Towards Digital Transformation In Administrative Inventory Control: A Web-Based System Development Study

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Abstract.

The inventory information system currently employed by the General Administration Department remains largely manual, relying on Microsoft Office Excel. This approach results in inefficiencies, particularly in the retrieval and processing of inventory data, which tends to be slow and prone to errors. In response to these limitations, this study aims to develop a more efficient, user-friendly inventory management system that improves access to information and streamlines data and file handling. The proposed system is designed to enhance operational efficiency within administrative units, particularly the logistics sub-division, by providing accurate records of goods management activities, including procurement, inventory, and transactional processes. With the implementation of this system, it is expected that the handling of university logistics data will become faster, more reliable, and less prone to human error. Moreover, access to logistical information will be more readily available whenever required, supporting timely and informed decision-making.

Keywords: *Inventory System; Logistics Management; MySQL; Database Application and Information Efficiency.*

I. INTRODUCTION

The rapid advancement of information technology has profoundly transformed organizational operations, particularly within administrative and inventory management domains[1]. Across public and private institutions, administrative units are increasingly required to manage diverse resources and assets efficiently amid growing operational complexity[2]. Effective inventory management plays a pivotal role in ensuring continuity, budgetary control, and informed decision-making processes. Nevertheless, many organizations continue to utilize conventional or fragmented systems that are susceptible to data redundancy, restricted accessibility, and limited transparency[3].In response to these challenges, the integration of web-based information systems presents a strategic solution. These systems facilitate real-time access, centralized data management, and enhanced interdepartmental coordination[4]. The digital transformation of inventory systems, therefore, represents not merely a technological enhancement but a critical necessity for institutions seeking to improve administrative efficiency and accountability[5].Despite growing recognition of their benefits, the adoption of inventory information systems within administrative contexts remains limited[6]. Manual recording methods, isolated software tools, and the lack of real-time data access often result in inefficiencies, inconsistencies, and delayed decision-making[7]. Existing systems frequently fail to accommodate the dynamic and collaborative nature of administrative operations, which demand multi-user access, seamless departmental integration, and intuitive user interfaces[8]. Furthermore, the absence of customizable solutions aligned with the specific workflows of administrative units restricts the potential for process optimization[9]. These shortcomings underscore the pressing need for a dedicated, adaptable web-based inventory information system that responds to institutional requirements.

This study aims to design and develop a web-based inventory information system specifically tailored to support general administration functions[10]. The system is intended to offer centralized tracking capabilities, real-time data accessibility, and support for multiple user roles. The design process incorporates user-centered principles to ensure alignment with operational workflows, thereby promoting usability, scalability, and contextual adaptability[11]. Additionally, this study seeks to evaluate the system's performance in terms of administrative efficiency, data accuracy, and user satisfaction, contributing to the broader objective of enhancing institutional resource management and decision support[12].While inventory systems have been extensively studied within industrial, manufacturing, and supply chain contexts, limited scholarly attention has been devoted to administrative environments[13]. Inventory activities in administrative settings often involve non-commercial assets, dynamic documentation, and intricate

interdepartmental coordination[14]. Existing literature largely focuses on technical development without integrating the functional requirements unique to administrative workflows, and rarely includes empirical assessments of system effectiveness in real-world settings. This represents a significant gap in current knowledge, necessitating research that addresses both the functional and contextual challenges of administrative inventory management[15].The present study offers a novel contribution by developing a web-based inventory system that is contextually aligned with the specific needs of administrative environments. Unlike prior models that apply generalized approaches, the system introduced here incorporates administrative task flows, user accessibility demands, and real-time data synchronization. This integration enhances the system's relevance and usability while enabling more effective resource planning and transparency. By addressing an underexplored domain in information system research, the study advances theoretical understanding and offers practical implications for digital transformation initiatives. The system is expected to support governance enhancement, operational efficiency, and improved decision-making within administrative units.

