

A
Mini Project Report on
**SMART INVENTORY MANAGEMENT
SYSTEM**

Submitted in partial fulfillment of the requirements
for the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

YASH SAWANT (23106009)

NEHAL NIKAM (23106130)

SOHAN VERNEKAR (23106012)

PARTH RANE (23106018)

Under the guidance of

Prof. Yogeshwari Hardas



Department of Computer Science & Engineering
(Artificial Intelligence & Machine Learning)
A. P. Shah Institute of Technology
G. B. Road, Kasarvadavali, Thane (W) - 400615
University Of Mumbai
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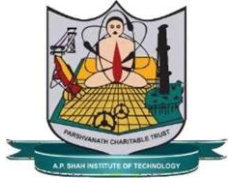


CERTIFICATE

This is to certify that the project entitled “**SMART INVENTORY MANAGEMENT SYSTEM**” is a bonafide work of Yash Sawant (23106009), Nehal Nikam (23106130), Sohan Vernekar (23106012), Parth Rane (23106018) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning)**.

Prof. Yogeshwari Hardas
Mini Project Guide

Dr. Jaya Gupta
Head of Department



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Project Report Approval

This Mini project report entitled “**Smart Inventory Management System**” by **Yash Sawant, Nehal Nikam, Sohan Vernekar and Parth Rane** is approved for the degree of *Bachelor of Engineering in Computer Science & Engineering*, (AI&ML) **2024-25**.

External Examiner: _____

Internal Examiner: _____

Place: APSIT, Thane

Date:

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We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Yash Sawant
(23106009)

Nehal Nikam
(23106130)

Sohan Vernekar
(23106012)

Parth Rane
(23106018)

ABSTRACT

The Smart Inventory System is a web-based application designed to assist shop owners in managing their inventory and financial records efficiently. The system enables users to track profits, losses, total income spent, and revenue generated through a streamlined dashboard. Built using Flask, Jinja, Bootstrap, Tailwind CSS, JavaScript, HTML, and Python the system integrates with a MySQL database (“inventory.db”) to store and manage inventory data.

Key features of the system include product management, financial tracking, and automated report generation, allowing users to export reports in Excel and PowerPoint formats for better analysis. The system also includes a secure login/register module, ensuring authorized access. By automating inventory tracking and financial calculations, the Smart Inventory System enhances operational efficiency, reduces manual errors, and helps shop owners make data-driven decisions to optimize their business performance.

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CHAPTER 1

INTRODUCTION

1. Introduction

A Smart Inventory Management System is designed to efficiently track, manage, and control stock levels to prevent overstocking or shortages. It ensures that businesses have the right products available at the right time, reducing waste and improving operational efficiency. This system replaces traditional manual tracking methods with an automated approach, making it easier to monitor stock movements, update quantities, and generate reports.

One of the key advantages of using a smart inventory system is its ability to provide real-time updates on stock levels. This allows businesses to make informed decisions regarding restocking, sales, and product demand. Additionally, the system can categorize inventory based on different parameters such as product type, quantity, price, and purchase date, helping businesses organize and retrieve information quickly.

By implementing a structured inventory management system, businesses can minimize errors, improve accuracy, and enhance productivity. Whether used in retail, warehouses, or small businesses, a well-managed inventory system ensures smoother operations and better customer satisfaction.

CHAPTER 2

LITERATURE SURVEY

2. Literature Survey

2.1 Historical Development of Inventory Management Systems

Inventory management has been a critical aspect of businesses for centuries. Traditionally, inventory tracking was done manually using ledger books and spreadsheets, which was time-consuming and prone to errors. The advent of computerized inventory management systems in the late 20th century improved accuracy by automating calculations and record-keeping. Early digital systems relied on basic databases to store stock information, but they lacked real-time tracking capabilities.

With the growth of e-commerce and digital transformation, businesses started adopting more advanced systems that could track inventory in real-time. Cloud-based inventory solutions emerged, allowing businesses to manage stock across multiple locations seamlessly. Modern inventory management integrates automated stock updates, barcode scanning, and data analytics to enhance efficiency and reduce losses due to overstocking or stockouts.

2.2 Approaches and Techniques

Several approaches have been used to develop smart inventory management systems:

- Automated Stock Tracking: Modern inventory systems automatically update stock levels when new shipments arrive or sales are made, reducing the need for manual record-keeping.
- Database Management Systems: Relational databases store inventory information, making it easier to query and retrieve product details efficiently.
- Predictive Analysis: Some systems incorporate analytics to forecast demand based on past sales data, preventing overstocking or stock shortages.
- User-Friendly Dashboards: Interactive dashboards help businesses monitor stock levels, sales trends, and alerts for low inventory, improving decision-making.

