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Application for Prohibited Item Data Collection for the Security Division of Kualanamu International Airport

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***Abstract*— Kualanamu International Airport, the second-largest airport in Indonesia and the fourth-largest in Southeast Asia, has adequate security facilities for aviation safety, such as an automated baggage handling system (BHS). However, the airport security system lacks a centralized system for recording prohibited items and lost or misplaced belongings in the security screening area. This shortcoming impacts the level of service (LOS) of the airport, which is assessed annually through surveys distributed to airport users. A decline in the could lead to the airport losing its international status, affecting both the internal operations and the surrounding regional economy. This research aims to develop a Prohibited Item Data Collection Application for the Airport Security Division at Kualanamu International Airport. The application will digitize the process of recording prohibited items and lost or misplaced belongings, as well as provide monthly reports to facilitate the retrieval of retained items by passengers. The study involves the participation of Airport Security personnel, who have confirmed the importance of developing this application to support their work performance.**

Keywords—baggage_handling_system, prohibited_items, aviation_safety

I. INTRODUCTION

Kualanamu International Airport, located in Deli Serdang Regency, is the second-largest airport in Indonesia and the fourth-largest in Southeast Asia. The airport is equipped with sufficient security facilities, such as an automated baggage handling system (BHS)[1], to ensure aviation safety[2].

Despite the efficient baggage handling system[3], the airport's security system faces a significant challenge: the lack of a centralized system for recording prohibited items and lost or misplaced belongings in the security screening area. This shortcoming impacts the level of service (LOS) of the airport[4], which is a key indicator assessed through annual surveys distributed to airport users. A decline in the LOS could lead to the airport losing its international status, affecting both the internal operations[5] and the surrounding regional economy.

To address this issue, the researchers aim to develop a Prohibited Item Data Collection Application for the Airport Security Division at Kualanamu International Airport. The application will digitize the process of recording prohibited items and lost or misplaced belongings, as well as provide monthly reports to facilitate the retrieval of retained items by passengers.

Prior to the development of the application, the researchers conducted a survey among Airport Security personnel, which revealed that 92.9% of the respondents agreed on the importance of creating such an application to support their work performance. The application will include features for recording prohibited items and lost or misplaced belongings, as well as generating monthly reports to enhance the overall level of service at the airport.

II. METHODOLOGY

Methodology that was used in building a Prohibited Item and Lost and Found data collection system at the Airport Security Outpost:

Step	Description
1. Current System Analysis	Understand the business processes and the current running system, including its weaknesses.
2. System Requirement Identification	Identify the functional and non-functional requirements of the new system to be built.
3. System Design	Design the system architecture, database, business processes, and user interface.
4. System Implementation	Develop the system according to the design that has been made, including coding and testing.
5. Data Migration	Transfer the existing data from the manual system to the new computerized system.
6. User Training	Provide training to users (Airport Security Outpost admins) on how to use the new system.
7. Implementation and Maintenance	Deploy the new system in the production environment and

Step	Description
	perform regular maintenance.
8. Evaluation and Improvement	Evaluate the implemented system and make improvements if necessary.

This methodology will help ensure that the new system built can meet user needs, can be implemented smoothly, and can be managed well in the long term.

III. DESIGN AND RESULTS

A. HIPOchart and Flowchart Design

The author has provided the HIPO chart design for the archiving application that has been designed[6]. The HIPO (Hierarchy plus Input-Process-Output) chart is a structured programming technique that provides a visual representation of the program's hierarchy and the input, process, and output (IPO) for each module.

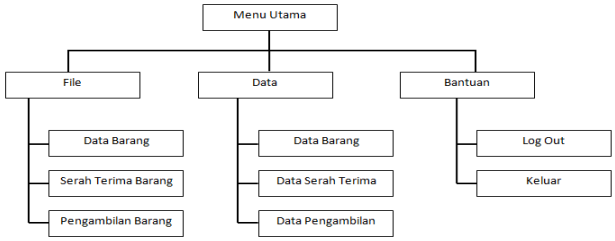

Figure 1. HIPO Chart

The Main Menu is the starting point for all the Forms. Within the Main Menu, there are several Forms: File, Data, and Help.

