



# Technology-Driven Sustainable Economic Transformation in Logistics: Digitalization of Web-Based Reporting Systems at PT BGR Logistik Indonesia

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**Abstract.** This study aims to analyze the existing monthly reporting process in warehouse operations at PT BGR Logistik Indonesia, Semarang Branch, and develop an integrated web-based reporting system that promotes operational efficiency, supports data-driven decision-making, and contributes to technology-driven sustainable business transformation through green digital innovation. The study used Waterfall software development methodology, which includes requirement analysis, system design, implementation, testing, and deployment. Data was collected through observation, interview, and documentation. MySQL was utilized as the database management system for data retrieval and storage. The results demonstrate that the developed web-based reporting system successfully integrates data collection, data storage, monitoring, data validation, and report retrieval into one single digital platform. Some of the features include user authentication, report submission, monitoring dashboard, report recapitulation, validation of document status, and search of reports using warehouse name, month, and year. This system ensures efficiency in reporting processes, data access control, and real-time monitoring of report completion. In addition, the digitization of reporting process simplifies administrative processes and paper work which enhances green digital innovation in logistics operations. This study contributes to the literature on digital transformation and sustainable logistics by demonstrating the role of web-based reporting systems in enabling technology-driven business transformation. Practically, the proposed system provides an integrated digital solution that enhances operational performance, data accessibility, and sustainability in logistics management

**Keywords:** Green digital innovation, sustainable logistics, web-based reporting system.

## 1 Introduction

The rapid advancement of information technology has accelerated digital transformation across various sectors, including logistics, improving the speed, accuracy, and efficiency of data management as well as operational efficiency and service quality [10][11][13]. However, digitalization in logistics companies still faces various challenges, with many organizations continuing to rely on manual or semi-digital processes [1][12].

PT BGR Logistik Indonesia Semarang Branch is a logistics and warehousing company whose monthly warehouse operational reporting currently relies on several

independent digital platforms WhatsApp, Google Forms, Google Sheets, and Google Drive — that are not integrated into a unified system. This results in challenges such as limited cloud storage, additional costs for storage expansion, difficulty retrieving documents, lack of real-time monitoring, difficulty verifying report completeness, and limited staff for report management. The most important problem is the storage of Google Drive, which provides 15 GB, and each report takes 36 MB. As a result, theoretically, one can have 427 files on Google Drive; however, currently there are already about 420 files, which is 98.4% of the capacity, so there is only place for less than 7 more reports.

These challenges reduce the effectiveness of monthly reporting and hinder efficient document management, highlighting the need for a web-based system that integrates report submission, storage, monitoring, validation, and retrieval within a single platform to improve accessibility and support more structured, effective operations [6]

Previous studies show that web-based information systems can improve operational efficiency and document management across various organizations yet research specifically addressing the digitalization of monthly warehouse reporting in logistics companies remains limited. This study therefore aims to analyze the existing monthly reporting process at PT BGR Logistik Indonesia Semarang Branch, identify system requirements based on the challenges faced, and design an integrated web-based reporting system to improve the efficiency and effectiveness of the company's operations.

## **2 Literature Riview**

### **2.1 Management Information Systems**

An Information System is designed to collect, process, and analyze data to generate information that supports managerial functions [4]. As a specific type of information system, a Management Information System (MIS) assists organizations by providing accurate and timely information for decision-making. Its implementation contributes to improved decision-making, operational efficiency, resource management, organizational competitiveness, customer satisfaction, transparency, accountability, and organizational innovation [14].

Information Systems play a significant role in supporting organizational performance by improving operational efficiency and the quality of managerial decision-making [5]. The implementation of a Management Information System (MIS) enables organizations to enhance operational efficiency, ensure data accuracy and information reliability, facilitate timely access to information for decision-making, support data analysis and strategic planning, and strengthen organizational competitiveness.

