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Word count: 2623
Character count: 14783

Design and Construction of a Web-Based Inventory Information System Using the First In First Out (FIFO) Method at the Samanda Store

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Abstract

The fashion sector confronts progressively intricate issues in the contemporary digital world. Swiftly evolving fashion microtrends require enterprises to adopt stringent inventory and supply chain management practices to maintain competitiveness. Toko Samanda, a fashion retail establishment, faces immediate consequences of these micro-trends, including ineffective inventory management, intuition-driven restocking, and manual recording inaccuracies that lead to overstocking. As a result, increased warehouse inventory risks diminishing market appeal, thereby decreasing selling value.

Progress in information technology underscores the need for effective inventory management, especially for small enterprises such as Toko Samanda, which hitherto relied on manual record-keeping. This research aims to design and develop a web-based inventory information system using the First In First Out (FIFO) method to optimize stock management. The researcher utilized the Object-Oriented Analysis and Design (OOAD) methodology to construct the system. The system's functionality includes managing data for employees, categories, items, suppliers, and customers, processing procurement and sales transactions, and generating inventory reports.

System testing through Black-box Testing and User Acceptance Testing (UAT), using Toko Samanda's personnel, resulted in a satisfaction rate of 95.19% (Grade A). The application of the FIFO approach efficiently governs the movement of items, improves accuracy and processing velocity, and facilitates more informed management decision-making.

Keywords : *Information System, Inventory, First In First Out (FIFO),OOAD, User Acceptance Testing*

INTRODUCTION

At present, information technology pervades many facets of life, particularly in the business sector, where entrepreneurs must implement contemporary methods to improve operational efficiency and effectiveness. Information technology facilitates expedited and accurate data processing, thereby enhancing decision-making accuracy and reducing the errors typically associated with human recording.

Toko Samanda is a women's fashion retail enterprise that has been in operation for roughly 5 years, offering a range of apparel, including gamis (long dresses), shirts, and trousers. Nevertheless, the store continues to rely on manual inventory recording, resulting in limitations such as challenges with real-time stock oversight, documentation inaccuracies, and data loss. Moreover, the lack of an automated method for monitoring the movement of commodities leads to inefficient stock rotation management. This is especially crucial as fast-fashion trends require exceptional inventory management to avoid stockpiling and a decline in selling value.

To address these issues, the researcher develops a web-based inventory information system that enables automated, real-time stock management. (Adi Duta Saputra P. & Dwi Nuryana, 2024; Sadiah et al., 2024)This system employs the First In, First Out (FIFO) methodology to ensure that older inventory is prioritized for sale or relocation, thereby preventing the buildup of obsolete stock and

facilitating efficient inventory turnover.

The following is a translation of the theoretical framework section into English, employing technical, formal active voice in accordance with information systems literature standards:

An inventory information system is a comprehensive program or website that manages inventory data, enabling companies to efficiently and effectively oversee stock levels. This technology enables enterprises to monitor stock movements in real time, minimize recording errors, and accelerate reporting processes, thus ensuring seamless operational performance (Firdaus et al., 2025; Yoraeni et al., 2025). Moreover, a website, or the World Wide Web (WWW), is a collection of pages within a specified domain that offers varied content accessible to internet users via search engines (Aryani & Ali, 2025). Boone and Kurtz, as referenced in (Nazri et al., 2024), broadly define a website as a collection of interconnected, visually appealing informational resources within the vast internet infrastructure. In this digital management framework, the FIFO (First In, First Out) method serves as a crucial inventory valuation technique, in which the items entered first into the system are the first to be sold or distributed. This strategy reduces the risk of losses due to expiration or obsolescence by emphasizing the depletion of older stock, thus ensuring efficient inventory rotation, sustaining relatively "fresh" inventory levels, and ensuring that the earliest registered products are the first to be sold (Selpiyana et al., 2025).

