

Development of Website-Based Digitalization of Apron Movement Control Logbooks at Djalaluddin Gorontalo Airport

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Abstract

Operational activities at Djalaluddin Gorontalo Airport, particularly in the Apron Movement Control (AMC) unit, still rely on manual recording through logbooks. This conventional system is prone to inefficiency, limited access to information, and the risk of data loss, which hinders operational accuracy and effectiveness. This study aims to design, develop, and implement a digital AMC logbook system using a website-based platform. This research adopts a Research and Development (R&D) approach with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The system is designed with key features such as data input forms, search and filter functions, report printing, and accessibility via desktop and mobile devices. Validation was conducted by IT experts and AMC personnel to assess the functionality, usability, and overall performance of the system. The results of the study show that the system functions effectively, provides accurate and real-time data management, and improves efficiency compared to manual processes. This innovation contributes to improving the quality of airport operations and can be a reference for similar developments at other airports.



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1 INTRODUCTION

Airports play a vital role in supporting national connectivity, economic growth, and public mobility. Among the critical operational units at airports is the Apron Movement Control (AMC), responsible for supervising aircraft, ground vehicles, and personnel activities on the apron to ensure safety and orderliness. According to the Directorate General of Civil Aviation Regulation[1], AMC personnel are licensed to manage aircraft parking, refueling, loading/unloading, and apron traffic control.

At Djalaluddin Gorontalo Airport, the AMC logbook is still recorded manually in physical documents. This system faces limitations, including delays in recording, difficulty in retrieving historical data, risk of damage or loss, and human error [2]. Several airports in Indonesia, such as Fatmawati Soekarno Airport Bengkulu, have successfully implemented digital logbook systems to improve operational efficiency[3].

Based on these challenges, this study focuses on developing a digital logbook system for AMC at Djalaluddin Gorontalo Airport. The objectives are:

1. To design and develop a website-based AMC logbook.
2. To implement the system and evaluate its functionality and usability in operational environments.

This research is expected to enhance efficiency, transparency, and accountability in airport apron operations, contributing to the realization of smart airport management aligned with digital transformation trends.

2 METHOD

This study uses a Research and Development (R&D)[4] approach with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation)[5]. The ADDIE model was chosen because it provides a systematic framework for effectively developing, implementing, and evaluating digital systems[6]. According to Waruwu (2024)[7], the ADDIE model is widely applied in research and development to ensure that each stage is interconnected and continuously improved.

1) Analysis

The analysis stage involved identifying problems in the manual record-keeping system at Djalaluddin Gorontalo Airport. Observations and interviews with Apron Movement Control (AMC) personnel revealed inefficiencies in manual documentation, such as delays, risk of loss, and limited access to historical data. This is in line with Nugroho & Hendrastomo (2021)[8]. User needs analysis showed the need for a system that provides quick access to information, secure data storage, and ease of reporting. The analysis also considered the implementation of digital logbooks already in place at other airports, which showed increased operational efficiency and transparency.

2) Design

The design phase involved creating diagrams such as use case diagrams and system flowcharts[9]. The website structure was planned to include the following menus: login, dashboard, logbook entry, search and filter, and report printing[10]. The interface design emphasized simplicity and accessibility, ensuring that AMC personnel could easily input and retrieve data. The design also incorporated responsive layout principles so that the system could be accessed via both computers and smartphones.

System The system design process begins with a use case diagram derived from system requirements analysis. This diagram serves as the foundation for developing use case modeling[11].