### **2.2 Digitalization**

Digitalization refers to the transformation of conventional mechanical and analog processes into digital technology to improve organizational performance [15]. The implementation of digital technologies enables organizations to enhance operational efficiency, optimize data management, and improve decision-making processes. In the context of reporting systems, digitalization transforms manual reporting into an

integrated information system consisting of data input, processing, storage, and information output [2].

In this study, digitalization serves an important role in developing a web-based monthly reporting system, where the process of reporting which used to be done manually or semi-manually has been digitized to become a more integrated, precise and easily accessible system. The digitization proves that digitalization is more than just about changing the medium of reporting but rather about making strategic efforts towards effectiveness and efficiency in operations, especially in PT BGR Logistik Indonesia Semarang Branch.

### **2.3 Reporting System**

A reporting system as a mechanism through which subordinates report their responsibilities and work performance to their supervisors [9]. A reporting system is an information system designed to provide timely, accurate, and relevant information to support operational control and managerial decision-making [3]. An effective reporting system should provide complete and reliable information, be easily accessible by users, and facilitate monitoring activities to improve organizational performance..

### **2.4 Web-Based Information System**

A web-based information system is an application that utilizes web technologies to store, process, and present information in various multimedia formats, including text, images, and videos [8]. Through the Hypertext Transfer Protocol (HTTP), users can access information using a web browser regardless of location. Compared with conventional desktop applications, web-based systems provide greater accessibility, centralized data management, and improved information sharing, making them suitable for supporting organizational reporting processes.

### **2.5 Waterfall**

The Waterfall model is a sequential software development method in which each phase must be completed before proceeding to the next. Consequently, subsequent stages cannot be carried out until the preceding stage has been successfully completed. Such an approach ensures that every stage is completed systematically before progressing through the development process. The Waterfall model usually comprises a number of stages such as requirements analysis, system design, database design, development, and testing [7].

## **3 Method**

This research utilizes qualitative research method with a case study at PT BGR Logistik Indonesia Branch Semarang. Qualitative research method is chosen to get a deep insight of the current monthly warehouse operation reporting process, the problems experienced during the report management process and the system requirement of the web based reporting system. The research focused on the monthly reporting activities carried out by the company's warehouse operations division.

Data were collected through participant observation, semi-structured interviews, and document analysis. Observations were conducted on the monthly warehouse reporting process, while interviews involved three key informants, namely the Warehouse Manager, Warehouse Operations Staff, and the Head of Warehouse Operations. These informants were selected using purposive sampling because of their direct involvement in the reporting process. In addition, operational documents, reporting forms, and company archives were analyzed to support and validate the findings through source and method triangulation.

Based on the collected data, the proposed system was developed using the Waterfall software development model, which requirements analysis, system design, database design, development, and testing. The system was developed using the Laravel framework with PHP as the programming language and MySQL as the database management system. Unified Modeling Language (UML), including use case and activity diagram was employed to model the proposed system. Finally, functional testing was performed using the Black Box Testing method to ensure that all system features operated according to the specified requirements

## **4 Result and Discussion**

### **4.1 Existing Monthly Warehouse Operational Reporting Process**

The existing monthly warehouse operational reporting process consists of four main stages: data input, data processing, data storage, and information output. During the data input stage, the Warehouse Manager prepares six mandatory monthly reports using Microsoft Excel, namely the Warehouse Stock Taking Report, Cargo Handling Realization Report, Monthly Inventory Movement Report, Weighing Sampling Report, Stamp Report, and Overtime Summary Report, before submitting them through Google Forms. In the data processing stage, the sender's information and document links are automatically recorded in Google Sheets, where the Warehouse Operations Staff manually verifies the completeness and accuracy of each submission. If incomplete or incorrect reports are identified, the respective Warehouse Manager is requested to revise and resubmit the documents. Since the verification process is handled by only one staff member, it is time-consuming and prone to human error. The uploaded reports are then stored in Google Drive as the primary storage repository. However, limited storage capacity frequently disrupts the reporting process by preventing new file uploads once the storage quota has been exceeded. Finally, the information output stage provides basic reporting information through Google Sheets, including the warehouse identity, submission time, and document links. However, the system does not provide report status indicators or a monitoring dashboard, requiring report tracking and monitoring to be performed manually, thereby reducing the overall efficiency of the reporting process.