2.3 Comparison of Existing Systems

Several smart inventory management systems have been developed to improve business operations:

Zoho Inventory: A cloud-based inventory management solution that offers real-time tracking, order management, and barcode scanning features.

Odoo Inventory: An open-source inventory management system that provides automation, reporting tools, and seamless integration with e-commerce platforms.

NetSuite Inventory Management: A robust solution offering inventory optimization, demand forecasting, and warehouse management tools for large businesses.

2.4 Challenges in Existing Systems

Despite the improvements in inventory management, several challenges persist:

- **Data Accuracy Issues:** Manual errors or system mismatches can lead to discrepancies between recorded and actual stock levels.
- **Scalability Limitations:** Some systems struggle to handle increasing product varieties or high transaction volumes.
- **Integration Complexity:** Businesses using multiple software solutions may face difficulties in integrating their inventory system with other business tools.
- **User Adaptability:** Employees unfamiliar with digital systems may require training to use inventory management software effectively.

2.5. Potential Improvements and Innovations

- **Enhanced User Interfaces:** Creating intuitive and simple UI/UX designs to ensure that users can navigate the system effortlessly.
- **Improved Automation:** Implementing automatic stock updates through advanced algorithms to reduce human errors and improve efficiency.

CHAPTER 3

PROBLEM STATEMENT

3. Problem Statement

Traditional inventory management for small and medium-sized businesses (SMBs) often relies on manual record-keeping, which is prone to errors, inefficiency, and data loss. Shop owners face difficulties in tracking stock levels, calculating profits and losses, monitoring expenses, and generating financial reports. The lack of an integrated system results in mismanagement of inventory, inaccurate financial records, and loss of potential revenue due to overstocking, understocking, or missed transactions.

Managing inventory and financial records is a critical challenge for shop owners, often leading to errors, inefficiencies, and financial mismanagement when done manually. There is a need for an automated system that can efficiently track inventory, calculate profits and losses, and generate financial reports to aid in better decision-making.

This project aims to develop a Smart Inventory Management System that enables shop owners to manage products, monitor sales and expenses, and generate financial summaries in a structured and automated manner. The system will provide a user-friendly dashboard, secure authentication, and the ability to export reports in Excel and PowerPoint formats. It will be implemented using Flask, Jinja, Bootstrap, Tailwind CSS, JavaScript, HTML, and MySQL for seamless database management and web functionality.

CHAPTER 4

EXPERIMENTAL SETUP

4. Experimental Setup

4.1 Hardware Setup

- **Development Environment:**

A computer with a multi-core processor (Intel i7 or higher), 8GB RAM, and 500GB storage to efficiently handle development tasks.

4.2 Software Setup

Operating System

- Any operating system depending on the developer's preference and environment requirements.

Development Tools

- **Frontend Development**

HTML, CSS (Bootstrap & Tailwind CSS), JavaScript

Visual Studio Code (VS Code) for frontend coding

- **Backend Development**

Flask (Python) for handling backend logic

- **Database Management:**

MySQL (Using MySQL Workbench for database design and queries) Server Setup:

- **Report Generation:**

Excel and PowerPoint for exporting financial reports.