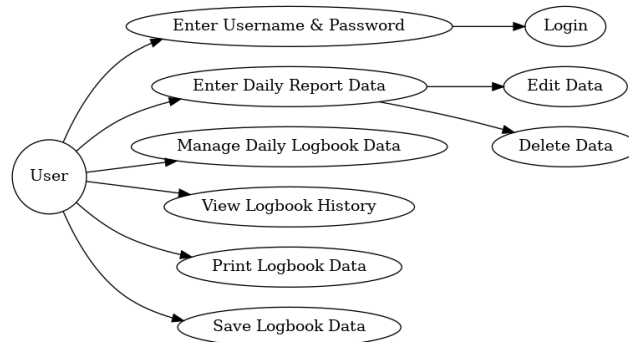


Figure 1. Use Case Diagram

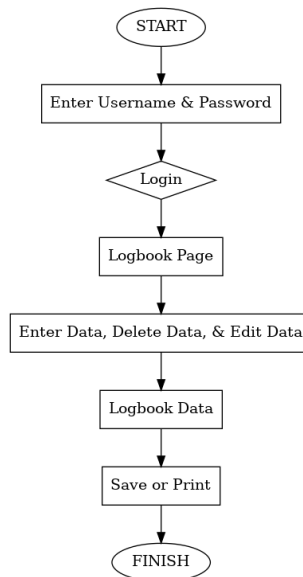


Figure 2. Website menu structure

This flowchart system is designed to be used by a single user[12]. The focus on single use is intended to maintain simplicity in operations and minimize potential errors that may occur due to multi-user interactions. With only one user having access, data management becomes more controlled and focused in accordance with the duties and responsibilities of the officer concerned. The Apron Movement Control officer can only fill in data, monitor and print reports, and manage user accounts and the system as a whole. This authority ensures that all processes carried out are fully under the control of the officer. These functions include inputting activity data, monitoring daily activities, and creating reports as part of the documentation required for daily operations.

3) Development

In the development stage, the planned design was transformed into a working prototype[13]. The website was built using PHP and MySQL as the database, with additional support from HTML, CSS, and JavaScript for interface development. Features implemented included user authentication, secure login, structured logbook entry forms, search filters, and report generation functions. The system was also designed to automatically store data in digital format, ensuring long-term accessibility and reducing the risk of data loss.

4) Implementation

The implementation stage introduced the prototype system to AMC personnel at Djalaluddin Gorontalo Airport[14]. Training sessions and demonstrations were conducted to familiarize users with the system's features. The system was then tested in real operational conditions, where users entered daily logbook data digitally. This process helped identify any technical issues and provided immediate feedback from the end users.

5) Evaluation

The evaluation was conducted using validation tools assessed by IT experts, AMC supervisors, and end users. The criteria used included functionality, interface design, ease of use, and system reliability. The evaluation results showed that the system was effective and suitable for operational use[15]. Feedback from validators emphasized the efficiency and accuracy of the system, while also suggesting the addition of backup security features for future improvements.

3 RESULTS

The system design produces a structured website consisting of several main menus, each of which is developed to accommodate the operational needs of Apron Movement Control (AMC). These menus are as follows:

1) Login Page

This page displays an input form for username and password, with one user account that can be used by all AMC personnel so that data access and management are more controlled in accordance with the duties and responsibilities of the officer.

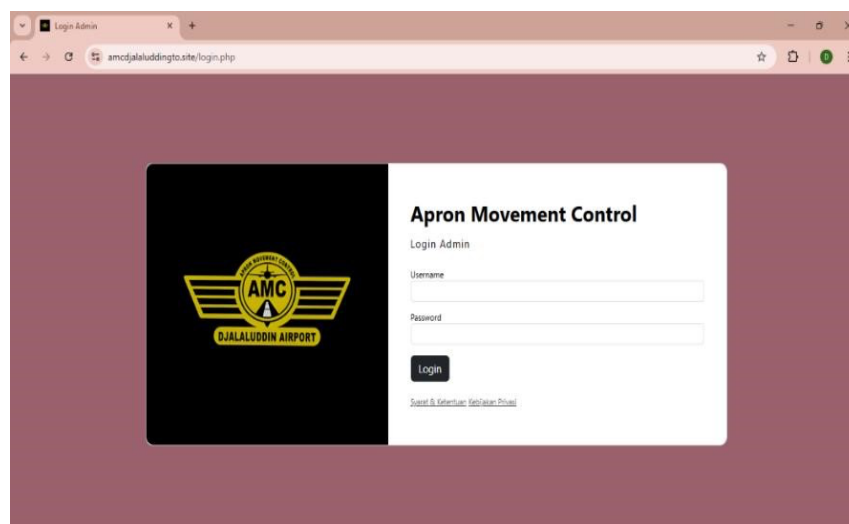


Figure 3. AMC Logbook System Login Page Display

2) Dashboard

Laporan Apron Movement Control

Masukkan Data: 07/07/2025 17:12 Petugas: Pilih Urutan Tugas: Keterangan:

Filter Data: Hari Ini: Cari...

