along with access accounts and *Standard Operating Procedures (SOP)* to guide users in operating the system, from login to checklist completion. The purpose of this stage is to ensure the system can be used optimally and sustainably.

3 RESULTS

The main result of this research is a website-based daily inspection checklist system developed according to the needs of the Terminal, Hygiene, and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu. This system is designed to facilitate the checklist completion process and digital data management, and is equipped with the following website testing results:

1. User Interface Website User

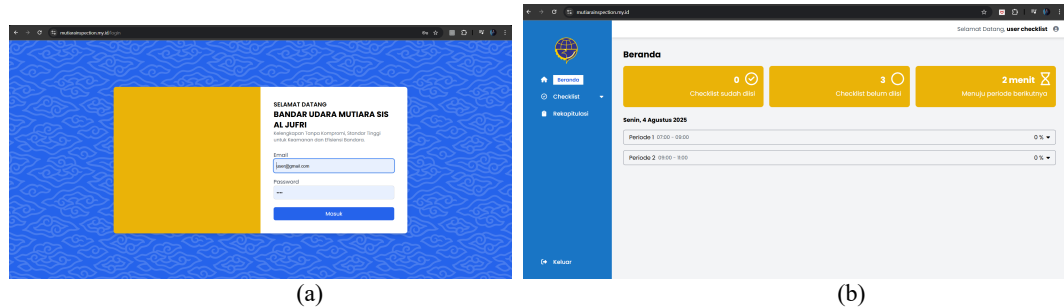


Figure 6 (a) Login Display (b) Dashboard Display

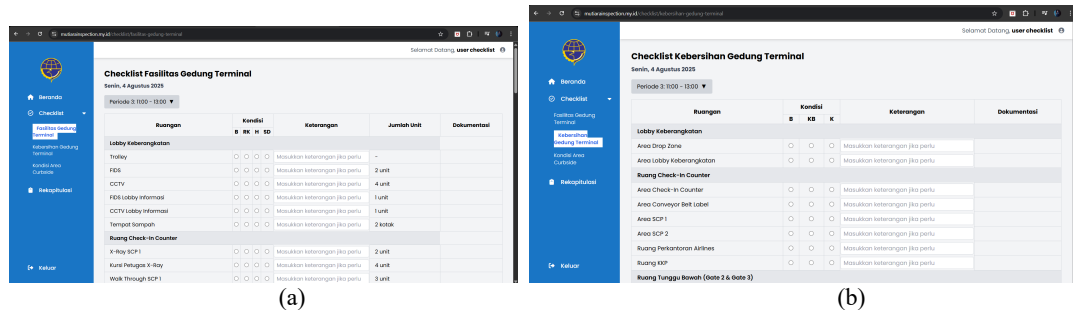


Figure 7. (a) Digital Form for Terminal Building Facility Checklist (b) Digital Form for Terminal Building Cleanliness Checklist

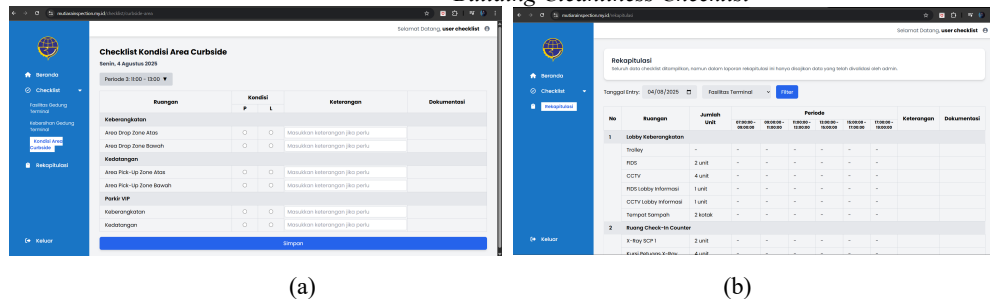


Figure 8 (a) Digital Form Curbside Area (b) Recapitulation

Figures 6, 7, and 8 display the daily inspection checklist website interface used by officers of the Terminal, Hygiene, and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu. This website has, **five (5) main pages** namely:

- Login**, which is the initial page used to access the system. Users are required to enter their email and password to log into the system.
- Home**, displays information on the number of checklists that have been completed and those that remain incomplete, the active checklist period, and the progress of checklist implementation for each area.
- Checklist**, is the page for filling out daily inspection forms based on the selected area, such as Terminal Facilities, Terminal Cleanliness, and Curbside Area. The form includes date, condition, remarks, and documentation upload.
- Recapitulation**, presents checklist result data in table format. This feature is equipped with search functionality based on date and area, as well as download buttons to print data to Excel.
- Logout**, used to exit the system and end the user session.