CHAPTER 5

PROPOSED SYSTEM & IMPLEMENTATION

5. Proposed System and Implementation

5.1 Block diagram of proposed system

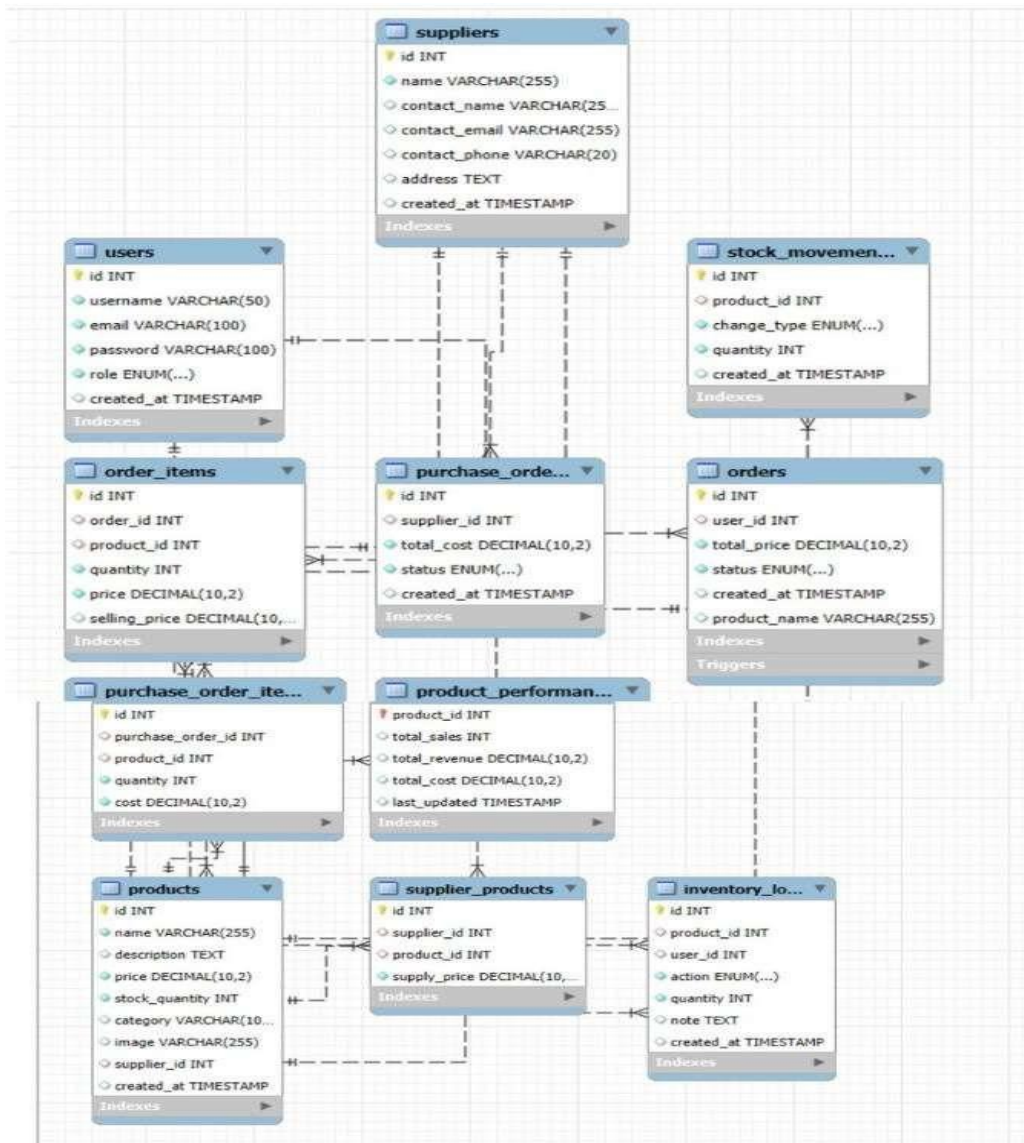


Fig 5.1 ER/EER Diagram for our given database

5.2 Description of Entity Relationship Diagram (ERD)

This ERD represents the relational structure of a **Smart Inventory Management System**. It consists of various entities (tables) such as users, products, orders, suppliers, and others, each linked through primary and foreign key relationships to maintain data integrity and enable efficient operations.

- Key Entities and Their Roles

- **Users**
 - Stores user credentials and identification.
 - Fields: id, username, email, password, role, etc.
- **Products**
 - Maintains product-related details like name, SKU, pricing.
 - Fields: id, product_name, sku, category, price, etc.
- **Suppliers**
 - Contains information about suppliers providing inventory.
 - Fields: id, name, contact_name, email, phone, address.
- **Orders**
 - Represents customer or internal orders.
 - Fields: id, user_id, status, total_amount, product_name.
- **Order Items**
 - A junction table linking products to specific orders.
 - Fields: id, order_id, product_id, quantity, price.
- **Purchase Orders**
 - Used for ordering products from suppliers.
 - Fields: id, supplier_id, total_cost, status.
- **Purchase Order Items**
 - Links products to purchase orders.
 - Fields: id, purchase_order_id, product_id, quantity, cost.
- **Stock Movement**
 - Tracks inventory changes (additions/removals).
 - Fields: id, product_id, change_type, quantity.