In the File Form, there are the following sub-forms:

- Item Data Form
- Handover Form
- Goods Retrieval Form

In the Data Form, there are the following sub-forms:

- Item Data Form
- Handover Data Form
- Goods Retrieval Data Form

In the Help section, there are the following sub-forms:

- Logout Form
- Exit Form

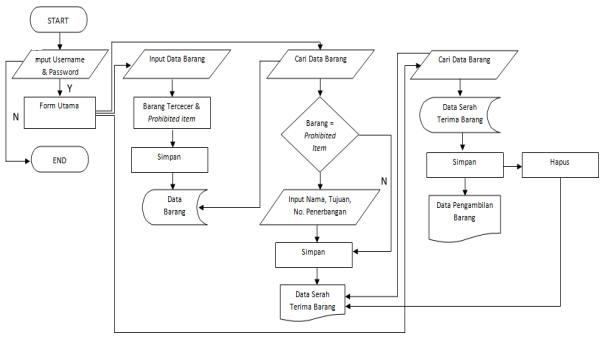

Figure 2. Flowchart

Before accessing the main Forms, the Admin or Operator must first log in. If the password and username are correct, the program will direct the user to the Main Menu. If the User wants to input item data, they will be directed to the Item Input Form. Here, the items are categorized into two types: Prohibited Items or Lost & Found items. The data is then saved in the Database. In the Handover Form flow, the data is taken from the Item Input Form. If the item is a Prohibited Item, the Operator must input the passenger's name, destination, and flight number. If not, the data can be directly saved. In the Goods Retrieval Form flow, the data is taken from the Handover Form. If the retrieved data is correct, it will be saved in the Goods Retrieval data, and the corresponding data in the Handover Form will be automatically deleted.

B. Data Entry Process

In the data entry process, the application built has a Login feature that must be accessed before entering the main form, as illustrated in the image below:

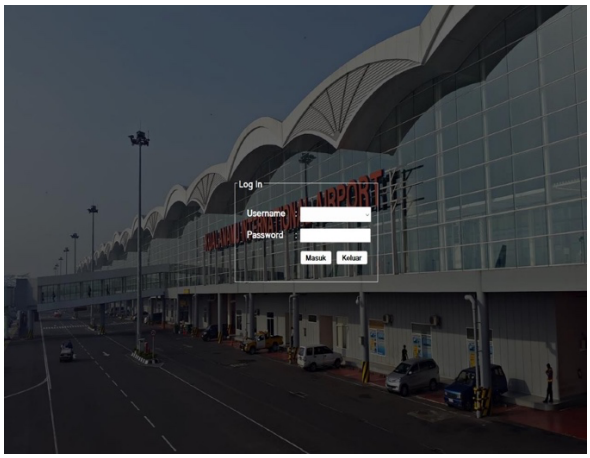

Figure 3. Login Form

In the login form above, the User enters their 'Username' and 'Password', and then clicks the 'Login' button to access the next page according to the user status applicable to each User who will use the data collection application. If the 'User' or 'Password' is incorrect, the User cannot access the subsequent page. This login mechanism serves to ensure that only authorized users can access the data collection system, thereby maintaining the security and integrity of the data. The successful login process verifies the user's credentials and grants them access to the appropriate functions and data based on their assigned role or privileges within the application. The implementation of a secure login[7] process is a crucial component in the design of the data collection system, as it helps to prevent unauthorized access, maintain data confidentiality, and ensure that only authorized personnel can perform data entry and management tasks.

