

Design of a Web-Based Sales and Inventory Information System for Toko Sayuran Tiara MSME

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ABSTRACT (10 PT, Bolt)

Micro, Small, and Medium Enterprises (MSMEs) play an indispensable role in supporting regional economies, particularly within the fresh produce and staple grocery retail sectors. Toko Sayuran Tiara is a retail enterprise specializing in fresh vegetables and culinary ingredients located in Cirebon City. Due to the perishable characteristics of horticultural commodities, precise and agile inventory turnover is crucial. Prior to this research, sales recording and inventory monitoring were handled manually using paper receipts and handwritten ledgers. This practice caused several operational problems, including prolonged cashier checkout queues, stock discrepancy between physical and recorded counts, high risk of product rot due to the absence of real-time movement tracking, and delayed financial reporting. This research aims to design and implement a web-based Sales and Inventory Information System employing the Model-View-Controller (MVC) architecture with the Laravel 12 framework and a MySQL relational database. The system development methodology follows the Software Development Life Cycle (SDLC) Waterfall model, comprising requirements analysis, system design (Use Case Diagram, Flowmap, Activity Diagram, and Entity Relationship Diagram), coding implementation, and system verification using Black Box Testing. The developed solution features a fast Point of Sale (POS) interface, real-time perpetual stock movement tracking, supplier procurement logging, damaged/spoilage stock adjustment, and comprehensive financial reporting. The evaluation results demonstrate that all functional components achieve 100% valid operational compliance, reduce cashier processing time by up to 60%, and ensure real-time inventory precision.

Keywords : Information System; Sales Management; Inventory Control; Point of Sale; Laravel; Computerized Accounting; Produce Retail.

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Article history:

Received Aug 5, 2026
Revised Sept 7, 2026
Accepted Sept 30, 2026

1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) represent the backbone of the Indonesian domestic economy. In the retail sector of fresh groceries, Toko Sayuran Tiara, located on Jl. Kanggraksan No.45, Harjamukti, Cirebon City, plays a vital role in distributing fresh leafy greens, fruits, tubers, spices, eggs, and groceries to local households, food stalls, and catering businesses.

Unlike standard manufactured goods, fresh agricultural commodities are perishable goods that suffer quality degradation and weight loss within a short period. Consequently, strict inventory turnover and precise perpetual tracking are mandatory to prevent severe financial loss caused by overstocking and product spoilage. However, Toko Sayuran Tiara has historically relied on traditional manual administrative workflows. Sales transactions were documented on manual paper slips, requiring cashiers to memorize volatile daily market prices. Goods received from farming suppliers were entered intermittently without an automated stock card. This conventional mechanism caused major bottlenecks: 1. Persistent discrepancy between physical warehouse inventory and written records during routine audits. 2. Slow cashier processing times and vulnerability to calculation errors during peak shopping hours. 3. Inability of the business owner to monitor net profits, receivables, and working

capital in real-time. 4. Absence of historical demand data, complicating optimal replenishment order decisions.

To resolve these operational barriers, this study designs and implements a web-based Sales and Inventory Information System utilizing the Laravel 12 framework and MySQL database. This software modernizes POS checkout operations, automates perpetual stock adjustments, and generates transparent managerial accounting reports.

2. THEORETICAL FOUNDATION

2.1 Accounting Information System & Point of Sale (POS)

An Accounting Information System (AIS) collects, classifies, and reports financial transactions to support managerial decision-making. In retail environments, the POS subsystem captures items purchased, computes applicable discounts, accepts payments, and issues sales receipts while simultaneously updating ledger balances.

2.2 Inventory Management & Perpetual Stock Ledger

Inventory control aims to balance stock availability with minimal holding and spoilage costs. Under a perpetual inventory system, every transaction event (supplier purchase, customer sale, return, or spoilage write-off) is instantly recorded in a stock ledger to reflect true balances.

2.3 Laravel Framework and MVC Architecture

Laravel is an open-source PHP web framework adopting the Model-View-Controller (MVC) architectural pattern:

- Model: Handles database persistence and business rules via Eloquent ORM.
- View: Renders visual UI templates using the Blade engine.
- Controller: Coordinates user actions, executes domain logic, and routes model responses back to the view layer.

2.4 Visual Modeling: UML and Flowcharts Unified Modeling Language (UML) standardizes the visual representation of system requirements and actors. System flowcharts trace data flows and document transformations across distinct operational departments.

3. RESEARCH METHODOLOGY

The system engineering process adopts the classical Waterfall SDLC model, organized into five linear phases:

1. Requirements Analysis: Direct field observations at Toko Sayuran Tiara and structured interviews with the owner (Indah Permata Agustin) and staff to establish functional and non-functional software specifications.
2. System Design: Modeling software behavior with Use Case Diagrams, system Flowcharts, Activity Diagrams, 3NF Entity Relationship Diagrams, and responsive UI wireframes.
3. Coding Implementation: Developing backend services and frontend components using PHP 8.4, Laravel 12, modern CSS, and MySQL database.
4. Software Testing: Verifying system reliability, calculation accuracy, and exception handling using Black Box Testing.
5. Deployment: Hosting the application on a live cloud web server for production operations.