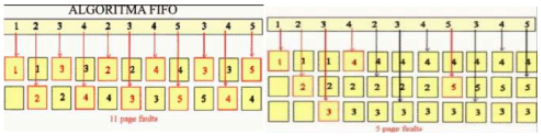

Figure 1. FIFO algorithm

User Acceptance Testing (UAT) is the final evaluation to determine how well a system meets end users' requirements and expectations in a real-world operational environment. In addition to basic technical validation, User Acceptance Testing (UAT) confirms both commercial value and user experience (Bagus & Nuryana, 2025; Putra et al., 2024). This methodology's key features include a testing process conducted by end users or their designated representatives, an evaluation focused on functionality and usability from the perspective of actual users, and the incorporation of usage scenarios that reflect routine operational tasks. Ultimately, it assesses the alignment between system specifications and business requirements, indicating that UAT findings determine the system's readiness for widespread deployment, bolster user confidence in the new system, and minimize the risk of functional errors during implementation.

Besides testing approaches, system development frequently depends on Object-Oriented Analysis and Design (OOAD). The OOAD methodology represents a modern problem-solving approach that creates models based on real-world principles, utilizing an object-oriented perspective throughout the analysis and design phases (Roziqin & Kusuma, 2021). Toko Samanda expects this technology to enhance operational efficiency, diminish recording inaccuracies, and accelerate inventory monitoring. The integrated system facilitates

more accurate decision-making for product procurement and marketing, aligning with market demands and evolving fashion trends.

METHOD

Data Collection Techniques

The descriptive technique entails investigating the current situation of a population, an object, a condition, a system of ideas, or a category of events. Moreover, Husein Umar in Adriaman (2024) characterizes the descriptive method as a pragmatic approach to depicting or elucidating the studied object through the acquired data or samples in their original form, without performing generalized analysis or deriving universal conclusions.

The researcher uses various approaches to gather data in implementing this method:

Field Research: This entails direct inquiry at the research location, Toko Samanda, through interviews, observations, documentation, and field notes.

Library Research: This involves gathering information from guidebooks, scholarly publications, and other pertinent sources essential for the research writing process.

System Development Techniques

System Development Methodology

The researcher uses the Object-Oriented Analysis and Design (OOAD) methodology for system development. This approach primarily seeks to improve system comprehension, maintainability, and scalability by applying object-oriented programming principles. This phase emphasizes examining system requirements through the lens of real-world entities, aiming to understand what the system must achieve rather than the methods of execution. The subsequent section delineates the methodical phases of the Object-Oriented Analysis and Design (OOAD) development methodology:

1. Identification of System Requirements
2. Object-Oriented Analysis (OOA)
3. Object-Oriented Design (OOD)

RESULTS AND DISCUSSION

Based on the findings, Toko Samanda struggles with inefficient inventory management due to manual, handwritten stock recording, which frequently leads to data inaccuracies. The data retrieval process during stock-taking or monthly closing becomes highly complex, inefficient, and time-consuming, as employees must manually inspect each record.

To address these challenges, the proposed system implements the First In First Out (FIFO) method. This approach prioritizes the outflow of goods based on their entry sequence, ensuring that older inventory sells quickly and does not accumulate in the warehouse.

By implementing FIFO, the store achieves more orderly stock rotation and minimizes the risk of product damage from prolonged storage. Ultimately, this system simplifies inventory management and enhances the store's overall operational efficiency.

The aforementioned description illustrates that the system procures merchandise for sale from the original inventory and the earliest acquisitions. The business employs this strategy to expedite the sale of older inventory entering the warehouse, thereby averting product deterioration from extended storage.

a. Design

The inventory website design for the Samanda Shop includes the following use case diagram.

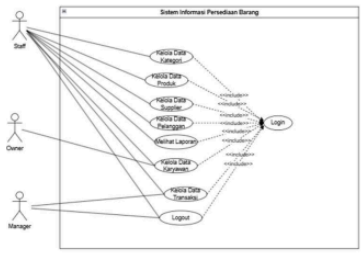

Figure 2. Use Case Diagram

b. Class Diagram

Class diagrams define the links among classes within a system. The subsequent illustration is a class diagram for the system to be developed.

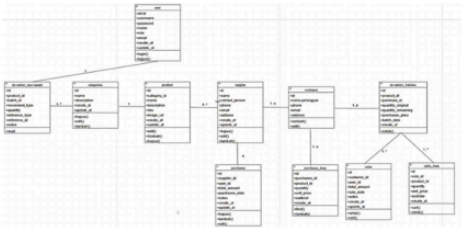

Figure 3. Class Diagram

c. Interface Implementation

During the implementation phase, the interface is developed according to the design established in the preceding stage to enhance user comprehension of the system.

