

Implementation of a Web-Based Waste Recap Input System at PT. Indonesia Nippon Seiki to Improve Operational Efficiency in the Printing and Manual Line Sections

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Abstract: Recording production waste data that is still done manually can cause several obstacles, such as the recap process that takes longer, data that is difficult to retrieve, and the risk of errors in calculating the total weight of waste. These problems were found in the Production 4, Printing Section, Line Manual, PT Indonesia Nippon Seiki. This internship research aims to design and implement a web-based waste recap input system as an additional menu in the company's internal system. The methods used include observation, needs analysis, system design, implementation, testing, and documentation. The system was developed using PHP as a programming language, MySQL as a database, Bootstrap as a display support, and XAMPP as a local development server. The main features created include adding data, displaying data, searching data, editing data, pagination, and automatic calculation of total waste weight. The results of the internship show that the web-based waste recap system can help the waste data recording process become neater, faster, and easier to manage. This system also helps users in displaying, searching, and updating waste data based on date, shift, waste type, and total waste weight. Further development can be done by adding Excel export features, report printing, period filters, graphs, and user access rights.

Introduction

Advances in information technology are encouraging companies to manage data more quickly, systematically, and accurately. Web-based information systems are widely used because they can facilitate the digital recording, storage, retrieval, and

reporting of data. The use of web-based systems also makes it easier for companies to reduce reliance on manual documents that are prone to loss, damage, or difficulty retrieving. Rahmi et al. (2023) explain that website-based information systems can help organizations manage data and support operational processes more effectively.

PT Indonesia Nippon Seiki is an automotive component manufacturing company located in the Cikande Modern Industrial Estate, Serang, Banten. One of the departments requiring routine data recording is Production Department 4, Printing Section, Manual Line. This department records production waste, including date, shift, waste type, individual waste weight, and total waste weight. This data is required for administrative purposes and internal company reporting.

The problem arises because a dedicated menu for recording and summarizing waste data is not yet available specifically in the Printing and Line Manual sections. Manual recording can slow down the recapitulation process, complicate retrieval of old data, and increase the risk of calculation errors. Ningsih et al. (2022) stated that digitization through applications can make data processing and storage more effective and efficient. Based on this need, this internship focuses on creating a web-based waste recapitulation input system.

The system created consists of an additional menu to assist with digital waste data recording. This system does not cover the entire company's internal website, as the main system is confidential. The discussion focuses solely on the waste recap menu created during the internship. This menu includes features for adding data, displaying data, searching data, editing data, pagination, and automatically calculating total waste weight. The primary goal of developing this system is to facilitate a faster, more organized, easier-to-search, and more structured waste recording process.

Research Method

The method used in this internship involves several stages. These stages include observation, system requirements analysis, system design, system implementation, system testing, and documentation. These work stages are structured to ensure system development meets user needs and addresses the issues encountered in the Printing and Line Manual sections.

The first stage is observation. In this stage, the author observed the waste data recording process in the Printing and Line Manual sections. Observations were conducted to determine the types of data that needed to be recorded, the constraints of manual recording, and the limitations of the information that could be displayed in reports. The results of the observations served as the basis for determining the scope of the system to be developed.

The second stage is system requirements analysis. At this stage, the author determines the main features required by users. System requirements include waste data input, data display in tabular form, data search, data editing, pagination, and automatic calculation of

total waste weight. Data managed in the system includes date, shift, paper, plastic, PMMA reject parts, PC Sheet reject parts, roll protect, used solvent, used ink, ink cans, and total waste weight.

The third stage is system design. This design involves developing the system workflow, database design, and interface design. Flowcharts are used to illustrate the system's process flow. Use case diagrams are used to show the relationship between users and system features. Entity Relationship Diagrams are used to illustrate the data structure and relationships used within the system. Putra et al. (2022) explain that system design through diagrams helps the system development process become clearer and more focused.

The fourth stage is system implementation. The system was built using PHP, MySQL, Bootstrap, and XAMPP. PHP is used to process data from input forms, store data, display data, modify data, and calculate the total waste weight. MySQL is used to store waste summary data in a database. Bootstrap is used to make the system display more presentable and user-friendly. XAMPP is used as a local server to run and test the system before it is deployed internally within the company.

The fifth stage is system testing. Testing is conducted using the black box testing method. This testing focuses on system functionality without directly examining the program code structure. Pratama et al. (2023) explain that black box testing can be used to assess whether application functions are running according to expected inputs and outputs. Testing of this system was conducted on the features for adding data, displaying data, searching data, editing data, pagination, and calculating total waste weight.

Results and Discussion

Problem Analysis

Observations indicate that waste data recording in the Printing and Line Manual section requires a system that can store data more neatly and easily searched. The manual recording process has several drawbacks, such as taking longer, making data difficult to trace, and potentially inaccurate calculations of total waste weight. These issues can disrupt administrative efficiency, as waste data needs to be regularly summarized.

A web-based waste recap system was designed to address these issues. It allows users to input waste data by date and work shift. Each type of waste can be entered into a form, and the system automatically calculates the total waste weight. The stored data can be displayed in tabular form, allowing users to easily review the data.