- **Inventory History**
 - Logs past inventory changes for auditing.
 - Fields: id, product_id, old_quantity, new_quantity.
- **Supplier Products**
 - Maps which supplier provides which product and at what cost.
 - Fields: supplier_id, product_id, price.
- **Product Performance**
 - Tracks performance metrics of products.
 - Fields: product_id, sales, returns, last_updated.

➤ **Relationships**

- users ↔ orders (one-to-many)
- orders ↔ order_items ↔ products (many-to-many)
- suppliers ↔ purchase_orders ↔ purchase_order_items ↔ products
- products ↔ stock_movements, inventory_history, product_performance
- supplier_products acts as a bridge between suppliers and products

➤ **Purpose**

This structure ensures:

- Efficient stock tracking
- Accurate order and purchase management
- Supplier-product relationship handling
- Auditing and performance analysis

5.3 Implementation

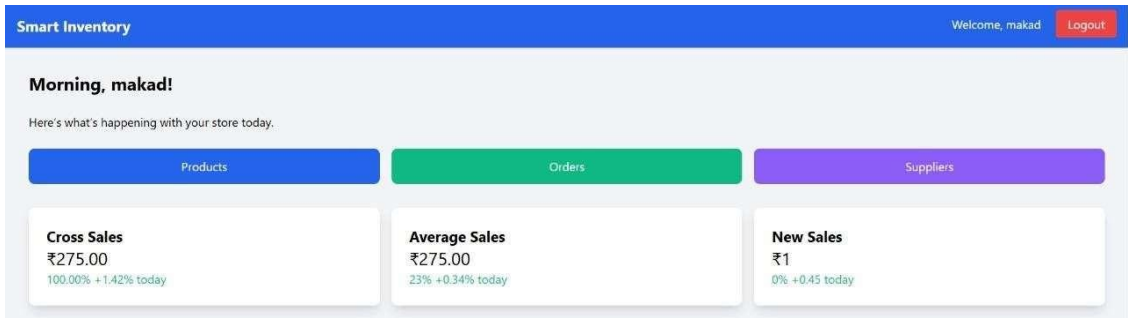


Fig 5.2 Dashboard page

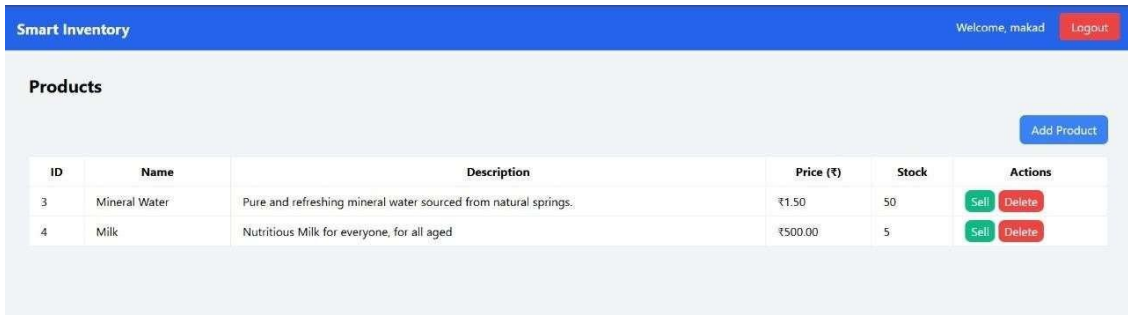


Fig 5.3 Products page



Fig 5.4 Page for adding new products

Smart Inventory						Welcome, makad	Logout
Orders							
Add Order							
Order ID	Product Name	Quantity	Total Price (₹)	Sale Time	Actions		
1	Milk	5	₹275.00	2025-03-18 23:19:50	Edit	Delete	

Fig 5.5 Orders page

Smart Inventory						Welcome, makad	Logout
Suppliers							
Add Supplier							
ID	Name	Contact Name	Contact Email	Contact Phone	Actions		
3	AquaPure Suppliers	John Doe	john.doe@aquapure.com	+1234567890	Delete		
5	Amul Coop Ltd	Yash Sawant	amulcoop@gmail.com	998766554	Delete		

Fig 5.6 Supplier’s page

Top Products			
Product Name	Supplier	Stock	Sales
Milk	Amul Coop Ltd	5	5

Fig 5.7 Sales Display on Dashboard

Smart Inventory						Welcome, makad	Logout
Morning, makad!							
Here's what's happening with your store today:							
Products		Orders		Suppliers			
Cross Sales		Average Sales		New Sales			
₹24200.00		₹2688.89		10			