### **4.2 Challenges in the Monthly Warehouse Operational Reporting System**

**Timely.** The current monthly reporting system uses Google Forms and Google Drive as platforms for document submission and storage. However, the limited storage

capacity of Google Drive frequently results in insufficient storage space, preventing Google Forms from accepting new report uploads. To address this issue, the company either deletes obsolete files or upgrades the storage capacity. However, these solutions are temporary and increase operational costs. This condition indicates that the current system does not meet the timeliness characteristic of an effective reporting system [3] nor the objectives of a Management Information System (MIS) in improving resource management efficiency [14]. Therefore, a more integrated and efficient reporting system is required

**Easy to Understand and Access.** Another issue identified in the current reporting system is the difficulty of retrieving report documents based on warehouse name or reporting period, particularly when the documents are required for audits or data reconciliation. Report data stored in Google Sheets are not systematically organized, making document retrieval a manual and time-consuming process. This indicates that the current system does not meet the characteristics of an effective reporting system, particularly in terms of accessibility and timeliness [3]. Therefore, the proposed system should provide a search feature that enables users to retrieve reports efficiently based on warehouse name, reporting period, and document type.

**Monitoring.** The existing reporting system lacks a real-time monitoring feature, requiring the Warehouse Operations Staff and the Warehouse Operations Section Head to manually review Google Sheets to track the submission status of monthly reports from each warehouse. This approach is inefficient, may delay the identification of overdue reports, and does not fulfill the characteristics of an effective reporting system in terms of supporting monitoring activities [3]

**Accuracy and Completeness.** Each monthly report must include six mandatory documents required by the company before it can be verified and used for operational monitoring and reporting. However, in the existing system, document completeness is verified manually because the uploaded files are stored separately through Google Forms, Google Sheets, and Google Drive. As a result, the Warehouse Operations Staff must open each document individually to check its completeness, making the verification process time-consuming and inefficient. Consequently, the current system does not fully satisfy the characteristics of an effective reporting system in terms of ensuring report accuracy and completeness [3].

### 4.3 Designing a Web-Based Monthly Reporting System

**Requirement analysis.** Based on the analysis of the existing monthly reporting system, several functional requirements were identified to address the operational challenges faced by PT BGR Logistik Indonesia Semarang Branch. These requirements include secure user authentication and access control, a dashboard for displaying reporting summaries, web-based report submission, real-time monitoring of report submission status, report preview and completeness verification, report validation, fast and accurate document retrieval, and centralized document storage. These requirements were derived from the identified problems and feedback provided by key informants. Therefore, this study proposes a web-based monthly reporting system that integrates

report submission, validation, document management, retrieval, and monitoring into a single platform to improve operational efficiency and support real-time monitoring.

**Design.** The proposed system was designed using UML to represent the functional requirements identified in the previous stage. The design consists of a use case diagram, activity diagram, and database design.

*Use Case Diagram.* The use case diagram of the proposed monthly warehouse reporting management system illustrates the interactions between the system actors and its main functionalities. The system involves three actors: the Warehouse Operations Staff, the Warehouse Operations Section Head, and the Warehouse Manager. The Warehouse Operations Staff and the Warehouse Operations Section Head have access to report management, document retrieval, report monitoring, and document completeness verification features. Meanwhile, the Warehouse Manager has access to the warehouse dashboard, where they can upload monthly reports and monitor the submission status of the uploaded reports. Figure 1 presents the use case diagram of the proposed system.