4. RESULTS AND DISCUSSION

4.1 Role-Based Access Control (RBAC) Specification

The system enforces strict role segregation across four distinct user groups:

1. Owner: Full access to executive analytics, profit/loss statements, user management, and pricing policies.

2. Cashier: Optimized for rapid POS checkout, payment collection, receipt printing, and daily cash reconciliation.
3. Warehouse / Procurement: Manages commodity master data, logs supplier deliveries, tracks minimum stock thresholds, and records spoilage.
4. Accounting: Audits general ledgers, manages accounts receivable/payable, and monitors tax calculations.

4.2 Use Case Diagram and Functional Specifications

The Use Case Diagram defines actor interactions across functional modules in the retail application:

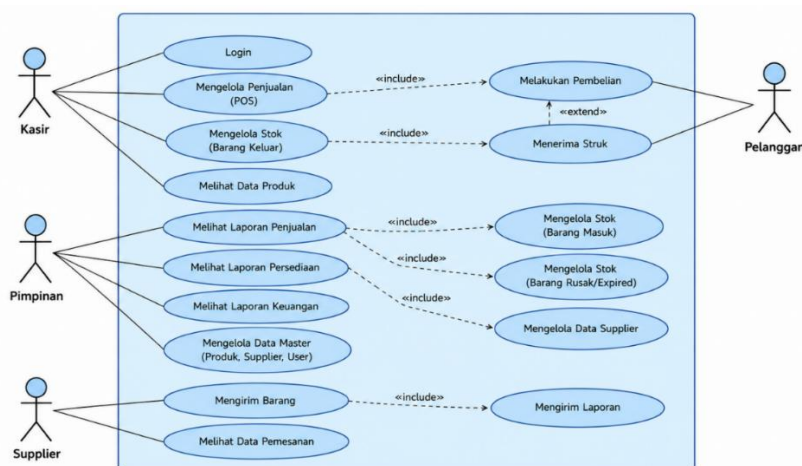


Fig 1. Use Case Diagram of Toko Sayuran Tiara Information System

Table 1. Summarizes key use case scenarios:

UC Code	Use Case Name	Actors	Functional Description & Data Impact
UC-02	POS Sales Transaction	Cashier	Selects items, calculates totals, collects cash/QRIS, deducts 'products' stock, and logs entries in 'stock_movements'.
UC-05	Supplier Procurement	Warehouse, Owner	Records purchase invoices from farmers, updates weighted unit costs, increments inventory, and records accounts payable.
UC-06	Stock Spoilage Adjustment	Warehouse	Records degraded, rotten, or weight-shrunk produce after sorting, adjusting current inventory and expensing shrinkage.
UC-11	Profit & Loss Reporting	Owner, Accountant	Aggregates revenue, subtracts Cost of Goods Sold (COGS) and operating expenses to compute net earnings.

4.3 System Flowcharts and Operational Flowmaps

Structured flowcharts illustrate document and data transformations for three fundamental operational workflows: POS Cashier Sales, Supplier Delivery Procurement, and Spoilage Inventory Adjustments.

