



**Oxford Engineering  
College**



# **SB8096 – Salesforce Developer (Naan Mudhalvan)**

**Project Title: Medical Inventory Management System**  
**Team ID : MM2025TMID03970**

## **Team Members:**

**Leader : Kaviya B – 813022205025**

**Member: Lavanya S - 813022205026**

**Member: Dharshika A - 813022205010**

**Member: Roshini Devi R - 813022205035**





# MEDICAL INVENTORY MANAGEMENT SYSTEM

---

## 1. Abstract

The **Medical Inventory Management System (MIMS)** is a web-based application designed to streamline the management of medical supplies in hospitals, pharmacies, and healthcare institutions. The system automates stock tracking, supplier management, expiry monitoring, and purchase orders. Built using **Django (Python)** and **MySQL**, it reduces manual errors, ensures timely replenishment, and prevents medicine wastage. This report presents a detailed, phase-wise development lifecycle of the project, from requirements to deployment and maintenance.

---

## 2. Introduction

Efficient management of medical inventory is vital to ensure patient safety and smooth hospital operations. Manual tracking methods are prone to errors, leading to shortages or overstocking of critical medicines. The **Medical Inventory Management System** provides a centralized platform to record, track, and analyze inventory data, offering automated alerts for low stock and expired items. The system enhances decision-making and operational efficiency.

---

## 3. Problem Statement

Hospitals and pharmacies often face challenges such as:

- Lack of real-time inventory tracking
- Expiry of unused medicines
- Inefficient ordering and supplier coordination
- Manual errors in stock recording

These challenges result in wastage, financial loss, and potential risks to patients. There is a need for a digital solution to monitor, manage, and automate the inventory workflow.

---

#### **4. Objectives**

- To design a web-based application to manage medical inventory effectively.
  - To automate the process of stock updates, purchase orders, and supplier management.
  - To minimize expired and overstocked items.
  - To generate analytical reports for better decision-making.
  - To provide secure role-based access to users (admin, pharmacist, staff).
- 

#### **5. Scope of the Project**

The system is designed for hospitals, clinics, and pharmacies to manage medical supplies. It can be extended to include multiple branches, integrate with barcode scanners, or connect with hospital management systems. The system ensures efficient supply chain management and reduces administrative workload.

---

#### **6. System Requirements**

##### **Hardware Requirements**

- Processor: Intel i5 or above
- RAM: 8 GB minimum
- Hard Disk: 100 GB
- Network: LAN / Wi-Fi enabled

##### **Software Requirements**

- Operating System: Windows / Linux
- Backend: Django Framework (Python 3.x)
- Database: MySQL
- Frontend: HTML, CSS, JavaScript, Bootstrap
- IDE: VS Code / PyCharm

Web Server: Apache / Django development server

## INDEX (Table of Contents)

- 1. Introduction**
  - 1.1 Background
  - 1.2 Purpose of Medical Inventory Management
  - 1.3 Objectives
  - 1.4 Scope and Applicability
  - 1.5 Key Challenges
- 2. Phase 1: Assessment and planning**
  - 2.1 Situational Assessment
  - 2.2 Demand & Consumption Analysis
  - 2.3 Goal Setting
- 3. Phase 2: System Design and Policy Development**
  - 3.1 Inventory Classification
  - 3.2 Policy and Process Definition
  - 3.3 System Architecture
- 4. Phase 3: Implementation Phase**
  - 4.1 Data and Master Setup
  - 4.2 Software and Integration Setup
  - 4.3 Staff Training and SOP Development
- 5. Phase 4: Operational Management**
  - 5.1 Daily Operations
  - 5.2 Stock Level Monitoring
  - 5.3 Documentation and Traceability
- 6. Phase 5: Monitoring, Audit, and Evaluation**
  - 6.1 Physical and System Audits
  - 6.2 Performance KPIs
  - 6.3 Continuous Improvement
- 7. Phase 6: Optimization and Automation**
  - 7.1 Data Analytics and Forecasting
  - 7.2 Automation and IoT Integration
  - 7.3 System Integration and Dashboards
- 8. Phase 7: Review and scaling, Maintenance and Evaluation**
  - 8.1 Expansion Strategy
  - 8.2 Governance and Compliance
  - 8.3 Training and Sustainability

## 9. Annexures

- Annexure A: Sample KPI Metrics
  - Annexure B: Sample Inventory Policy Template
  - Annexure C: Sample ABC–VED Matrix
- 

## 1. INTRODUCTION

### 1.1 Background

Medical inventory management is a crucial component of hospital and healthcare administration. It ensures that the right medical items — drugs, consumables, surgical instruments, and equipment — are available at the right time, in the right quantity, and under safe storage conditions.