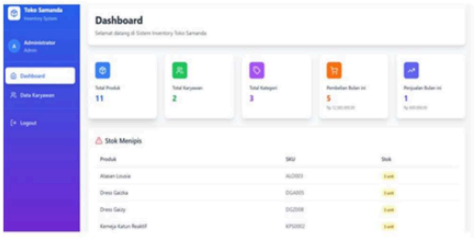

Figure 4. Admin Dashboard

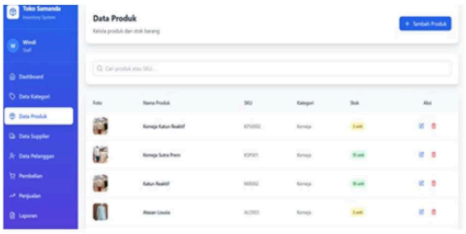

Figure 5. Product Data

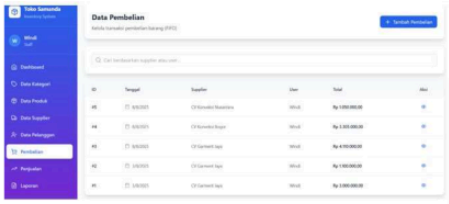

Figure 6. Purchase Data

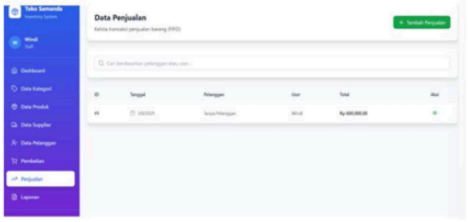

Figure 7. Sales Data

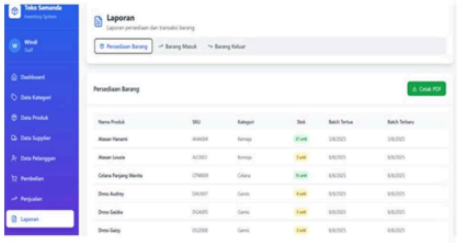

Figure 8. Report

d. Blackbox testing

System Evaluation

The system testing phase emphasizes Black-Box Testing to assess the application's functionality. The researcher examines the execution results and verifies that designated inputs activate the appropriate processes to yield outputs consistent with the original

design. This testing procedure classifies functional assessments by user role, specifically Admin and Owner. During the implementation phase, the interface is developed according to the design established in the preceding stage to enhance user comprehension of the system.

Table 1. Blackbox Testing Admin Page

Functions Tested	Testing Scenario	Applied Results	Test Results
Login	Empty all login data fields or fill in one of the login data (email and password, then press the "login" button.	The system will deny login access and continue to display the incomplete fields.	Succeed
Login	Fill in the conditions where one of the data is correct and/or both login data are incorrect, then press the "login" button.	The system will deny login access and display the message "Incorrect username/password."	Succeed
Login	Fill in the correct login data then press the "login" button	The system accepts login access and then immediately displays the admin dashboard.	Succeed
Dasboard	Press the dashboard button on the main admin page	The system will display the dashboard	Succeed
Managing product data	Press the product data button	The system will display a product data form and you can add photos, product names, and the date the product is in the product category.	Succeed
Managing supplier data	Press the supplier data button	The system will display supplier data and can add additional information such as name, phone number, and company name.	Succeed
Managing customer data	Press the customer data button	The system will display customer data and can add additional information such as name, phone number, city of origin, and product you wish to purchase.	Succeed
Goods purchasing activity	Press the purchase activity button	The system will display a page showing which products are still ready and our total purchase will appear.	Succeed
Sales activity of goods	Press the sales activity button	The system will display a page showing which products the customer will purchase and	Succeed

		the total.	
Report	Press the report button and there will be a dropdown for incoming goods report, outgoing goods report and goods inventory report.	The system displays the incoming goods report, outgoing goods report and goods inventory report pages.	Succeed