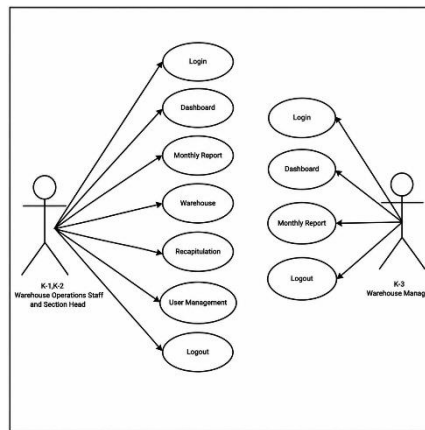


**Fig. 1.** Use case diagram

*Activity Diagram.* The activity diagrams describe the workflows performed by each user in the proposed monthly warehouse reporting system. The diagrams illustrate the interaction between users and the system for the main operational processes.

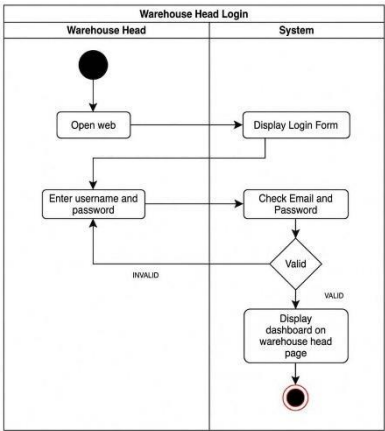


**Fig. 2.** Activity diagram of the Warehouse Manager login process.

Figure 2 illustrates the login process performed by the Warehouse Manager. The process begins when the user accesses the login page, enters the username and password, and is authenticated before being redirected to the dashboard.

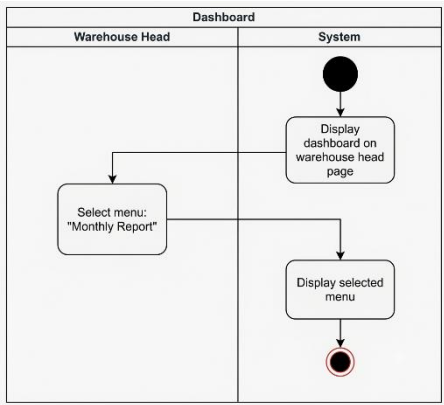


**Fig. 3.** Activity Diagram Dashboard

Figure 3 illustrates the workflow when a user successfully logs into the system and accesses the available menus.

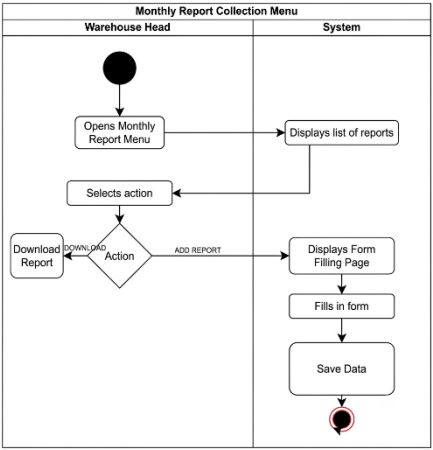


**Fig. 4.** illustrates the workflow for uploading monthly reports by the Warehouse Manager.

Figure 4, the activity diagram for the monthly report submission menu, illustrates the workflow of the Warehouse Head in accessing and managing monthly reports within the system.

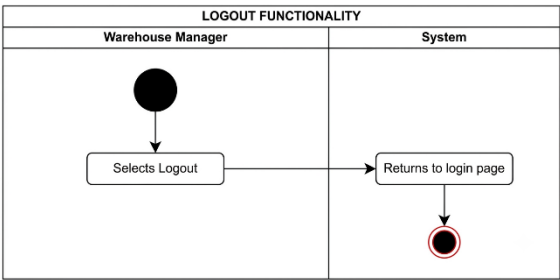


**Fig. 5.** Warehouse Manager Logout Activity Diagram

Figure 5, the logout activity diagram for the Warehouse Head, illustrates the process of the Warehouse Head logging out of the web-based monthly reporting system.