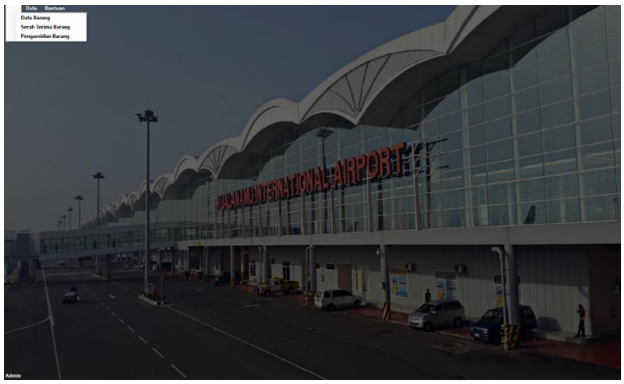

Figure 4. Main Form

The main menu of this data collection application has several sub-menus, such as File, Data, and Help. Under the File menu, there are submenus for Item Data, Item Handover, and Item Retrieval, which are the transaction forms in this application. The Data menu contains submenus for Item Data, Item Handover Data, and Item Retrieval Data. These are the data forms where the item information previously entered in the transaction forms is displayed. Finally, the Help menu has options for Changing Password, Logging Out of the Admin or Operator account, and Exiting the application. The hierarchical structure of the main menu, with its various submenus, provides a well-organized and intuitive interface for users to access the different functionalities of the data collection system. This design allows users to easily navigate between the transaction forms and the corresponding data management sections, facilitating efficient data entry, retrieval, and reporting.

The data input process takes place in the Item Data Input form. This item data form serves the purpose of initially categorizing the items and determining whether they are classified as prohibited items or lost and found items. If the user wishes to add a new type or category of item to the item data input database, they must first press the Add button. For the item code, the system is programmed to automatically populate this field, eliminating the need for the user to manually input the item code. The item type is also automatically divided into two categories: prohibited item or lost and found item. The user is only required to enter the name of the item. Subsequently, the user can directly press the Save button to store the data in the Item Data database. If the user wishes to cancel the data input process on the item data input form, they can press the Cancel button. This structured approach to item data entry, with automatic categorization and code generation, streamlines the data input process and helps to ensure consistency and accuracy in the item data records. The inclusion of the Add and Cancel buttons provides the user with the necessary flexibility to manage the data entry workflow as required. The efficient and user-friendly design of the Item Data Input form contributes to the overall effectiveness and usability of the data collection application, facilitating the maintenance of accurate and comprehensive item data records by users.

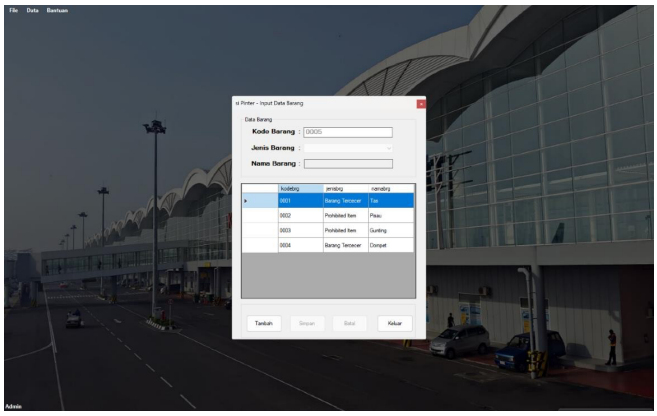

Figure 5. Item Data Input Form

C. Transaction Data Process

The transaction data process in this application is located in the Item Handover and Item Withdrawal forms. The Item Handover form serves as the interface to process the transaction of found lost items by airport security personnel, as well as prohibited items seized across all SCPs (Security Checkpoint) at the Airport[8], for subsequent data entry into the application.

