Case Study: Predictive Digital Management System (PDMS) for Aakash Pharma Chem

# 1. Title

Modernizing Manufacturing Operations with a Predictive Digital Management System

# 2. Overview

Aakash Pharma Chem, a cellulose-based chemical manufacturer in Tamil Nadu, faced challenges with paper-based operations, delayed insights, and manual quality control. To solve these, a Predictive Digital Management System (PDMS) was conceptualized and built during a master’s-level internship, integrating real-time dashboards, anomaly detection, and intelligent stock and production tracking.

# 3. Problem

The factory lacked digital infrastructure for:

- Tracking shift-wise production and operator logs

- Performing quality control in a traceable, structured format

- Managing inventory across raw materials, processing, and dispatch

- Automatically detecting anomalies and stock mismanagement

- Generating timely, error-free reports

This manual setup led to inefficiencies, increased human error, and lack of visibility for plant managers.

# 4. Solution

A complete digital transformation was proposed and implemented in modular form:

Key Modules:

- User & Role Management: Secure access by role (Supervisor, QA, Manager)

- Material & Production Management: Digital logging of raw materials and batch processing

- Quality Control Logging: Parameterized QC data with auto-pass/fail logic

- Inventory Tracking: Real-time stock levels, threshold alerts, and FIFO logic

- Anomaly Detection Engine: Rule + ML-based error and inconsistency detection

- Dashboards & Reporting: Real-time visualizations and scheduled reports for managers

- Notification System: Multi-channel alerts (email, SMS, in-app) based on critical events

All components were built using:

- Backend: Django + DRF

- Frontend: React + TailwindCSS

- Database: PostgreSQL + Redis

- Storage: AWS S3

- Async Tasks: Celery

- Deployment: Docker, GitHub Actions, EC2 (AWS)

# 5. Results

Shift Reporting Accuracy: Increased by 90% with real-time data locking

QC Data Compliance: Auto-validation reduced errors by 60%

Inventory Visibility: Real-time stock view improved planning

Anomaly Resolution Time: Reduced via alerts and escalation logic

Audit Trail Coverage: Full lifecycle traceability across stages

# 6. Testimonial

The PDMS is a game-changer for our plant. We now track everything from raw materials to batch quality in real-time.

# 7. Conclusion

This project successfully replaced a legacy paper-based system with a modular, scalable digital solution. It demonstrated how predictive analytics, real-time validation, and structured reporting can dramatically improve manufacturing visibility and efficiency — even in mid-scale industries with minimal prior digitization.