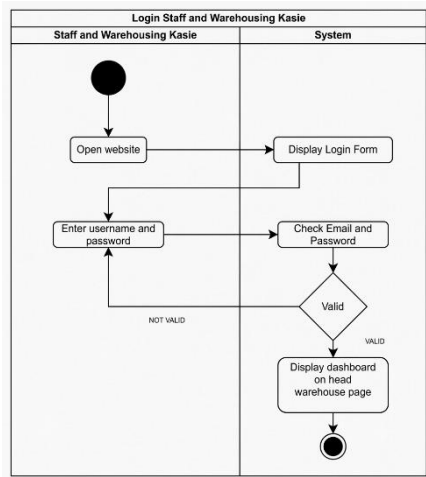


**Fig. 6.** Activity diagram for Staff and Warehouse Operations Section Head login

Figure 6, the login activity diagram for Warehouse Staff and Section Heads, illustrates the process by which they log in to the web-based monthly reporting system.

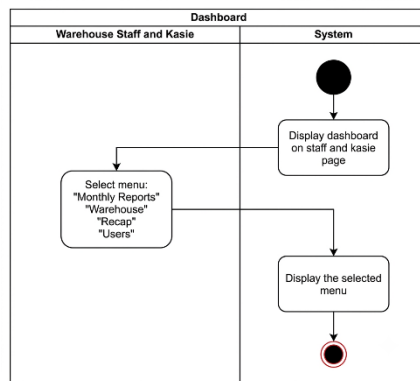


**Fig. 7.** Activity diagram Dashboard

Figure 7, the dashboard activity diagram begins with the system displaying the dashboard page for the Warehouse Staff and Warehouse Section Head accounts. Once the dashboard is displayed, the actor can select from the available menus based on their needs, such as the Monthly Report, Warehouse, Recapitulation, and User menus.

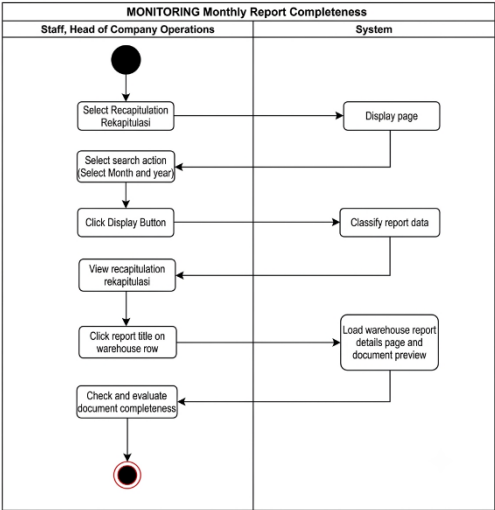


Fig. 8. Activity diagram for the report search feature

Figure 8, the activity diagram for the monthly report search menu, is used by the Company's Staff and Operational Section Heads to search for monthly report data stored in the system.

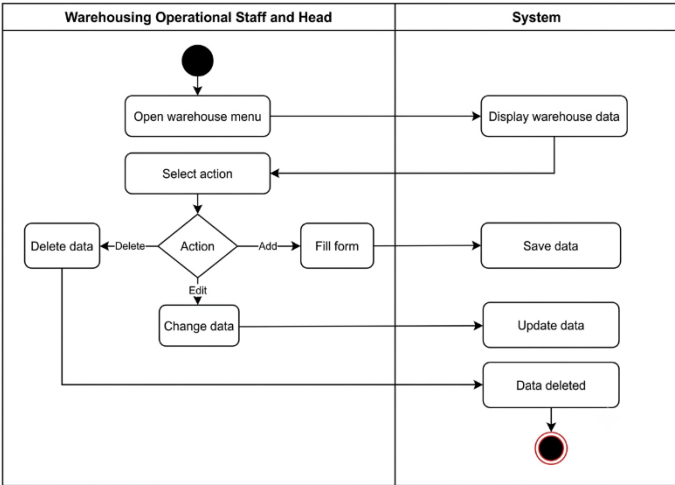


Fig. 9. Warehouse menu

Figure 9, the warehouse data management activity diagram, illustrates the roles of the Staff and the Company's Operations Section Head in managing warehouse data within the system.