Table 2. Blackbox Testing Owner Page

Testing activities	What to expect	Test results	Conclusion
Login	Owners can log into the system and be directed to the owner page	Login successful and enter the owner dashboard page	Succeed
View/monitor employee data	Display all employee data	All employee data appears	Succeed
View/monitor item data,	Displays all item data	All item data appears	Succeed
View and search reports	Displays all searched reports list by report type and desired date	Displays all searched reports list by report type and desired date	Succeed
Downloading the report	Reports are downloaded and saved to the device	The report list has been successfully downloaded in PDF format and saved on your device.	Succeed
Viewing item predictions using the FIFO algorithm	The system displays the predicted results of incoming and outgoing goods in table form.	The system successfully predicts goods based on incoming and outgoing goods in the form of a table.	Succeed
Logout	Session expired and redirected to login page	*User is logged out and redirected to the login page*	Succeed

e. User Acceptance Testing Method

The User Acceptance Testing (UAT) involved six participants, all employees of the Samanda Store. Following data collection via a questionnaire, the authors obtained the processing outcomes presented in Table 3.

Table 3. UAT Testing Results

No	Question	Results			
		Very good	Good	Not good	Not good
1	Is the login function on the website working properly?	5	1		
2	Can the dashboard display the latest stock data correctly?	5	1		
3	Does the data adding function work properly?	5	1		
4	Does the data transformation function work properly?	5	1		
5	Does the delete data function work properly?	5	1		
6	Does the data search function work properly?	5	1		
7	Does the function of adding purchase transactions work properly?	4	2		
8	Does the function of adding sales transactions work well?	5	1		
9	Is the stock of goods automatically reduced after the sales process?	5	1		
10	Is the inventory report working properly?	5	1		
11	Are the menu and button displays easy to understand?	5	1		
12	Overall, does this system make inventory management easier?	5	1		
13	Can the FIFO method help to correctly recommend products that should be restocked?	4	2		

Calculation:

Weighting: Very Good (SB) = 4, Good (B) = 3, Poor (KB) = 2, Not Good (TB) = 1

Maximum score per question = (number of respondents) × (question score)

Percentage = (Score ÷ 24) × 100%

Table 4. Results of Respondents' Answer Calculations

No	SB	B	KB	TB	Score = number of respondents x weight	Total Score	Percentage = (score / 24) x 100%
1	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
2	4	2	0	0	(4x4) + (2x3) = 16 + 6 = 22	22	91,67%
3	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
4	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
5	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
6	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
7	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
8	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
9	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
10	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
11	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
12	5	1	0	0	(5x4) + (1x3) = 20 + 3 = 23	23	95,83%
13	4	2	0	0	(5x4) + (1x3) = 16 + 6 = 22	22	91,67%

Overall total:

Σ Score = 11×23+2×22=253+44=253

Σ Maximum Score = 13×24=312

Total UAT percentage = 297 ÷ 312 = 0.9519230769 (rounded to 95.19%)

Test Conclusion:

Table 4 indicates that the total column is derived from questionnaire questions 1-13. In contrast, the percentage column is calculated by calculating (total score ÷ 24) × 100%, yielding a final average of all percentage values of 0.9519230769, rounded to 95.19. The UAT scores from respondents show that the Samanda Store's Inventory website has received a favorable reaction and can enhance the performance of Samanda Store employees and staff.

CONCLUSION

The research findings indicate that the researcher effectively planned and implemented a web-based inventory information system for Toko Samanda that fulfills all defined needs. The User Acceptance Test (UAT) results, which achieved a satisfaction percentage of 95.19%, indicate that the system is highly viable for operational implementation. The system efficiently automates and streamlines real-time stock monitoring, allowing for expedited, simplified, and more precise product data verification.

Moreover, the First In, First Out (FIFO) approach operates efficiently by distributing items in the order they were received. This approach mitigates the hazards of product damage and the buildup of obsolete inventory—essential in a sector characterized by swiftly evolving trends—while streamlining inventory management for personnel and administration. This information system streamlines inventory processes, enables efficient operations, and aims to improve Toko Samanda's performance and competitiveness in the digital age.

REFERENCES

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