Fig 5.8 Product details page

Top Products			
Product Name	Supplier	Stock	Sales
Ice Cream	Amul Coop Ltd	5	90
Onion	AquaPure Suppliers	10	45
White T-Shirt	Ranges Clothing	0	45
potato	AquaPure Suppliers	25	25
Milk	Amul Coop Ltd	5	5

Fig 5.9 Top Products Table

Smart Inventory					
					Welcome, makad Logout
Products					
Add Product					
ID	Name	Description	Price (₹)	Stock	Actions
3	Mineral Water	Pure and refreshing mineral water sourced from natural springs,	₹1.50	30	Sell Delete
4	Milk	Nutritious Milk for everyone, for all aged	₹500.00	5	Sell Delete
5	White T-Shirt	Cool white oversize t-shirts	₹500.00	0	Sell Delete
12	Onion	Essential Food	₹40.00	10	Sell Delete
15	potato	yum yumm	₹25.00	25	Sell Delete
16	Ice Cream	thanda thanda cool cool	₹30.00	0	Sell Delete

Fig 5.10 Product history and stocks/prices

Smart Inventory

Welcome, makad

Logout

Orders

Add Order

Order ID	Product Name	Quantity	Total Price (₹)	Sale Time	Status	Actions
1	Milk	5	₹275.00	2025-03-18 23:19:50	completed	<a>Edit <a>Delete
2	White T-Shirt	15	₹9000.00	2025-03-19 01:08:03	canceled	<a>Edit <a>Delete
3	White T-Shirt	30	₹18000.00	2025-03-19 01:59:21	completed	<a>Edit <a>Delete
4	Mineral Water	10	₹100.00	2025-03-19 02:10:15	completed	<a>Edit <a>Delete
5	Mineral Water	10	₹100.00	2025-03-19 02:14:28	completed	<a>Edit <a>Delete
6	Onion	10	₹600.00	2025-03-19 10:13:25	completed	<a>Edit <a>Delete
7	Ice Cream	5	₹175.00	2025-03-19 10:26:58	completed	<a>Edit <a>Delete
8	potato	25	₹750.00	2025-03-19 10:27:52	completed	<a>Edit <a>Delete
9	Ice Cream	45	₹2700.00	2025-03-19 10:30:04	completed	<a>Edit <a>Delete
10	Onion	30	₹1500.00	2025-03-19 10:30:33	completed	<a>Edit <a>Delete
11	Onion	5	₹275.00	2025-03-19 10:37:34	pending	<a>Edit <a>Delete

Fig 5.11 Order history and status.

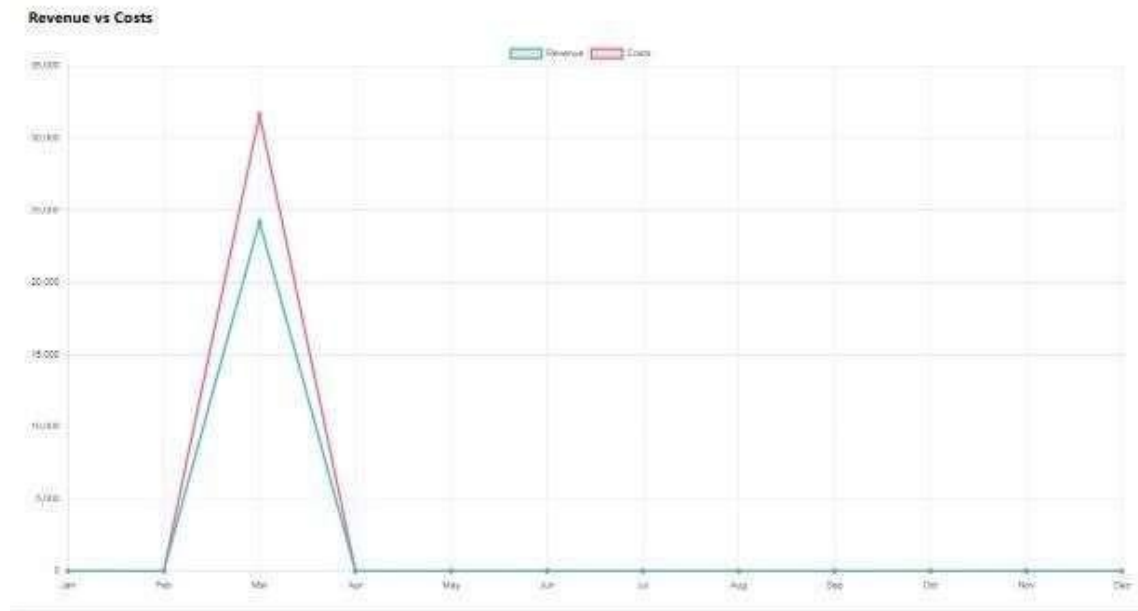


Fig 5.12 Revenue vs Costs Graph: X-axis: Jan–Dec; Y-axis: 0–35,000 by 5,000 intervals.