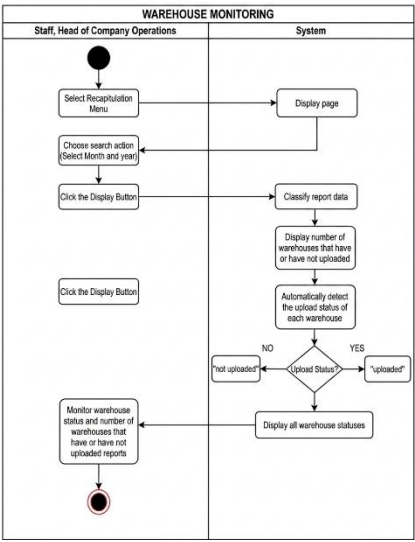


Fig. 10. Warehouse monitoring activity diagram

Figure 10, the warehouse monitoring activity diagram, illustrates the workflow of the staff and the Company's Operations Section Head in monitoring the status of monthly reports from each warehouse—specifically, whether or not the reports have been submitted.

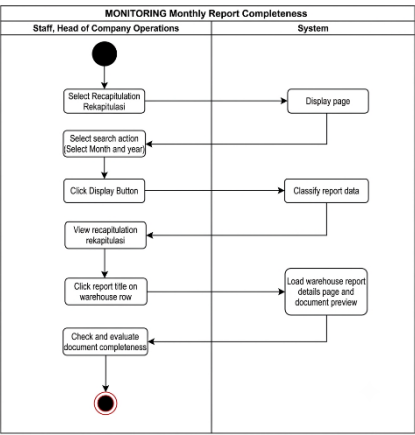


Fig. 11. Activity diagram for monitoring monthly report completeness

Figure 11, the activity diagram for monitoring monthly report completeness, illustrates the workflow of the Company's Operational Staff and Section Head in monitoring and verifying the completeness of monthly report documents from each warehouse.

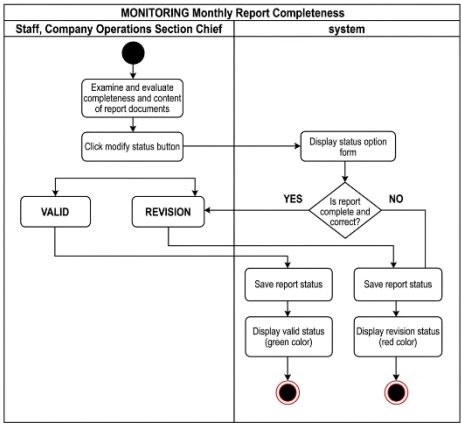


Fig. 12. Activity diagram for monitoring monthly report completeness

Figure 12, the activity diagram for monitoring monthly report completeness, illustrates the workflow of the Company's Staff and Operations Section Head in monitoring and verifying the completeness of monthly report documents from each warehouse.

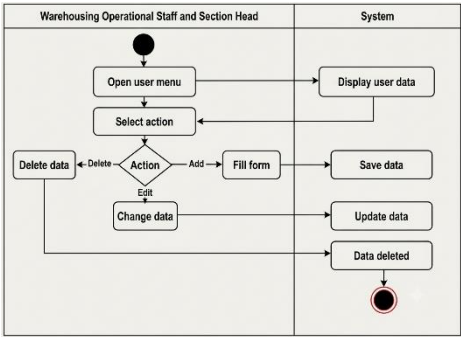


Fig. 13. Activity Diagram Users Menu

Figure 13 illustrates the workflow for the action selection stage, which presents three main options: add data, edit data, and delete data. If the Warehouse Operations Staff or Warehouse Operations Section Head selects the "add" action, the user must first complete the user data form.