Tanggal	Waktu	Petugas	Uraian Tugas	Keterangan	Aksi
07-07-2025	1840		Pengawasan pelaksanaan pesawat JT 792		Edit Hapus
07-07-2025	1837		Pemantauan Parkir Pesawat JT 892 & docking arlo		Edit Hapus
07-07-2025	1827		Pengawasan PS 84 untuk pesawat JT 892		Edit Hapus
07-07-2025	1534	ABIS BAHUMBA	Koordinasi dengan ATC untuk ETA & PS pesawat JT 892		Edit Hapus
07-07-2025	1320		Pengawasan pelaksanaan bagasi di make up area		Edit Hapus
07-07-2025	1120		Standby monitoring		Edit Hapus
07-07-2025	1100		Mencatat data penertarikan & form arlo		Edit Hapus
07-07-2025	1059		Undocking pesawat JT 891		Edit Hapus
07-07-2025	1032		Pemantauan Parkir Pesawat JT 792 & docking arlo		Edit Hapus
07-07-2025	1031		Pemantauan Parkir Pesawat JT 792 & docking arlo		Edit Hapus

Dari Tanggal: hh/bb/tttt Sampai Tanggal: hh/bb/tttt

Figure 4. Logbook System Dashboard Display

3) Print/Save feature

Print/Save feature that users can use to print or save logbook data according to the selected period, whether it is “Today's” data, “This Month's” data, or based on a specific date range. When printed or saved, the display is designed to be filled with the e-signature of the Head of the AMC Djalaluddin Unit.

LAPORAN HARIAN APRON MOVEMENT CONTROL
UNIT: DIALALUDDIN

PERIODE: 07/07/2025

No	Tanggal	Waktu	Petugas	Uraian Tugas	Keterangan	Aksi
1	20/07/2025	05:00	COLOM TUNDA	Pengawasan pelaksanaan pesawat JT 792		
2	20/07/2025	05:15		Pengawasan monitoring dan monitoring AC di arlo		
3	20/07/2025	05:20		Standby monitoring		
4	20/07/2025	05:30		Pengawasan pelaksanaan bagasi di make up area		
5	20/07/2025	05:35		Koordinasi dengan ATC untuk ETA & PS pesawat JT 892		
6	20/07/2025	05:40		Pengawasan PS 84 untuk pesawat JT 892		
7	20/07/2025	05:50		Pemantauan Parkir Pesawat JT 892 & docking arlo		
8	20/07/2025	05:55		Pengawasan pelaksanaan pesawat JT 892		
9	20/07/2025	07:30		Undocking pesawat JT 891		
10	20/07/2025	07:35		Mencatat data penertarikan & form arlo		
11	20/07/2025	08:30		Koordinasi dengan ATC untuk ETA & PS pesawat JT 792		
12	20/07/2025	09:20		Pengawasan PS 84 untuk pesawat JT 792		
13	20/07/2025	09:30		Pemantauan Parkir Pesawat JT 792 & docking arlo		
14	20/07/2025	09:35		Pengawasan pelaksanaan pesawat JT 891		
15	20/07/2025	10:10		Mencatat data penertarikan & form arlo		
16	20/07/2025	10:15		Mencatat data penertarikan & form arlo		
17	20/07/2025	10:30		Standby monitoring		

PERSONEL YANG BERTUGAS:
1. Sdr. Png. OLIVA TUNDA
2. Sdr. Sng. : 
AGUS DARMA,
NIP. 19820801201211004

REVISI/REVISI:
KARYA AGUS

Print 1 page

Destination:

Pages: 1

Layout: Legal

Paper size: Legal

Pages per sheet: 1

Margins: Minimum

Figure 5. Logbook Data Display after Printing

4) Product testing (website)

A comprehensive assessment of the developed system was conducted to determine its feasibility, effectiveness and future development potential. During the testing process, validators provided constructive feedback and suggestions for future system development. The assessment covered aspects of the website interface and digital forms. The complete results of the validation process can be seen in the following table:

Table 1. Product validation results

No	Validator	Conclusion	Recommendations
1.	IT Expert	Suitable for use without revision	-
2.	User (AMC Officer)	Suitable for use without revision	-

Based Based on the results of testing and validation conducted by two validators, it can be concluded that the Development of Website-Based Apron Movement Control Logbook Digitalization has met the eligibility criteria in terms of website interface and digital form display. All components evaluated were deemed suitable for use without revision, indicating that each element of the system functions as expected and in accordance with requirements.

4 CONCLUSION

This research concludes that the website-based AMC logbook system was successfully designed and developed using the ADDIE model. The implementation of the system shows that it is effective, functional, and user-friendly, as well as significantly improving efficiency and accuracy compared to manual methods. The validation results confirm that this system is suitable for operational use at Djalaluddin Gorontalo Airport.

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