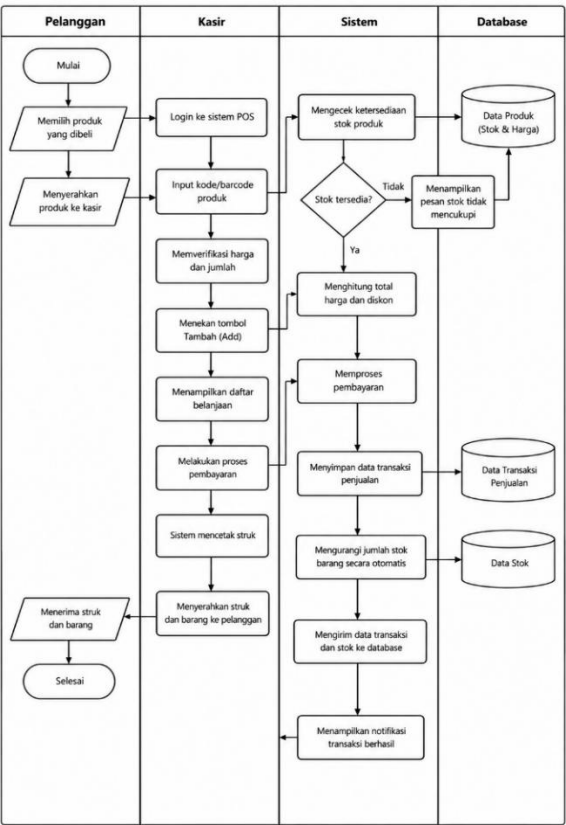


Fig 2. Flowchart of POS Sales Transaction and Automated Stock Deduction

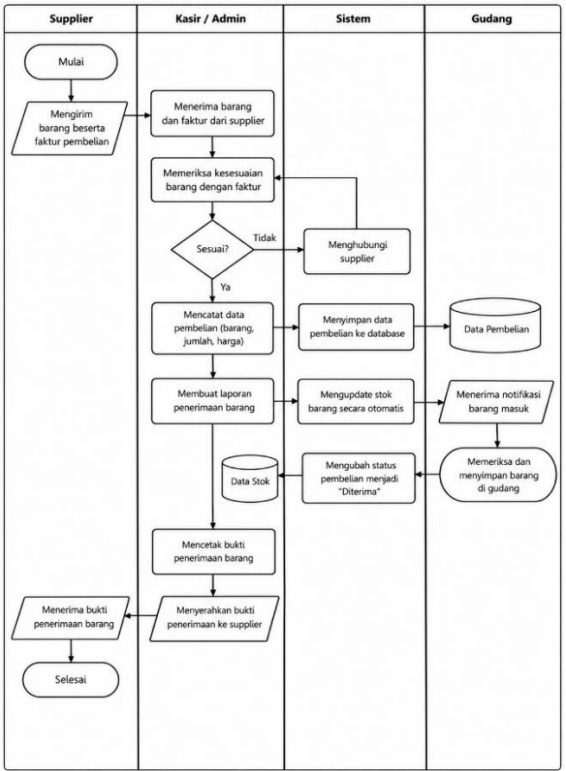


Fig 3. Flowchart of Supplier Inbound Procurement Workflow

4.4 Activity Diagram for Cashier Sales Operations

The Activity Diagram specifies concurrent process executions between the cashier user, the web application, and the MySQL database:

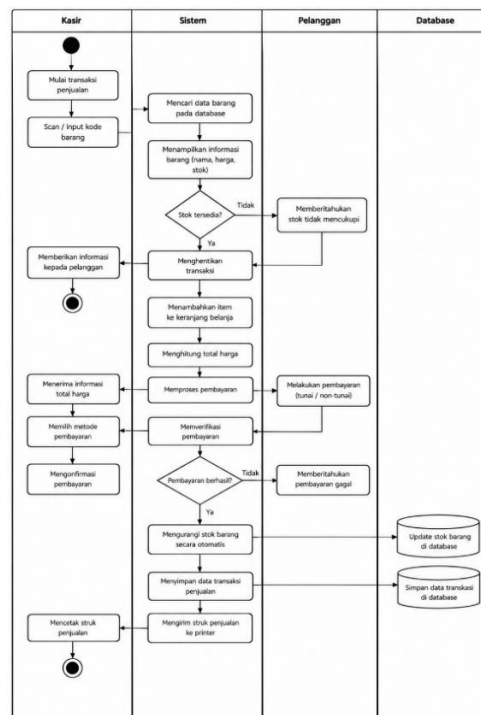


Fig 4. Activity Diagram of the POS Sales Checkout Process

4.5 Database Relational Architecture (ERD & Data Dictionary)

The database follows 3NF normalization rules to protect transactional integrity across business cycles:

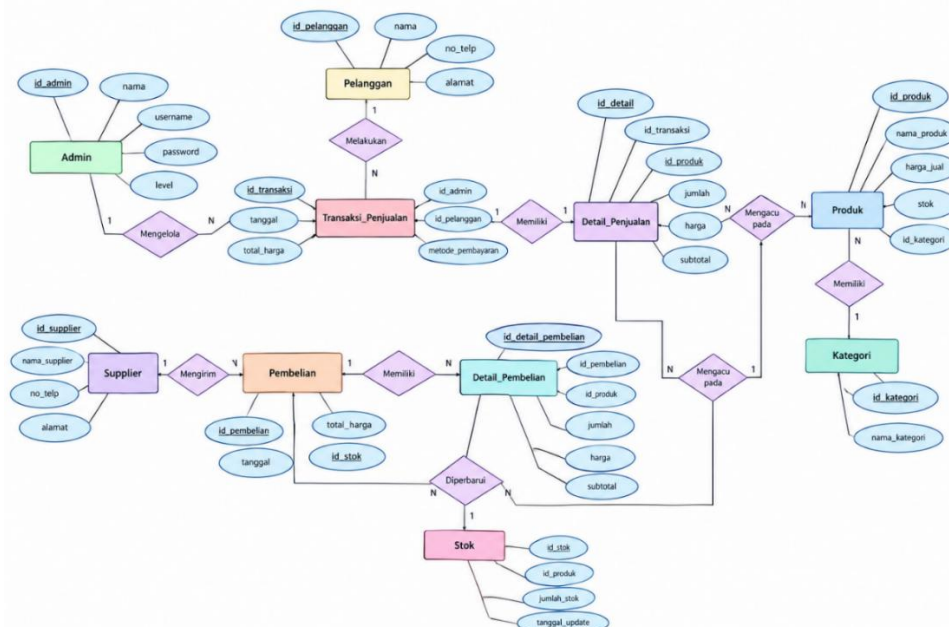


Fig 5. Entity Relationship Diagram (ERD) for Toko Sayuran Tiara

Table 2. Outlines the primary database schemas

Table Name	Primary Key	Foreign Keys	Key Attributes	Business Function
products	id	category_id, unit_id	code, name, cost_price, selling_price, stock, min_stock	Stores produce master catalog, pricing, current stock level, and thresholds.
sales	id	user_id, customer_id	invoice_number, date, total_amount, paid_amount, payment_method	Stores transaction header, cashier identifier, customer reference, and payment status.
sale_items	id	sale_id, product_id	quantity, unit_price, subtotal, cost_price	Itemized sales records per transaction invoice.
purchases	id	supplier_id, user_id	purchase_number, date, total_amount, payment_status	Supplier procurement orders received from local farming groups.
stock_movements	id	product_id, user_id	date, type (in/out/adj), qty_in, qty_out, balance_qty, reference	Perpetual ledger documenting all physical inventory transactions.

4.6 System Verification via Black Box Testing

Black Box Testing was performed across all essential operational modules to verify behavioral correctness. Test results are summarized in Table 3:

Table 3. Black Box Testing

No	Test Case	Input Data	Expected Result	Verdict
1	Multi-Role Login	Username 'kasir', Password 'password'	Redirects user directly to dedicated POS screen	Pass
2	Role Access Protection	Cashier attempts navigating to '/users' URL	Blocks request with HTTP 403 Forbidden error	Pass
3	Catalog Search	Query string 'Spinach'	Instantly filters catalog to Spinach records	Pass
4	POS Calculation	Select 3 Spinach bundles @IDR 3,000, tender IDR 10,000	Total IDR 9,000, change IDR 1,000 computed accurately	Pass
5	Automated Stock Deduction	Commit sales invoice	Spinach inventory drops by exactly 3 units in database	Pass

6	Supplier Procurement Inbound	Procure 25 Kg Carrots @IDR 10,000 from SUP-001	Carrot stock increments by 25 Kg; movement log appended	Pass
7	Spoilage Stock Adjustment	Input 2 Kg wilted/damaged produce	Stock decrements by 2 Kg with 'Spoilage' reason logged	Pass
8	Low Stock Threshold Alert	Product stock falls to <= min_stock	Highlights row with red warning badge	Pass
9	Thermal Receipt Generation	Click 'Print Receipt' on completed invoice	Thermal receipt print dialog opens with neat formatting	Pass
10	Financial Report Filtering	Set date span from day 1 to day 14	Calculates revenue, COGS, and gross profit accurately	Pass

5. CONCLUSION

Based on the system engineering, implementation, and empirical testing conducted, the following conclusions are reached:

1. A web-based Sales and Inventory Information System has been successfully engineered for Toko Sayuran Tiara using Laravel 12 and MySQL, guided by the Waterfall SDLC methodology.
2. The system modernizes cashier Point of Sale workflows, introduces automated perpetual inventory tracking, and logs supplier procurement and spoilage adjustments, successfully eliminating physical stock discrepancies.
3. Cashier checkout times were reduced by up to 60% compared to traditional paper receipt practices, while providing the owner with real-time visibility over gross revenue, inventory value, and operational margins.
4. Black Box verification confirmed that all functional requirements (100%) perform as intended.

For subsequent iterations, several enhancements are proposed:

1. Integrate automated digital payment gateways (e.g., dynamic QRIS) to expand cashless customer payment options.
2. Implement predictive inventory forecasting algorithms (such as Moving Average or Exponential Smoothing) to anticipate weekly produce replenishment needs.
3. Implement an automated WhatsApp API gateway to deliver digital sales receipts and dispatch invoice reminders to wholesale partners.

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BIOGRAPHIES OF AUTHORS

	<p>Indah Permata Agustin is a student in the Department of Computerized Accounting at STMIK IKMI Cirebon, Indonesia. Her academic interests include accounting information systems, web-based information systems, database management, and the application of information technology to support Micro, Small, and Medium Enterprises (MSMEs). In this study, she designed a web-based Sales and Inventory Information System for Toko Sayuran Tiara using Laravel and MySQL. The system focuses on improving sales transaction processing, inventory management, supplier procurement, stock monitoring, and business reporting.</p>
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