**Database.** This system makes use of MySQL as the main database where all the required data will be stored. MySQL has been chosen because of its open source code, robustness, and extensive usage in developing web-based applications. phpMyAdmin is used for database management. It acts as an interface that helps in data administration. The database of this system consists of three major tables: users, reports, and warehouses.

**Development.** The proposed web-based monthly report generation system has been designed using Laravel framework with MySQL as the database management system,

Visual Studio Code as the development tool, and XAMPP as the local server. The two user types for which the system caters to include the Warehouse Manager who is responsible for providing the monthly reports and the Warehouse Operations Staff and Warehouse Operations Section Head who will be responsible for monitoring, verifying, and validating the reports. A secure login with role-based dashboard will be included in the design of the system to enable access according to user's role. Warehouse Managers will be able to generate the six required monthly reports using a web application replacing the current reporting system which uses Microsoft Excel, Google Forms, and Google Drive. Reports submitted will be stored in a centralized database, but authorized users can easily look for reports based on warehouse, reporting periods, and report type. Moreover, the system also supports real-time monitoring of report submission, document preview, and validation where reports can be identified as either Valid or Revision after successful validation. Additional features such as warehouse management, user management, and safe logout have also been developed in order to guarantee effective system and account management. All in all, the proposed system incorporates report submission, storage, searching, monitoring, and validation within one web-based system to make the process of monthly warehouse reporting process at PT BGR Logistik Indonesia Semarang Branch.

**Testing.** Black box testing is the technique of testing a software application without taking into account the internal workings or the source code of the application under test. The test case design methodology centers around testing whether the outputs produced by the software correspond to the expected output for certain inputs.

**Table 1.** System Testing Using Black-Box Testing

| No | Module            | Feature              | Expected Result                                                        | Result |
|----|-------------------|----------------------|------------------------------------------------------------------------|--------|
| 1  | Login             | User Authentication  | System authenticates users and redirects them according to their roles | Passed |
| 2  | Dashboard         | Dashboard Display    | Dashboard is displayed according to user access rights.                | Passed |
| 3  | Monthly Report    | Report Submission    | Monthly reports are successfully uploaded and stored in the database.  | Passed |
| 4  | Monthly Report    | Report Status        | Users can view the report submission status.                           | Passed |
| 5  | Report Management | Report Search        | Reports can be searched by warehouse, month, year, or title.           | Passed |
| 6  | Warehouse         | Warehouse Management | Warehouse data can be added, edited, and deleted successfully.         | Passed |
| 7  | Monitoring        | Real-Time Monitoring | Report submission status is displayed correctly.                       | Passed |
| 8  | Monitoring        | Document Validation  | Reports can be previewed and validated                                 | Passed |

|    |        |                 |                                            |        |
|----|--------|-----------------|--------------------------------------------|--------|
| 9  | User   | User Management | User accounts can be managed successfully. | Passed |
| 10 | Logout | Logout          | User session is terminated successfully.   | Passed |

## 5 Conclusion

The result from this research shows that the current monthly reporting system in PT BGR Logistik Indonesia Semarang Branch is still semi-digital because it uses Google Forms, Google Sheets, and Google Drive without an integrated platform. As a result, several issues were identified, including limited storage capacity, inefficient document retrieval, the absence of real-time monitoring, and manual report verification. Based on the identified requirements, this study designed a web-based monthly reporting system using the Waterfall development method. The proposed system includes user authentication, role-based dashboards, report submission, document search, real-time monitoring, report validation, and warehouse and user management features. Black-box testing demonstrated that all system functions operated as expected, indicating that the proposed system can integrate the monthly reporting process into a single platform and improve operational efficiency, data management, and report monitoring.

**Disclosure of Interests.** The authors have no competing interests to declare that are relevant to the content of this article.

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