Efficient inventory management directly impacts **patient safety, operational efficiency, and financial sustainability**. With increasing regulatory scrutiny and the complexity of modern healthcare supply chains, hospitals must adopt structured and technology-driven approaches.

---

### 1.2 Purpose of Medical Inventory Management

The purpose of this document is to provide a **comprehensive, step-by-step framework** for planning, implementing, and optimizing a medical inventory management system that ensures:

- Continuous availability of critical medical supplies
  - Minimization of wastage, expiries, and pilferage
  - Compliance with national and international healthcare regulations
  - Financial control and operational transparency
-

### **1.3 Objectives**

- To maintain uninterrupted supply of essential medical items.
  - To optimize stock levels using scientific inventory control methods (ABC, VED).
  - To implement digital tracking for real-time monitoring.
  - To ensure adherence to **FEFO (First Expire, First Out)** and **FIFO (First In, First Out)** principles.
  - To integrate inventory management with procurement, finance, and clinical operations.
- 

### **1.4 Scope and Applicability**

This framework applies to:

- Hospitals, Clinics, Diagnostic Centres
- Pharmacies and Biomedical Engineering Departments
- Warehouse and Supply Chain Units in Healthcare Systems

It covers **medical consumables, pharmaceuticals, reagents, medical devices, and equipment parts.**

---

### **1.5 Key Challenges**

- Overstocking and understocking due to poor forecasting
  - Expiry-related wastage
  - Lack of real-time visibility
  - Manual errors and poor data accuracy
  - Compliance issues with controlled or temperature-sensitive drugs
-

## **2. PHASE 1: ASSESSMENT & PLANNING**

### **2.1 Situational Assessment**

- Map existing inventory processes.
- Identify inefficiencies and pain points.
- Review storage areas, stock records, and vendor management.
- Check compliance with standards (e.g., NABH, WHO-GSDP).

### **2.2 Demand & Consumption Analysis**

- Analyse past consumption trends (12–24 months).
- Compute **Average Monthly Consumption (AMC)**.
- Identify fast-moving, slow-moving, and non-moving items.

### **2.3 Goal Setting**

Set measurable goals:

- Reduce expired stock by 20%.
  - Achieve 100% stock traceability.
  - Integrate with Hospital Information System (HIS).
-

### **3. PHASE 2: SYSTEM DESIGN & POLICY DEVELOPMENT**

#### **3.1 Inventory Classification**

Use combined **ABC–VED** analysis:

Category	Description	Control Level
A-Vital	High-cost, critical items	Strict control
B-Essential	Moderate cost, essential	Periodic monitoring
C-Desirable	Low-cost, non-critical	Minimal control

#### **3.2 Policy and Process Definition**

Develop policies for:

- Procurement (authorization limits, vendor selection)
- Storage (temperature, segregation, FEFO/FIFO)
- Issue and return (documentation, responsibility)
- Disposal (expired, damaged, or recalled items)

#### **3.3 System Architecture**

Decide on the system type:

- **Manual:** Registers, Excel, paper records
  - **Digital:** ERP, HIS, or specialized IMS (Inventory Management System)  
Integrate procurement, store, and pharmacy workflows.
-

## **4. PHASE 3: IMPLEMENTATION PHASE**

### **4.1 Data and Master Setup**

- Create master item list with SKU codes, UOM, vendor data, and expiry dates.
- Assign minimum and maximum levels.

### **4.2 Software and Integration Setup**

- Configure IMS/HIS modules.
- Test with pilot departments.
- Ensure barcode or RFID functionality.

### **4.3 Staff Training and SOP Development**

- Conduct end-user training.
  - Develop standard operating procedures (SOPs).
  - Perform mock inventory audits before go-live.
-

## **5. PHASE 4: OPERATIONAL MANAGEMENT**

### **5.1 Daily Operations**

- Records all stock receipts, issues, and returns.
- Enforce **FEFO** and **FIFO** strictly.

### **5.2 Stock Level Monitoring**

- Use dashboards for reorder alerts.
- Monitor near-expiry items weekly.

### **5.3 Documentation and Traceability**

- Maintain batch/lot records.
  - Keep traceability logs for controlled drugs, implants, and blood products.
-

## **6. PHASE 5: MONITORING, AUDIT & EVALUATION**

### **6.1 Physical and System Audits**

- Monthly physical verification.
- Quarterly internal audits.

### **6.2 Performance KPIs**

KPI	Description	Target
Inventory Turnover	Efficiency of stock usage	>8 per year
Stockout Rate	% of requests unfulfilled	<2%
Expiry Loss	% of total value lost	<1%

### **6.3 Continuous Improvement**

- Review slow-moving items.
  - Optimize reorder levels periodically.
-

## **7. PHASE 6: OPTIMIZATION & AUTOMATION**

### **7.1 Data Analytics and Forecasting**

- Predict consumption using statistical models.
- Detect anomalies (e.g., misuse or theft).