II. METHODS

Resereach Design

This study employs a descriptive research design utilizing both qualitative and quantitative approaches to evaluate the development of a web-based inventory information system for general administrative management. The primary objective is to obtain comprehensive insights into user experiences and perceptions of the system, as well as to assess its effectiveness in enhancing administrative efficiency.

Population and Sample

The study involves a total of five respondents, selected purposively based on their functional roles as key users of the newly developed system. The sample includes:

1. the Head of Subsection,
2. Logistics Staff, and
3. System Operators.

Research Procedure

The research is conducted through the following four stages:

1. Planning: Identifying user requirements and defining the goals for system development.
2. Analysis: Examining the limitations of the existing system and the challenges encountered in administrative operations.
3. Design: Developing the structure and features of the web-based inventory system to meet the identified needs.
4. Implementation: Deploying the system in a real-world administrative setting and conducting testing to ensure operational functionality.

Data Collection Techniques

To support the research process, the following data collection methods are applied:

1. Interviews: Semi-structured interviews are conducted with selected respondents to explore their insights, expectations, and evaluations of the system.
2. Observation: Direct observation is carried out to examine system usage in actual operational settings and to identify any issues related to system functionality.
3. Literature Review: A review of related scholarly literature is conducted to establish a theoretical framework and to compare the developed system with existing inventory solutions

Data Analysis Techniques

The research uses both qualitative and quantitative analysis:

1. Qualitative Analysis: Identifying key themes from interviews and observations to understand user needs and system challenges.
2. Descriptive Analysis: Summarizing survey results to evaluate user satisfaction and system performance.

3. SWOT Analysis: Evaluating strengths, weaknesses, opportunities, and threats related to the web-based system's implementation.
4. System Performance: Assessing the system's speed, accuracy, and reliability in administrative tasks.
5. User Feedback: Collecting user feedback to evaluate their experiences and identify areas for improvement.
6. Gap Analysis: Identifying gaps between the current system and the newly developed system, highlighting areas for further enhancement.

III. RESULT AND DISCUSSION

Data Flow Diagram (DFD) Design

This interaction model reflects a clear separation of access privileges and data processing roles. Administrative users are entrusted with full control over data input, configuration, and validation, while unit-level users are primarily engaged in transactional operations. The bidirectional arrows in the diagram indicate real-time data exchange between the system and users, facilitating continuous synchronization and feedback.Implementation of this model has resulted in improved data accuracy, minimized redundancy, and enhanced transparency in inventory tracking processes. Structured access rights have significantly reduced operational errors, particularly in the validation of item inflows and outflows.Furthermore, system evaluation revealed that respondents from both user groups reported higher levels of efficiency and usability. These findings underscore the critical importance of aligning system architecture with actual administrative workflows and user-specific requirements.

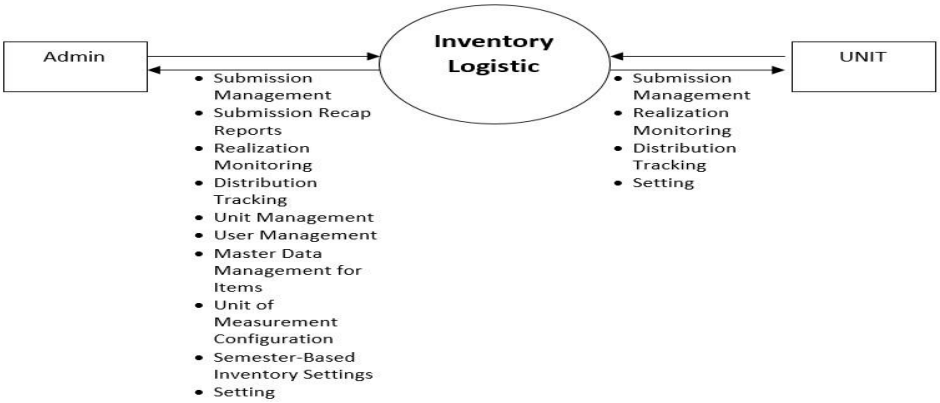

Fig 1. System interaction model for the Web-Based Inventory Information System

Figure 1 illustrates the interaction model integrated into the developed Web-Based Inventory Information System, which is specifically designed to support general administrative functions at the institutional level. The system distinguishes two primary user roles—**Admin** and **Unit**—each granted access to tailored functionalities based on their respective operational responsibilities.

