

AN INTERACTIVE DRUG SUPPLY CHAIN TRACKING SYSTEM USING BLOCKCHAIN

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To Cite this Article

K.Nikhitha, S.Raju, Y.Manaswini, B. Kumar, Mrs.G.Archana, "An Interactive Drug Supply Chain Tracking System Using Blockchain", Journal of Science Engineering Technology and Management Science, Vol. 02, Issue 08, August 2025, pp: 402-410, DOI: <http://doi.org/10.63590/jsetms.2025.v02.i08.pp402-410>

Submitted: 12-07-2025

Accepted: 18-08-2025

Published: 25-08-2025

ABSTRACT

Drug inventory and supply chain management is a crucial aspect of the pharmaceutical industry that ensures the efficient tracking, storage, and distribution of medicines. this project aims to develop a web-based application using python, django, and sqlite/mysql to streamline the management of drug inventory from manufacturers to pharmacists. the proposed system provides a centralized platform for tracking medicine stock, managing orders, and enhancing supply chain visibility. the platform allows different stakeholders, including administrators, manufacturers, distributors, suppliers, and pharmacists, to efficiently manage their respective roles. by integrating qr code-based tracking and automated order processing, the system improves accuracy, reduces wastage, and prevents stock shortages.

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I. INTRODUCTION

Managing drug inventory and supply chains is a significant challenge in the pharmaceutical industry. Traditional systems are often manual, leading to inefficiencies, human errors, and delays in drug distribution. The increasing demand for timely medicine availability necessitates a reliable system that ensures transparency and efficiency. This project introduces a web-based Drug Inventory and Supply Chain Management system that automates the tracking of medicines from manufacturers to end-users. The system integrates various roles such as administrators, manufacturers, distributors, suppliers, and pharmacists, ensuring smooth order processing, inventory tracking, and order fulfillment.

Problem Statement

The pharmaceutical industry faces significant challenges in managing drug inventory and supply chains due to manual record-keeping and inefficient tracking mechanisms. Traditional systems lack synchronization between manufacturers, distributors, suppliers, and pharmacists, leading to delays, errors, and stock management issues. This project aims to address these challenges by developing an integrated web-based system that enhances inventory tracking, order management, and communication among stakeholders.

Objectives

- To develop a web-based platform for efficient drug inventory management.

- To provide role-based access for different stakeholders.
- To automate order processing and tracking using QR codes.
- To enhance transparency and reduce human errors in inventory management.
- To ensure timely medicine distribution and prevent shortages.

II. LITERATURE SURVEY

Several existing research studies highlight the importance of automated supply chain management systems in the pharmaceutical industry. Most traditional systems rely on paper-based tracking, leading to delays and errors. Some studies focus on the integration of IoT-based solutions, blockchain technology, and AI-driven predictive analytics to enhance supply chain transparency and efficiency. However, the majority of existing systems do not offer an end-to-end solution that integrates all stakeholders on a single platform. This project bridges that gap by providing a web-based, role-based system that streamlines operations and ensures efficient inventory management.

EXISTING SYSTEM

Currently, pharmaceutical inventory management relies on manual record-keeping and standalone software solutions that lack real-time tracking capabilities. Most distributors and suppliers maintain separate databases, leading to synchronization issues. Order placement and fulfillment processes involve significant paperwork, increasing the likelihood of errors. Additionally, tracking expired medicines is challenging, resulting in unnecessary losses.

Disadvantages of existing system

- Lack of real-time tracking and synchronization.
- High risk of human errors in data entry and stock management.
- Limited visibility of the supply chain process for different stakeholders.
- Inefficient order fulfillment processes due to manual handling.
- Increased chances of medicine shortages or overstocking.
- Inability to track medicine expiry effectively.

PROPOSED SYSTEM

The proposed system is a web-based application that automates the entire drug inventory and supply chain management process. It allows administrators, manufacturers, distributors, suppliers, and pharmacists to interact through a centralized platform. Key features include automated order processing, QR code generation for medicine tracking, real-time inventory updates, and role-based access control. The system ensures accurate stock management, reduces wastage, and enhances operational efficiency.

Advantages of proposed system

- Real-time tracking of drug inventory and orders.
- Automated medicine tracking using QR codes.
- Reduced human errors in data entry and inventory management.
- Streamlined communication between stakeholders.
- Efficient order processing and fulfillment.
- Enhanced visibility of the supply chain for improved decision-making.
- Prevention of expired medicine distribution.

OBJECTIVES

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- To enhance transparency and reduce human errors in inventory management.

- To ensure timely medicine distribution and prevent shortages.

III. MODULES

For your Interactive Drug Supply Chain Tracking System using Blockchain, here's a breakdown of potential modules for each stakeholder (Admin, Manufacturers, Distributors, Suppliers, Pharmacists) along with their functionalities:

Admin Module:

User Management: Admin can add/remove users, including manufacturers, distributors, suppliers, and pharmacists.

Blockchain Monitoring: Admin oversees the entire blockchain to ensure transparency and integrity across the system.

Reports and Analytics: Admin has access to high-level reports about the movement of drugs, potential fraud alerts, and supply chain health.

System Configuration: Admin manages system settings and updates, ensuring compliance with local laws and regulations.

Manufacturer Module:

Production Tracking: Manufacturers log the details of drug production, including batch numbers, ingredients, and production dates.

Smart Contracts: Trigger automated processes (like quality checks, shipment orders) when certain conditions are met, ensuring drugs are ready for distribution.