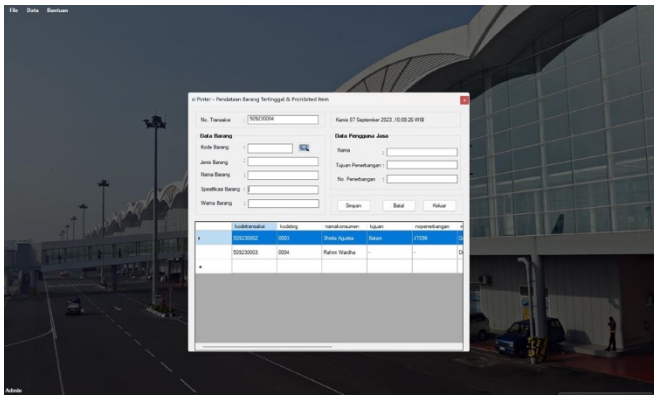

Figure 6. Item Handover Form

In the Item Handover form, the transaction number is automatically generated by the system. The user then enters the item type and item name, which can be selected from the previously filled-out Item Data Input form by pressing the search icon (magnifying glass) next to the item code field.

This process allows the user to efficiently record the details of items being handed over, whether they are lost and found items or prohibited items confiscated at the airport. The automated transaction number and integration with the Item Data Input form streamline the data entry workflow, contributing to the overall effectiveness of the application in managing item-related transactions.

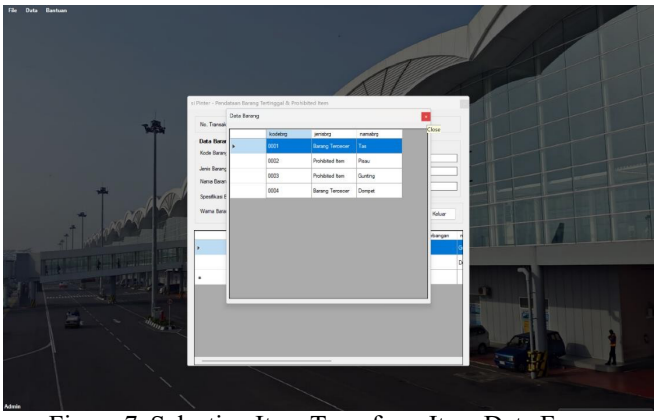

Figure 7. Selecting Item Type from Item Data Form

After the user has entered the item type, the next step is for the user to input the item name, specifications/details, and color. If the item type is categorized as a prohibited item, the user must also enter the passenger's name, flight destination, and flight number. If the item type is categorized as a lost or found item, the user can leave the passenger data fields blank.

Once all the necessary data has been entered, the user can save the information by pressing the Save button. This will automatically store the entered data in the Item Handover database.

This process flow allows the application to comprehensively capture the details of the items being handed over, whether they are prohibited items or lost and found items. The differentiation in data entry requirements based on the item category ensures that the necessary information is collected for each type of item transaction.

The integration between the Item Handover form and the previously populated Item Data Input form streamlines the data entry process, reducing the effort required by the user and promoting accuracy and consistency in the recorded item information.

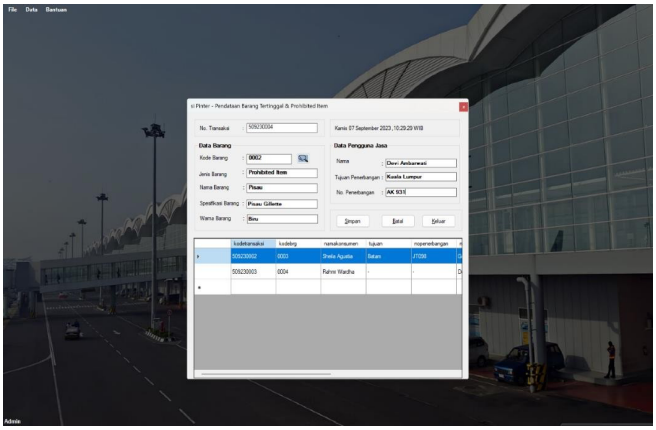

Figure 8. Process for Inputting Item Data and User Service Data

The next Transaction Data process in the application is the Item Withdrawal process. The Item Withdrawal process is where passengers or service users can retrieve their items, whether they are lost/found items or prohibited items that were confiscated by airport security personnel when the passenger went through the Security Checkpoint (SCP) at Kualanamu International Airport.