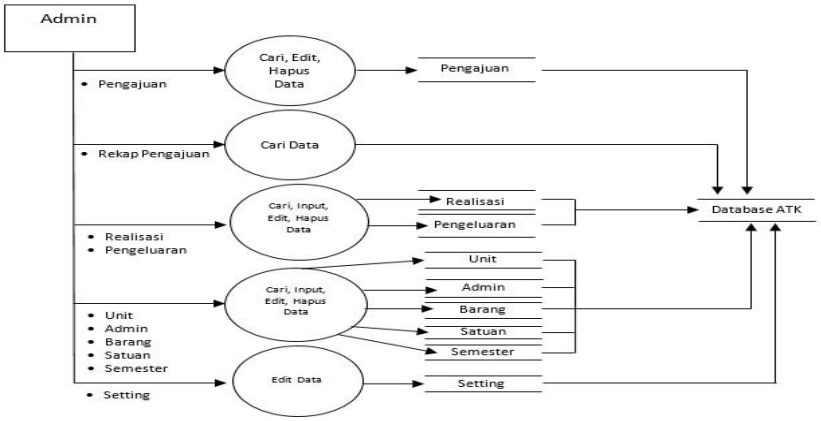

Fig 2. Contextual Data Flow Diagram (DFD) for the Admin Role in the Web-Based Logistics Inventory Information System.

Figure 2 presents a contextual Data Flow Diagram (DFD) that illustrates the interaction model specific to the *Admin* role within a web-based logistics inventory information system. The diagram visualizes the flow of data and processes involved in the centralized management of office supply (*ATK*) inventory operations.

The *Admin* user is granted comprehensive access to critical system modules, including the following:

1. Submission Management: Enables the Admin to search, edit, and delete inventory submission records. The updated data are then stored in the centralized inventory database.
2. Submission Recap: Facilitates retrieval of historical submission data to support reporting and analytical tasks.
3. Realization and Distribution: Allows the Admin to perform data entry, modification, and deletion related to item realization and disbursement to respective units. These activities directly update the ATK database.
4. Master Data Management: Covers management of fundamental system entities such as *Unit*, *Admin*, *Item (Barang)*, *Unit of Measurement (Satuan)*, and *Semester*. The Admin is responsible for executing data operations—input, retrieval, editing, and deletion—on each of these entities.
5. System Configuration (Settings): Supports the adjustment of system parameters through the editing process to align with specific institutional requirements.

All interactions and data transactions in this subsystem are synchronized with the ATK database, which functions as the central repository for real-time data integration, ensuring consistency and accuracy across the entire inventory management workflow.

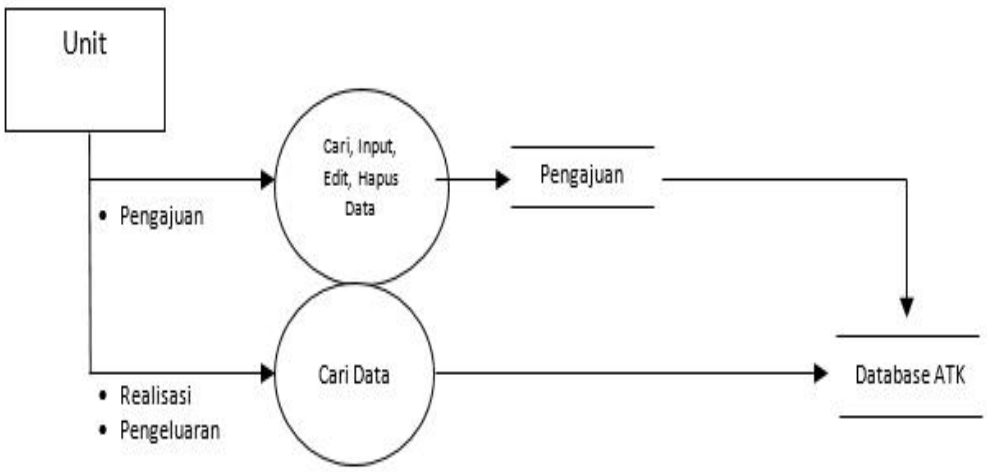

Fig 3. Contextual Data Flow Diagram (DFD) for the Unit role in the Web-Based Logistics Inventory Information System