### **7.2 Automation and IoT Integration**

- Use barcode or RFID for tracking.
- Apply IoT sensors for cold-chain monitoring.

### **7.3 System Integration and Dashboards**

- Integrate inventory with finance and clinical systems.
  - Generate real-time dashboards and reports.
-

## **8. PHASE 7: REVIEW & SCALING, MAINTANACE & EVALUATION**

### **8.1 Expansion Strategy**

- Roll out to other hospital units or branches.

### **8.2 Governance and Compliance**

- Establish an **Inventory Control Committee**.
- Review compliance with NABH, GMP, and WHO-GSDP standards.

### **8.3 Training and Sustainability**

- Conduct refresher training quarterly.
- Review and update SOPs annually.

## **Maintenance and Evaluation**

### **Goals**

To maintain and evaluate system performance after deployment.

### **Activities**

- Monitor performance and fix bugs.
- Take regular backups.
- Add enhancements based on user feedback.

### **Deliverables**

- Maintenance logs
  - Updated system versions
-

## **Results and Discussion**

The system successfully automates medical inventory processes. It improves efficiency, reduces errors, and provides timely alerts for stock shortages and expirations. Reports help management make data-driven decisions. Performance testing showed stable operation with multiple users.

## **Future Scope**

- Integration with barcode and RFID scanners.
  - Mobile app for inventory access.
  - AI-based demand forecasting.
  - Integration with hospital management systems (HMS).
- 

## **Conclusion**

The **Medical Inventory Management System** achieves its goal of automating and optimizing inventory operations. It minimizes human errors, ensures availability of essential medicines, and enhances hospital efficiency. The project demonstrates the power of web-based automation in healthcare operations.

The **Medical Inventory Management System** project successfully addresses the crucial need for effective and efficient management of medical supplies in healthcare organizations. Through the implementation of this system, hospitals and clinics can maintain **accurate, real-time records** of their medicines, consumables, and equipment, thereby minimizing losses due to expiry, theft, or overstocking.

The project systematically progressed through well-defined phases — **requirement analysis, system design, development, testing, deployment, and maintenance** — ensuring a robust and reliable software solution.

By automating manual inventory processes, the system:

- Reduces human error,
- Improves operational efficiency,
- Provides instant access to stock information,
- Enhances decision-making for procurement and budgeting, and
- Ensures timely availability of critical medical supplies.

The developed system also promotes **data transparency**, **regulatory compliance**, and **cost optimization**. Furthermore, the modular architecture allows for **easy scalability** and **future integration** with technologies such as **AI-driven demand forecasting**, **IoT-based stock monitoring**, and **mobile health applications**.

In conclusion, this project not only fulfils its immediate purpose of streamlining medical inventory management but also lays a strong foundation for **digital transformation in healthcare logistics**. It demonstrates the potential of technology to significantly improve hospital management systems and ultimately enhance patient care delivery.

---

## References

1. Django Documentation: <https://docs.djangoproject.com/>
  2. MySQL Official Guide: <https://dev.mysql.com/doc/>
  3. IEEE SRS Standards for Software Projects
  4. Tutorials Point: Django Web Framework
  5. Stack Overflow discussions on Django-MySQL integration
- 

## 9. ANNEXURES

### Annexure A: Sample KPI Metrics

- Inventory Accuracy (%)
- Order Fulfilment Rate (%)
- Expiry Loss Value (₹)

### Annexure B: Inventory Policy Template

- Procurement process
- Stock issue process
- Return and disposal policy

### Annexure C: ABC–VED Matrix Example

---

## ANNEXURES

---

### Annexure A: Sample KPI Metrics for Medical Inventory Management

These Key Performance Indicators (KPIs) are used to measure the efficiency, accuracy, and cost-effectiveness of inventory management in healthcare facilities.

S.No	KPI Name	Definition / Formula	Target / Benchmark	Interpretation
1	<b>Inventory Turnover Ratio</b>	= Cost of Goods Used ÷ Average Inventory Value	8–10 times per year	Indicates how many times inventory is replaced within a year.
2	<b>Stockout Rate</b>	= (Number of Stockout Incidents ÷ Total Items Managed) × 100	≤ 2%	Lower value indicates better availability control.
3	<b>Expiry Loss Percentage</b>	= (Value of Expired Items ÷ Total Inventory Value) × 100	≤ 1%	Measures financial loss due to expired drugs/supplies.
4	<b>Order Fulfilment Time</b>	Time from requisition approval to delivery	≤ 48 hours (critical items)	Indicates efficiency of supply chain process.
5	<b>Inventory Accuracy</b>	= (System Quantity ÷ Physical Quantity) × 100	≥ 98%	Reflects reliability of stock records.
6	<b>Vendor Performance Index</b>	Composite score based on quality, delivery, and price	≥ 90%	Evaluates vendor reliability.
7	<b>Dead Stock Ratio</b>	= (Value of Non-Moving Items ÷ Total Inventory Value) × 100	≤ 5%	Identifies unused or obsolete items.
8	<b>Emergency Purchase Ratio</b>	= (Emergency Purchase Value ÷ Total Purchase Value) × 100	≤ 5%	Measures dependency on urgent/unplanned buying.