2. User Interface Website Admin

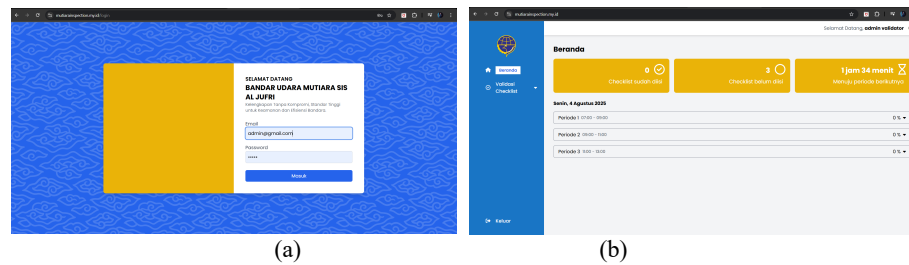


Figure 9. (a) Admin Login Display (b) Admin Dashboard Display

Normal User	Tanggal	Total Periode	Status Validasi	Aksi
user checklist	2020-07-09	1	X Belum-divalidasi	Validasi Detail
user checklist	2020-07-22	4	X Belum-divalidasi	Validasi Detail
user checklist	2020-07-16	3	X Belum-divalidasi	Validasi Detail
user checklist	2020-09-23	1	Sudah-divalidasi	Validasi Detail
user checklist	2020-09-24	1	Sudah-divalidasi	Validasi Detail
user checklist	2020-09-25	1	Sudah-divalidasi	Validasi Detail
user checklist	2020-09-26	2	Sudah-divalidasi	Validasi Detail

Figure 10. Validation Display

Figures 9 and 10 show the website menu display on the admin side, which has access to manage and validate checklist data. The main menu consists of:

- Login**, which is the initial page used to access the system. Users are required to enter their email and password to log into the system.
 - Home**, displays a summary of incoming daily checklist data, including completion status by officers and overall inspection progress.
 - Checklist Validation**, is the page for verifying checklists submitted by officers. Admin can view data details, approve, or reject checklists based on completeness and appropriateness of information.
 - Logout**, used to end the session and exit the system safely.
3. System Testing and Evaluation
- Based on the system testing that has been conducted, from the process of accessing the website, filling out daily inspection checklists, submitting data, to viewing recapitulation results in table format, all processes run well and according to the designed functionality. This testing was conducted using the Blackbox Testing method, which involves testing system functions without directly examining the program code, but only observing input and output [10]. The test results show that no errors were found during system operation, and each feature can function well and according to field requirements.
 - Validation activities were conducted by distributing validation forms to two parties: one IT expert and two (2) system users (admin and officers) from the Terminal, Hygiene, and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu. This validation aims to obtain assessments of system feasibility from both technical and field usage perspectives. The validation form covers aspects of ease of use, display clarity, and feature compatibility with user needs. The results of this validation process are presented in the following table, which summarizes the assessments and input from validators regarding the developed system.

Table 6 Validation Result

No	Evaluated Aspect	Component	Validator Result		
			V.1	V.2	V.3
1.	Website	Website Acces	100%	100%	100%
		Homepage Display	100%	100%	100%
		Menu Navigasi	100%	100%	100%
2.	Digital Form	Checklist Form	100%	100%	100%
		Dokumen upload	100%	100%	100%
		Rekapitulation form	100%	100%	100%

Based on the testing and validation results conducted by three validators, it can be concluded that the website-based daily inspection checklist system has **met the feasibility criteria**, both in terms of the website interface display and the digital forms used. All assessed components achieved a 100% pass rate, indicating that each element in the system functions well and is in accordance with the established needs and standards.

CONCLUSIONS

Based on the research results, it can be concluded that the website-based daily inspection checklist system successfully addresses the manual recording problems still used in the Terminal, Hygiene, and Sanitation Unit at Mutiara SIS Al-Jufri Airport Palu. This system has met the research objectives by providing digital services for checklist completion, automatically

storing data, and displaying information that is easy to understand. Test results show that the system can run well and is easy to use by both officers and administrators.

Practically, this research demonstrates that the use of simple digital systems can help accelerate work, improve data accuracy, and facilitate supervision in airport environments. From a theoretical perspective, this research proves that the Research and Development (R&D) approach can be used to develop service systems that are effective, user-friendly, and do not require expensive network or technological infrastructure.

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