

TechXpress

e-commerce system

Team:	3
Version:	Version 1.0.0
Start date:	March 2025

INTRODUCTION

The system's functionality is to optimize the daily operations of the **ECommerce website** by integrating advanced features for managing inventory, orders, sales, customer interactions, and reporting efficiently. The system aims to provide a user-friendly and secure platform that meets both administrative and customer needs, simplifies e-commerce management processes, and ensures the smooth functioning of the online business.

This system addresses critical challenges such as inventory management, order accuracy, and data security—ensuring products are listed correctly, orders are processed efficiently, and sensitive data is protected from unauthorized access. It also offers features such as real-time alerts for low stock or popular product demand, enabling proactive decision-making.

Key Features Include:

- **User Authentication and Access Control:** To ensure only authorized personnel can access the administrative dashboard, with automatic logout for enhanced security.
- **Inventory Management:** Simplified tracking of product quantities, stock levels, and restocking needs
- **Order Processing and Invoicing:** Accurate order handling, support for various product quantities, shipping calculations, and automated invoicing.
- **Order and Returns Management:** Streamlined order placement and return processes to improve customer satisfaction and operational efficiency.
- **Reporting Tools:** To analyze sales trends, monitor inventory, customer behavior, and generate comprehensive business performance reports.
- **Barcode Integration:** For efficient product identification and stock management during order fulfillment and inventory updates.
- **Security:** Robust protection of sensitive customer data, transaction records, and administrative access.

User Requirements

1. User Authentication and Access Control:

- Each **admin user or employee** shall have a unique password to access the system.
- The system shall automatically log out inactive sessions for enhanced security.
- Access logs shall be maintained for all admin activities.
- **Rationale:** To ensure security and accountability, prevent unauthorized access to sensitive data, and track login/logout activity for system administrators.

2. Inventory Management:

- The system shall have the ability to **add new products to the inventory**.
- The system shall have the ability to **track product quantity and availability status**.
- Generate alerts for **low stock levels or high-demand products**.
- **Rationale:** To optimize inventory levels, prevent stockouts, and improve product availability.

3. Purchase Order Management:

- Record purchases of new stock from suppliers/vendors.
- Track purchase date, supplier details, and quantity received.
- **Rationale:** To maintain accurate records of procurement and control operational costs.

4. Returns Management:

- The system shall have the ability to **track returned products** and **update inventory accordingly**.
- Allow customers to initiate product return requests via their accounts.
- **Rationale:** To efficiently handle customer returns, manage inventory accurately, and reduce loss

5. Order Processing and Invoicing:

- Generate digital invoices for each customer order.
- Calculate the total order cost, including shipping fees, taxes, and applicable discounts.
- Ability to apply **discount codes or promotional offers**.
- **Rationale:** To ensure accurate order processing, automate invoicing, and improve revenue tracking

6. Search Functionality:

- The system should allow users to **search for products using partial names, categories, or codes**.
- Recommend **related or alternative products** when searched items are out of stock.
- **Rationale:** To simplify product discovery and enhance user experience during product browsing

7. Barcode Generation:

- The system should **generate or integrate unique barcodes for each product**, supporting order fulfillment and inventory updates.
- **Rationale:** To streamline inventory tracking, product identification, and order management.

8. Reporting:

- The system shall generate **comprehensive reports** on sales performance, inventory status, order history, and profit analysis.
- **Rationale:** To enable business owners to monitor performance, identify top-selling products, and plan strategically.

9. Security:

- The system shall implement robust **data encryption, secure payment gateways, and role-based access control**.
- **Rationale:** To protect customer data, transaction details, and system integrity from threats or unauthorized access.

System requirements

Functional requirements:

1. User Authentication and Access Control

- The system shall enforce a unique username and password for each **customer, employee, or manager**.
- Passwords shall be stored securely using **industry-standard hashing and salting techniques**.
- The system shall validate login credentials against the stored user database.
- The system shall support **session timeouts after a period of inactivity** (instead of shift-based logout).
- The system shall provide a **timeout warning message 5 minutes before automatic session expiration**.
- **Access logs** shall be retained for at least 90 days and accessible only to authorized admin personnel.
- The system shall support **role-based access control**, such as:
 - **Customers** – Can browse products, place orders, and manage profiles.
 - **Employees/Admins** – Can manage inventory, orders, returns, and discounts.
 - **Managers** – Full access, including financial reports and analytics.