Figure 3 presents a contextual Data Flow Diagram (DFD) representing the Unit role within the Web-Based Logistics Inventory Information System. The Unit role is designed with limited system privileges, primarily focused on managing submission records and monitoring the realization and distribution of inventory items.Within the Submission process, Unit users are authorized to execute basic data operations, including searching, inputting, editing, and deleting records. These actions are processed through the corresponding system module and subsequently stored in the central inventory system.In contrast, the Realization and Disbursement processes allow Unit users only to retrieve data, enabling passive monitoring of the status and fulfillment of requests previously submitted and processed by administrative personnel.All interactions initiated by the Unit role are seamlessly integrated with the centralized ATK Database, which functions as the primary repository and synchronization point for real-time inventory data management.

Flowchart

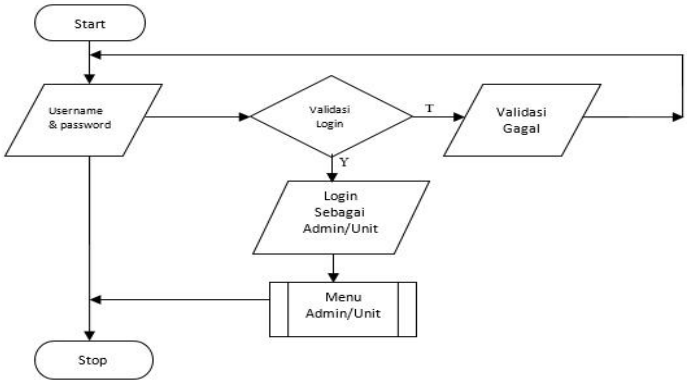

Fig 4. Flowchart of the user authentication process in the Web-Based Logistics Inventory Information System.

Figure 4 presents a flowchart outlining the user authentication process within the Web-Based Logistics Inventory Information System. The process initiates with the user inputting a valid combination of username and password. Following this input, the system executes a login validation procedure to authenticate the submitted credentials. If the validation fails (represented by the **T** branch), the system generates a "Validation Failed" notification and prompts the user to reattempt the login. Conversely, if the validation is successful (represented by the **Y** branch), the user is authenticated and granted access to the system, either as an Admin or Unit user, based on predefined role assignments. Upon successful authentication, the user is directed to the corresponding Admin or Unit interface, where they may access the system's functionalities according to their designated permissions. The process concludes when the user terminates the session and exits the system.