3.2 System Design

System design is carried out through the creation of flowcharts, use case diagrams, ERDs, and database table structures. The flowchart illustrates the user workflow, starting from opening the waste recap menu, inputting data, saving data, searching data, editing data,

and displaying the recap results. The use case diagram illustrates user interactions with system features. The ERD illustrates the database structure used to store waste data.

The database is designed using the manual waste table. This table contains several main fields, namely id, date, shift, paper, plastic, part_reject_pmma, part_reject_pc_sheet, roll_protect, used_solvent, majun, used_ink, ink_can, and total. The table structure is adjusted to the needs of waste data recording in the Printing, Line Manual section. Maysanjaya and Dermawan (2024) explain that database management is needed to organize data so that it can be stored, processed, and reused in a structured manner.

System Implementation

The waste recap system was implemented using PHP, MySQL, Bootstrap, and XAMPP. PHP is used to run the system's main processes, such as storing data from forms, displaying data from the database, performing searches, updating data, and calculating the total waste weight. Sitanggang et al. (2022) demonstrated that PHP and MySQL can be used in developing web-based systems that require dynamic data processing.

MySQL is used to store waste data inputted by users. The stored data can be displayed in tabular form on the system's main page. Using MySQL helps centralize data storage and makes it easier to manage. Silalahi (2022) explains that MySQL is a database management system widely used in web-based application development.

Bootstrap is used to simplify, streamline, and simplify the user interface. The system interface consists of a waste summary homepage, a data add form, and a data edit form. Ramadhani et al. (2024) explain that Bootstrap can help create responsive and user-friendly web applications on various devices. The use of Bootstrap in this system supports user needs, making data input and management more convenient.

System Features

The waste recap system has several key features. The first is "add data." This feature allows you to enter waste data based on the date, shift, and weight of each type. The second is "show data." This feature displays all stored waste data in a table.

The third feature is data search. This feature helps users find specific data based on the keywords they enter. The fourth feature is data editing. This feature is used to correct saved data if there are input errors. The fifth feature is pagination. This feature limits the amount of data displayed on a single page to maintain a neat table layout. The sixth feature is automatic total waste weight calculation. This feature calculates the total weight of the waste entered by the user.

Table 1. Main Features of the Waste Recap System

No	Feature	Function
1	Add data	Input waste data based on date, shift, and weight of each type of waste.
2	Display data	Displays all stored waste data in table form.
3	Data search	Helps users find specific data based on keywords.
4	Edit data	Correct stored data if there are input errors.
5	Pagination	Limit the amount of data displayed on a single page to

		keep the table neat.
6	Total calculation	Calculates total waste weight automatically based on entered data.

System Testing

System testing was conducted using black box testing. Testing was conducted on the system's core functions to ensure each feature performed as required. Test results showed that the add data feature can save data to the database. The display data feature can display previously saved data. The search feature can display data based on keywords. The edit data feature can update previously saved data. The pagination feature can limit the data display. The total waste weight calculation feature can automatically calculate the total based on user input.

The test results indicate that the system can perform its main functions as required by the Printing and Line Manual departments. This system helps to structure the waste recording process more effectively than manual recording. Digitally stored data is easier to display, search, and update. Ariyandi and Purwanti (2025) explain that operational efficiency can be improved through process automation, resource management, performance monitoring, and work process improvement. A web-based waste recap system aligns with this concept by reducing manual work in the data recap process.

Table 2. System Testing Summary

No	Function	Testing Scenario	Results
1	Add data	The user fills in all the waste data and then presses the save button.	Valid
2	Display data	The system displays waste data stored in the database.	Valid
3	Data search	Users enter keywords in the search field.	Valid
4	Edit data	Users update the waste data that has been saved.	Valid
5	Pagination	The system limits the display of data to a few pages.	Valid
6	Calculate the total	The system automatically adds up the weight of each waste.	Valid

Impact of the System on Operational Efficiency

The implementation of a web-based waste recap system has had a positive impact on waste data administration. Data input is streamlined because users fill in data using a provided form. Data retrieval is faster because data is stored in a database. Calculating total waste weight is more accurate because the system calculates the total automatically.

This system also helps reduce paper use in the recording process. Reducing manual recording can improve work efficiency and minimize the risk of data loss. Sihalocho et al. (2023) explain that a waste reporting system can help companies manage waste recording and reporting processes more regularly. In the context of this practical work, the waste recap system supports the company's internal needs in managing waste data in the Printing and Line Manual sections.

Conclusion

Based on the results of the practical work that has been done, a web-based waste recap input system has been successfully designed and implemented as an additional menu to support waste data recording in the Production 4 section, Printing Section, Manual Line, PT Indonesia Nippon Seiki. This system was created using PHP, MySQL, Bootstrap, and XAMPP. The main features developed include adding data, displaying data, searching data, editing data, pagination, and automatic calculation of total waste weight.

A web-based waste recap system can help speed up, streamline, and manage waste data recording. Waste data can be stored in a database and displayed in tabular form. Users can also search and update data more easily. Automatically calculating the total waste weight helps reduce the risk of miscalculations that can occur in manual processes.

Further development of the system is possible to make it more comprehensive. Features that could be added include report printing, data export to Excel, data filtering by period, waste summary graphs, and user access rights. These improvements can make the system more secure, informative, and tailored to a company's waste data administration needs.

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