---

## **Annexure B: Sample Inventory Policy Template**

### **Purpose:**

To standardize and streamline the management of medical supplies, drugs, and consumables within the healthcare organization.

---

### **1. Procurement Policy**

<b>Aspect</b>	<b>Description</b>
<b>Procurement Authority</b>	Purchase orders approved by Purchase Committee or authorized officer.
<b>Vendor Selection</b>	Based on prequalification, quality certification, and past performance.
<b>Reorder Level</b>	Calculated using historical data and consumption rate (AMC).
<b>Purchase Frequency</b>	Monthly or quarterly based on item criticality and lead time.
<b>Emergency Procurement</b>	Allowed only with documented justification and approval from Head of Department.

---

### **2. Storage and Handling Policy**

<b>Aspect</b>	<b>Description</b>
<b>Storage Conditions</b>	Maintain temperature, humidity, and cleanliness as per item specifications.
<b>Labelling</b>	Each item labelled with name, batch number, and expiry date.
<b>Arrangement Principle</b>	Follow FEFO (First Expire, First Out) and FIFO (First In, First Out).
<b>Segregation</b>	Separate areas for received stock, quarantined stock, and expired stock.
<b>Security</b>	Restricted access; controlled substances stored in lockable cabinets.

---

### **3. Issue and Distribution Policy**

<b>Aspect</b>	<b>Description</b>
<b>Requisition Process</b>	Departments submit indent/requisition forms electronically or manually.
<b>Approval Authority</b>	Verified by Store Officer and approved by Medical Superintendent or delegated staff.
<b>Issuance Record</b>	Every issue logged in system with quantity, date, and recipient department.
<b>Return Policy</b>	Departments must return unused items in original condition within defined timeframe.

---

### **4. Expiry and Disposal Policy**

<b>Aspect</b>	<b>Description</b>
<b>Monitoring</b>	Expiry tracking alerts generated 90 days before expiry.
<b>Disposal Method</b>	As per biomedical waste management guidelines (BMW Rules 2016 or local equivalent).
<b>Documentation</b>	All expired or damaged items recorded in disposal register and signed by committee.
<b>Audit Review</b>	Periodic review by Audit/Pharmacy Committee.

---

### **5. Compliance and Review**

<b>Aspect</b>	<b>Description</b>
<b>Internal Audit</b>	Conducted quarterly by internal audit team.
<b>Training</b>	Annual refresher training for all inventory and store staff.
<b>Policy Review</b>	Updated annually or upon regulatory changes.

### Annexure C: Example of ABC–VED Matrix

This matrix combines **ABC analysis (based on cost/value)** with **VED analysis (based on criticality)** to prioritize inventory control measures.

Item Code	Item Description	ABC Category	VED Category	Combined Category	Control Level	Remarks
M001	Cardiac Stent	A	V	<b>AV</b>	Very High	Critical, high-cost implant
M002	Antibiotic Injection (Ceftriaxone)	A	E	<b>AE</b>	High	High turnover essential drug
M003	Syringes 5ml	B	E	<b>BE</b>	Moderate	Medium-cost essential consumable
M004	Gloves (Latex, Sterile)	B	D	<b>BD</b>	Moderate	Frequently used but replaceable
M005	Cotton Roll	C	D	<b>CD</b>	Low	Low-cost, easily available
M006	Blood Bag	A	V	<b>AV</b>	Very High	Vital and regulated item
M007	Surgical Sutures	A	E	<b>AE</b>	High	Used daily, medium-high cost
M008	Hand Sanitizer	C	E	<b>CE</b>	Low	Routine item with stable supply
M009	Nebulizer Mask	B	D	<b>BD</b>	Moderate	Low-cost, moderate consumption
M010	Insulin	A	V	<b>AV</b>	Very High	Lifesaving, temperature-sensitive

### **Interpretation:**

- **AV (A + Vital):** Strict control, approval for every purchase, daily monitoring.
  - **AE (A + Essential):** Regular monitoring, automated alerts.
  - **BE / BD (B items):** Periodic monitoring, normal control.
  - **CD / CE (C items):** Minimal control, bulk purchase allowed.
- 

### **Annexure Summary**

#### **Annexure Purpose**

Annexure A Defines performance metrics and monitoring indicators.

Annexure B Provides standardized operational policy template.

Annexure C Demonstrates prioritization logic for inventory control.

---