2. Inventory Management:

Track Quantity and Product Details:

- The system shall maintain a real-time inventory of each product, including:
 - Current stock level.
 - Inventory shall update automatically after each **order, return, or stock adjustment**.

Add New Products:

- Admin interface shall allow adding new products with fields:
 - Product name.
 - Unique product code.
 - Brand/manufacturer.
 - Category or type (e.g., electronics).
 - Price per unit.
- The system shall generate **low-stock alerts** based on configurable thresholds.
- Alerts shall appear in **admin/manager dashboards** and optionally be sent via **email/SMS**.
- Manual inventory updates shall be supported for stock adjustments or returns.

3. Purchase Order Management (Admin Panel Only):

- The system shall allow admins to record **new stock purchases** with:
 - Product name and code.
 - Supplier details.
 - Purchase price.
 - Quantity received.
 - Purchase order number (optional).
 - Batch number and expiration date (if applicable).
- The system shall maintain a **comprehensive purchase history** for all products.

4. Returns Management:

- The system shall allow users to initiate **product return requests** (based on return policy).
- Admins shall validate the return request before restocking.
- If returned products are unsuitable for resale (e.g., damaged, expired), the system shall mark them as "**non-sellable**".
- Manager authorization shall be required for high-value returns.
- System shall generate reports on returns, including:
 - Quantity returned.
 - Return reasons.
 - Inventory and revenue impact.

5.Sales and Invoicing :

Generate Invoices for Each Customer Purchase:

- System shall generate detailed **invoices** for each customer order with:
 - Order ID.
 - Customer name and contact info.
 - Date and time.
 - List of products purchased.
 - Unit prices and quantity.
 - Discounts applied.
 - Total amount including taxes and shipping **Discounts and Offers:**
- Admins shall be able to configure:
 - Flat-rate discounts (e.g., 10% off).
 - **Promo codes** and **limited-time offers**.

5. Product Search:

Search Functionality

- The system shall support **partial name/code search**.
- Display suggestions including:
 - Product name.
 - Price.
 - Stock availability.
 - Discounts or offers.

Search results shall include **filters and sort options** (e.g., price, category, rating).

7.Barcode Generation and Product Identification

- The system shall generate **unique barcodes** per item or batch for inventory and logistics purposes.
- Barcode details include: ◦ Product name. ◦ Batch/Item code.
 - Quantity.
- Barcodes can be printed on **order invoices or shipping labels**.

8. Reporting and Analytics

The system shall support **comprehensive reports** for admins and managers, including:

Sales Reports:

- Most sold products.
- Sales trends by period.
- Revenue per category or customer segment.

Inventory Reports:

- Real-time stock levels.
- Expiring or expired items.
- Low-stock alerts.

Profit Analysis:

- Total revenue.
- Discount impact.
- Cost vs. revenue comparison

Non-Functional requirements

- **Security:**
 - Password policies shall require at least 8 characters, including uppercase, lowercase, numbers, and special characters.
 - User accounts shall lock after 5 failed login attempts, with a 15minute cooldown period.
- **Performance:**
 - **Authentication process** shall complete within **2 seconds for 95% of login attempts**.
 - **Real-time alerts** for low stock and upcoming product expirations (if applicable) shall be displayed instantly.
- **Scalability**
- **Reliability:**
 - **Inventory and order records** shall be updated immediately upon checkout, return, or stock adjustments.

- **Usability:**

- The system shall provide a **user-friendly and intuitive interface** for: ○ Browsing products. ○ Placing orders. ○ Managing returns/refunds.
- The **admin dashboard** shall offer simplified tools for inventory, discounts, order tracking, and analytics.
- Reports shall be presented in formats optimized for **business insights, accounting, and auditing** (e.g., downloadable CSV, PDF, or interactive charts).

- **Data Storage:**

- **Access logs** shall be retained for a minimum of **90 day** for auditing purposes.
- **Transaction records (orders, payments, returns)** shall be stored in compliance with regulatory requirements.
- Product and customer data shall be managed in a **secure, scalable, and queryoptimized database structure**.

- **Error Handling:**

- The system shall notify users of **invalid operations**, such as: ○ Attempting to order out-of-stock or discontinued products. ○ Entering invalid coupon codes. ○ Searching for non-existent products.
- Errors shall include **clear messages and actionable suggestions** (e.g., alternative products, contact support)

- **Data Backup and Disaster Recovery**