In this process, the user (passenger) must provide their personal information, such as their name, flight details (destination and flight number), and the item information (item type, name, specifications). This data is then matched against the records in the Item Handover database to validate the user's claim and facilitate the return of the item to the rightful owner.

The integration of the passenger and item data during the withdrawal process ensures a streamlined and secure procedure for retrieving lost, found, or prohibited items. This helps to maintain the integrity of the item management system and provides a user-friendly experience for passengers seeking to recover their belongings.

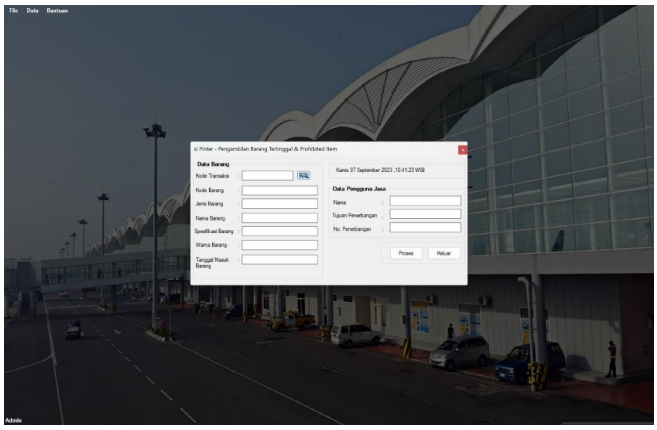

Figure 9. Item Withdrawal Form

In the Item Withdrawal form, the user, who in this case is the airport security staff, can search for the data of the service user who has come to the airport security post by pressing the search button or the search icon (magnifying glass). The application will then display the existing Item Handover data form.

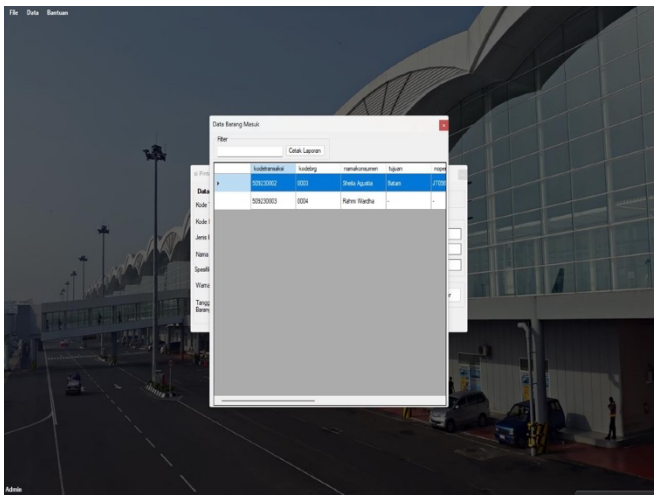

Figure 10. Item Handover Data Form

The user can then double-click on the data they want to retrieve, based on the item information provided by the service user, and the selected item data will be populated into the Item Withdrawal form for further processing.

This process allows the airport security staff to efficiently locate the relevant item handover record and facilitate the return of the item to the rightful owner. The integration between the Item Withdrawal form and the Item Handover data ensures a seamless retrieval process, where the necessary information is readily available to the user. The ability to double-click on the desired item data streamlines the workflow, minimizing the manual effort required by the user

and reducing the potential for errors during the item withdrawal process.