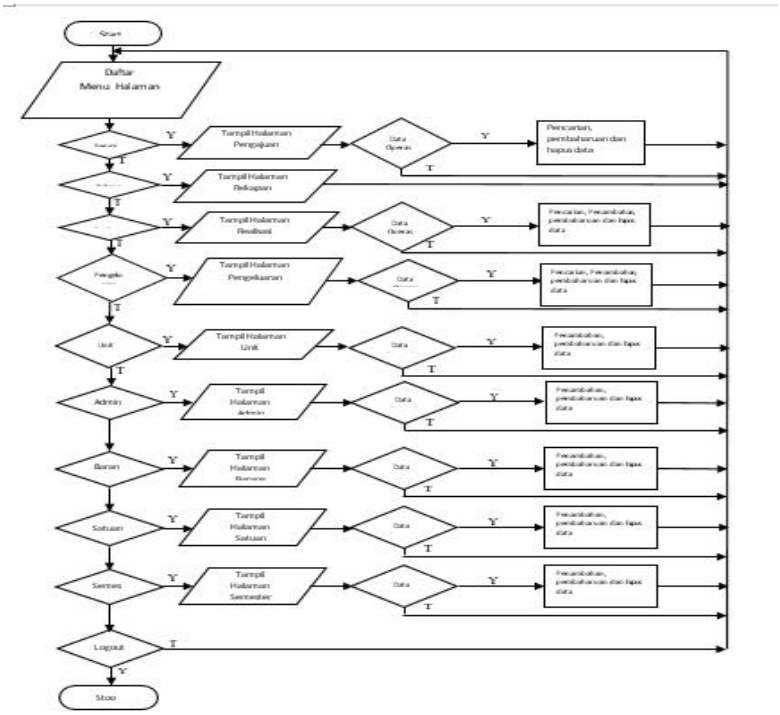

Fig 5. Flowchart of the admin authentication process in the Web-Based Logistics Inventory Information System.

Figure 5 illustrates the flowchart representing the navigation process within the Admin Menu of the Inventory Information System. This flowchart provides a comprehensive overview of the sequential actions available to administrators during system interaction. The process initiates with the Start symbol, indicating the commencement of system access. It proceeds to the Page Menu List, where various submenu options are displayed. These options enable administrative users to perform a range of inventory and data management

tasks. Within the View Application Page, administrators can review submission details submitted by various units or departments. The Operation Data on the Submission Page functionality supports the search, addition, modification, and deletion of submission records.

The Show Capture Page provides a summarized overview of processed data or activities, while the Show Realization Page displays realization information, including procurement and distribution statuses. In the View Expense Page, the system presents data related to inventory items that have been issued or consumed. Furthermore, the View Item Page enables access to item information and inventory record management. The Show Unit Page and Show Semester Page support the configuration and administration of unit-related information and academic semester settings, respectively. Additionally, the Show Admin Page facilitates administrative-level user management and system control access. The interaction concludes with the Logout function, allowing the administrator to securely exit the system, followed by the Stop node, marking the end of the session. This flowchart effectively illustrates the structured and role-specific interactions performed by administrative users, highlighting the system's capacity to streamline and organize inventory-related operations in a centralized and efficient manner.

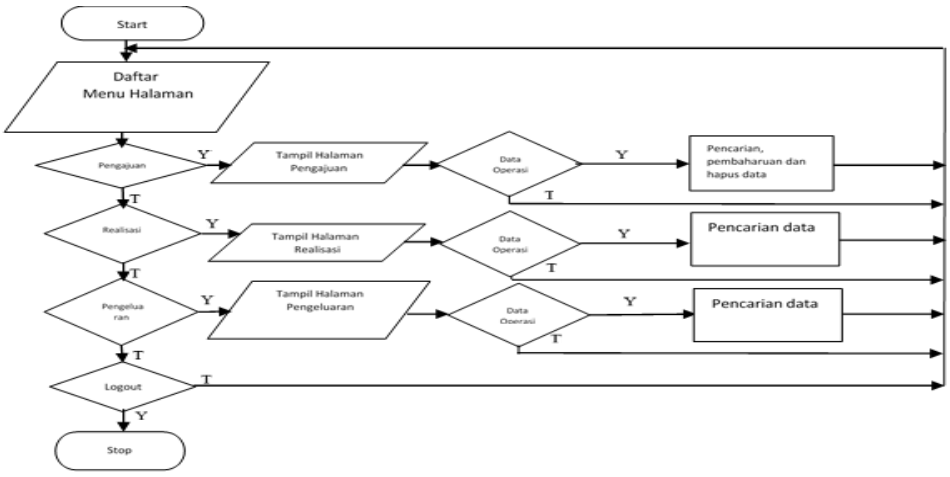

Fig 6. Flowchart of Unit Menu interaction in the Inventory Information System.