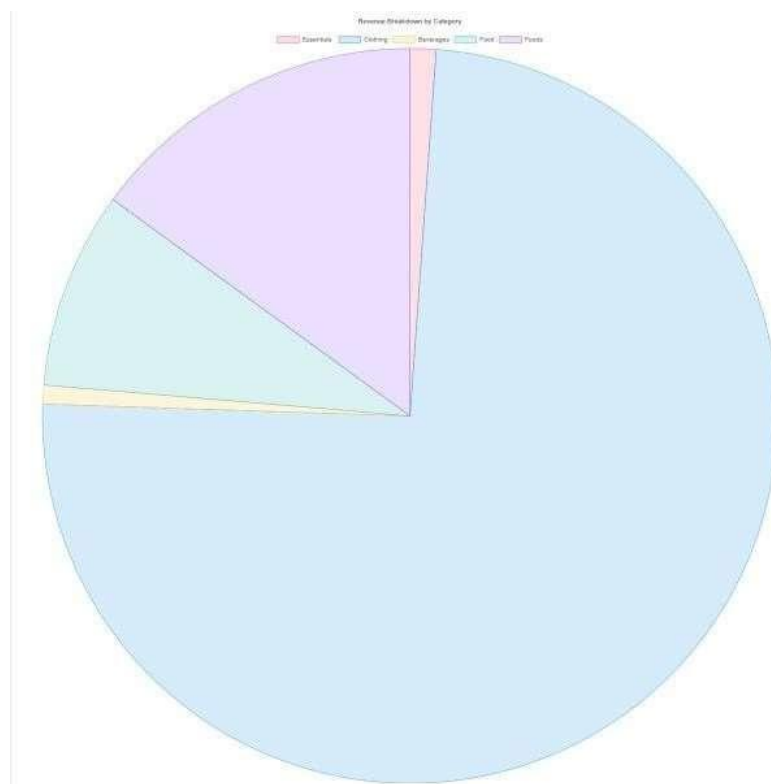


Fig 5.13 According to the legend at the top:

- **Desserts – Light pink**
- **Catering – Yellow**
- **Beverages – Light teal and further on.....**

5.4 Advantages

1. Real-Time Inventory Tracking

- Keeps the stock status updated instantly when products are added or sold.
- Helps avoid overstocking or stockouts.

2. Profit and Loss Analytics

- Automatically calculates and displays financial insights.
- Helps shopkeepers make data-driven decisions to cut losses and improve profit margins.

3. User-Friendly Dashboard

- Simple and intuitive UI for shop owners to manage products, expenses, and income.
- Clean login/register flow ensures security and personalization.

4. Automated Report Generation

- Exports professional reports in **Excel and PowerPoint**, saving time and effort.
- Useful for presentations, audits, or financial planning.

5.5 Disadvantages

1. Manual Data Entry Dependency:

- Issue: Requires users to manually input stock changes (no barcode/RFID automation).
- Impact: Prone to human errors (e.g., typos, missed updates).

2. Limited Real-Time Tracking:

- Issue: Updates only reflect when users manually enter data.
- Impact: Delayed alerts for stockouts or theft.

3. Basic Reporting:

- Issue: CSV exports lack advanced analytics (e.g., trends, supplier performance).
- Impact: Hard to make data-driven restocking decisions.

CHAPTER 6

CONCLUSION

Conclusion

The Smart Inventory Management System enhances inventory tracking, financial management, and reporting for shop owners. It improves efficiency, reduces errors, and supports better decision-making.

With automated tracking and detailed financial insights, it provides a cost-effective solution for businesses to streamline operations and maximize profits. Future advancements like AI-driven forecasting and cloud integration can further enhance its capabilities, making inventory management smarter and more efficient.

Additionally, the system aids in fraud prevention by maintaining accurate records of stock movement, minimizing losses due to theft or misplacement. With better organization and streamlined processes, shop owners can focus more on strategic growth rather than manual inventory tracking, ultimately driving business success.

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