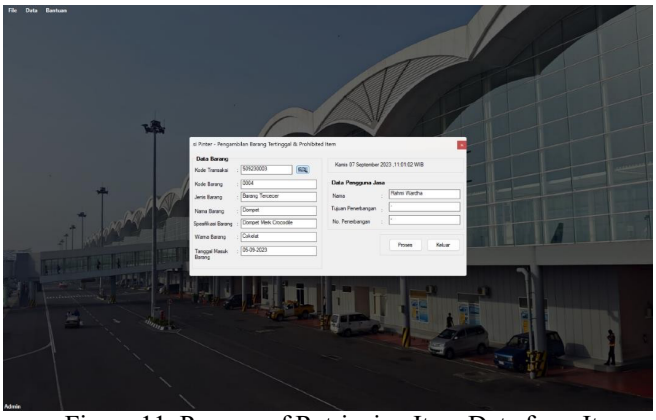

Figure 11. Process of Retrieving Item Data from Item Handover Data Form

When the user presses the "Process" button, the item data will be transferred from the Item Handover Data form to the Item Withdrawal form. All the data present in the Item Withdrawal form, including the date when the item was retrieved, will be populated. Simultaneously, the data in the Item Handover Data form will be automatically deleted.

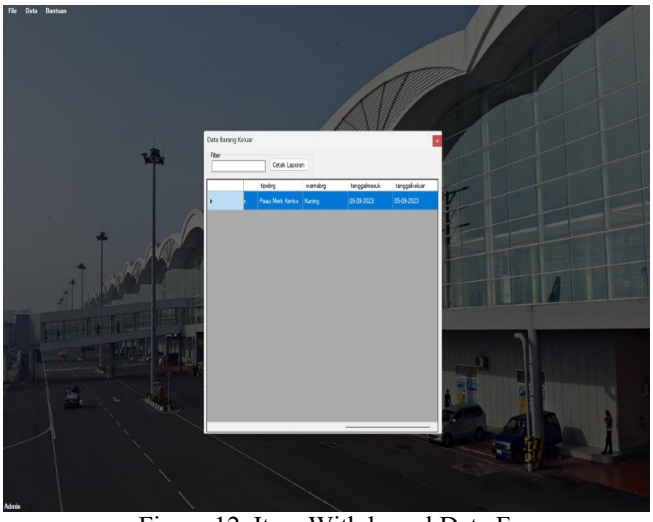

Figure 12. Item Withdrawal Data Form

This process flow ensures a seamless transition from the Item Handover to the Item Withdrawal process. By transferring the relevant data to the Item Withdrawal form and removing the corresponding records from the Item Handover form, the application maintains a clear and up-to-date record of the item retrieval transaction.

The automation of this data transfer and deletion process helps to reduce the manual effort required by the user and minimizes the potential for data inconsistencies or errors. This streamlined workflow enhances the efficiency and reliability of the item management system, providing a user-friendly experience for the airport security staff.

IV. Conclusion and Recommendations

A. Conclusion

Based on the results and discussion in building the prohibited item and lost item data collection application for the Airport Security Division of Kualanamu International Airport, the following conclusions can be drawn:

1) With the Prohibited Item and Lost Item Data Collection Application, the process of collecting data on lost items or prohibited items at the airport security post has become much more efficient. The collected data is also more organized, and the reports received by the Airport Security Quality Control are more accurate and timely.

2) The Prohibited Item and Lost Item Data Collection Application in the airport security division has also indirectly improved the Level of Service (LOS) of Kualanamu International Airport. Service users who want to retrieve their items can experience maximum service from the airport security officers. An increase in the Level of Service will have a significant impact on the level of an airport. The higher the Level of Service achieved by an airport, the greater the likelihood of upgrading the airport to a 5-star international standard.

B. Recommendations

The recommendations that the author can provide for the Prohibited Item and Lost Item Data Collection Application for the Airport Security Division of Kualanamu International Airport are as follows:

1) For Kualanamu International Airport, the airport must carry out equitable digitalization of facilities, including the Airport Security Division, to improve the Level of Service of Kualanamu International Airport and minimize complaints from service users.

2) For future researchers, the author is aware that the application currently built still has many shortcomings. The recommendation given to future researchers is to expand the scope of the research to further develop this application and follow the technological developments of the present era.

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