Figure 6 presents a flowchart depicting the user interaction process with the *Unit Menu* in the Inventory Information System. The diagram offers an overview of the navigational structure and the specific operations available to users operating at the unit level.The process initiates with the Start node, indicating the commencement of user interaction with the system. This is followed by the Page Menu List, which outlines the available menu options tailored to the operational scope of unit-level users. These options direct users to various functional pages within the system. The Submission Page enables users to create, view, update, and delete submission records. This functionality facilitates the initiation and management of procurement requests from individual units. The Realization Page provides access to information regarding the fulfillment of approved submissions, including the procurement and distribution status of requested items or services. The Expenditure Page displays detailed data on inventory items that have been issued or consumed. This feature plays a crucial role in supporting asset tracking and inventory control at the unit level. Each of these functional pages includes Operation Data capabilities, allowing users to perform essential data management tasks such as searching, adding, modifying, and deleting records. Upon completing the required operations, users may exit the system by selecting the Logout function, followed by the Stop symbol, which denotes the conclusion of the session. This flowchart illustrates a systematic and role-specific interface that empowers unit-level users to manage procurement submissions, monitor realizations, and track expenditures effectively, thereby contributing to a well-organized and accountable inventory management process within the institution.

Discussion

The figure 7 depicts the user interface of the home page in the web-based Logistics Inventory Information System. The layout incorporates a structured navigation menu on the left panel, enabling users to efficiently access various system modules. This panel includes menu options such as Home, Submission,

Submission Recap, Realization, Expenditure, Unit, Admin, and Master, representing the system's functional segmentation based on user access privileges. The central display features the title "Inventory Logistik" accompanied by the institutional logo positioned in the upper-right corner, serving as a visual identity marker. Overall, the interface functions as a centralized access point, facilitating integrated and systematic management of logistics inventory data..

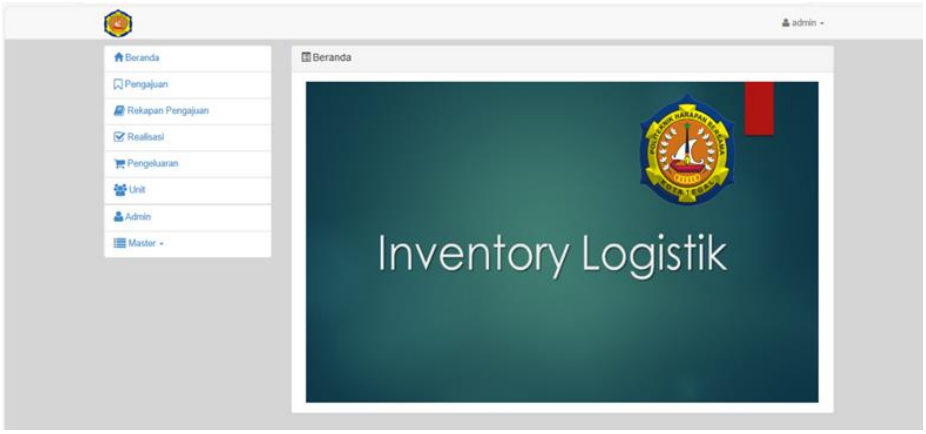

Fig 7. User interface of the home page in the Web-Based Logistics Inventory Information System.

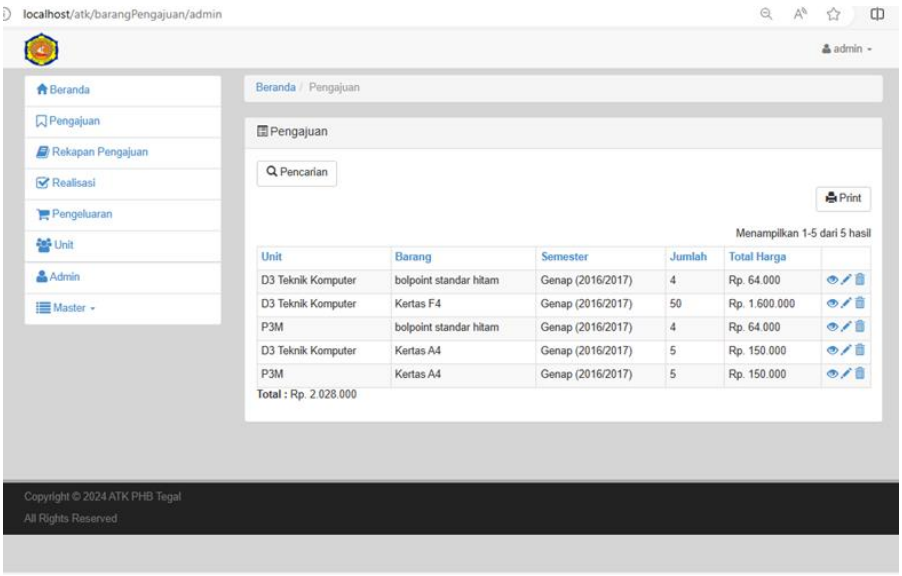

Fig 8. Application Menu Display

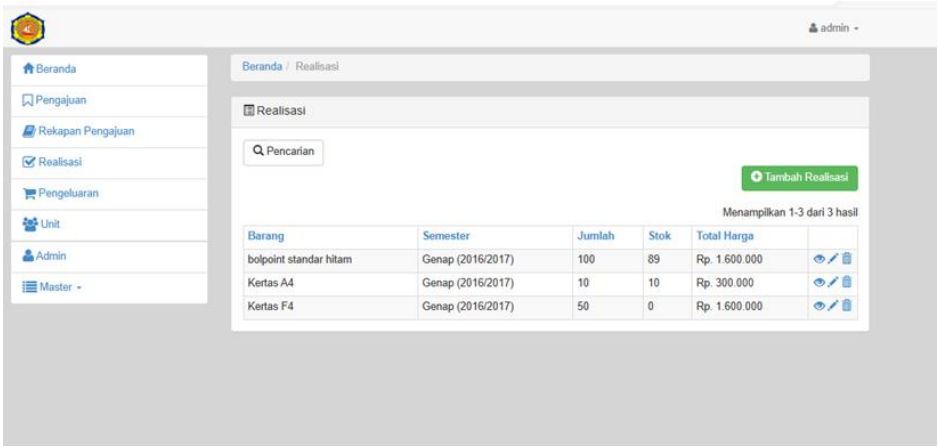

Fig 9. Application Realization Menu

Figures 7 and 8 depict the user interfaces of the "Submission" and "Realization" modules within the web-based Logistics Inventory Information System. The first figure illustrates a detailed submission table that presents information on submitting units, requested items, academic semesters, quantities, and corresponding total costs. The second figure displays the realization module, which contains data on fulfilled items, available stock, and total expenditure. Together, these modules are designed to support efficient tracking and management of procurement processes and inventory realization within the system.

IV. CONCLUSION

The inventory information system significantly improves operational efficiency and data accuracy, particularly within logistics sub-divisions of general administrative units. It facilitates the systematic management of procurement, inventory control, and transaction processing through the digitization of data entry, monitoring, and reporting activities.By utilizing structured system modules, users are able to submit item requests, monitor stock levels, and track the realization of distributed goods. Each transaction is automatically and securely logged, enhancing traceability while minimizing errors typically associated with manual recordkeeping.The implementation of role-based access control ensures that users are restricted to modules relevant to their designated responsibilities, thereby optimizing workflow efficiency and enhancing the security and integrity of system data.Overall, the system supports transparent and accountable inventory governance, expedites decision-making processes, and contributes to effective institutional resource management. This development marks a substantial step toward digital transformation in logistics administration.

V. ACKNOWLEDGMENTS

The authors gratefully acknowledge the Pusat Penelitian dan Pengabdian Masyarakat (P3M) of Politeknik Harapan Bersama for its essential support in facilitating this research on the development of a web-based logistics inventory information system. The institutional contributions, including infrastructure and resources, were instrumental in ensuring the successful execution of this study. The authors also extend their appreciation to the administrative and logistics divisions for their cooperation and valuable feedback throughout the system development and validation process.

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