Certification & Compliance: Upload compliance certificates and regulatory approvals that guarantee the drugs' authenticity and safety.

Data Encryption: Sensitive data about production is securely stored on the blockchain to prevent tampering.

Distributor Module:

Inventory Management: Track quantities and batches of drugs at different points in the supply chain.

Shipment Tracking: Real-time tracking of drugs as they move through the distribution network, using smart contracts to trigger actions when certain conditions are met.

Authentication: Verify the drugs' authenticity and origin before sending to suppliers or pharmacies.

Proof of Delivery: Use blockchain to confirm and document deliveries in real time, ensuring transparency and reducing fraud.

Supplier Module:

Order Fulfillment: View the list of drugs to be supplied based on real-time demand from pharmacies and distributors.

Tracking and Traceability: Ensure that the drugs are coming from verified sources (manufacturers, distributors).

Smart Contracts: Automatically accept orders once verified, ensuring faster, more accurate delivery of drugs.

Storage Monitoring: Suppliers can input data related to storage conditions, helping maintain the drugs' integrity throughout the supply chain.

Pharmacist Module:

Drug Verification: Verify the authenticity and origin of drugs before dispensing them to customers by scanning QR codes linked to blockchain data.

Prescription Validation: Ensure that prescribed drugs are not counterfeit and match the order details in the blockchain system.

Advantages of Blockchain Integration:

Transparency: All parties have real-time access to the same data, ensuring transparency and accountability at every stage.

Traceability: Easy tracking of drug batches from manufacture to pharmacy, ensuring compliance with regulations.

Security: Blockchain’s immutability ensures data integrity, preventing tampering and fraud.

Smart Contracts: Automates processes, reducing delays and errors while improving efficiency.

This modular approach ensures each stakeholder in the drug supply chain has the tools to manage their part of the process efficiently, securely, and transparently.

IV. SYSTEM DESIGN
SYSTEM ARCHITECTURE

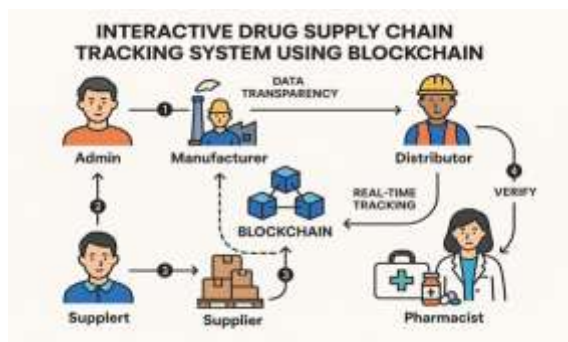


FIG: SYSTEM ARCHITECTURE

V. OUTPUT SCREENS

Open browser and enter URL as ‘http://127.0.0.1:8000/’ to get below home page.



First we can register for the all logins example:admin,manufacture,distributor,supplier,pharamicst



Admin:

Name	Brand	Order Date	Manufacturer	Price	Quantity	In Stock	Manufacturer	Order Status
paracetamol	paracetamol	April 25, 2020, 4:22 a.m.	paracetamol	100.00	20	20	paracetamol	Verified
paracetamol	paracetamol	April 27, 2020, 9:41 a.m.	paracetamol	200.00	20	20	paracetamol	Pending

Manufacturer	Medicine	Order Date	Quantity	Price	Distributor Price	Status	Supplier	Promocodes	assigned_distributor
paracetamol	paracetamol	April 25, 2020, 4:22 a.m.	20	100.00	20.00	Verified	paracetamol	paracetamol	paracetamol
paracetamol	paracetamol	April 27, 2020, 9:41 a.m.	20	200.00	20.00	Pending	paracetamol	paracetamol	paracetamol

Manufacturer	Medicine	Order Date	Quantity	Price	Distributor Price	Status	Supplier	Promocodes	assigned_distributor
paracetamol	paracetamol	April 25, 2020, 4:22 a.m.	20	100.00	20.00	Verified	paracetamol	paracetamol	paracetamol
paracetamol	paracetamol	April 27, 2020, 9:41 a.m.	20	200.00	20.00	Pending	paracetamol	paracetamol	paracetamol

Manufacture:

Drug Supply Chain Tracking System

Add Medicine

Medicine Name

Brand

Supply Date

Manufacturer

Quantity

Drug Supply Chain Tracking System | Add Medicine | Medicine | Orders | Logout

Order's

Manufacturer	Medicine	Order Date	Quantity	Price	Distributor Price	Status	Supplier	Pharmaceutical	assigned_distributor	Update Status
1001	1001	2021-01-01	100	1000	1000	0	1000	1000	1000	1000

Drug Supply Chain Tracking System | Add Medicine | Medicine | Orders | Logout

Update Medicine

Price

Quantity

Drug Supply Chain Tracking System | Medicine | Medicine | Orders | Logout

Distributor

Medicine's

Name	Brand	Supply Date	Description	Price	Quantity	N.Packages	Manufacturer	Price Offer
1001	1001	2021-01-01	100	1000	1000	0	1000	1000

Drug Supply Chain Tracking System | Medicine | Medicine | Orders | Logout

Registration Form

Quantity

Complete Your Payment

Ship Address

Country:

State:

City:

Zip:

Street:

Payment

Account No:

Branch No:

Branch Name:

Account Name:

Account Type:

Account Status:

Account Balance:

Account Type:

Account Status:

Account Balance:

Drug Supply Chain Tracking System Medicine Messages Orders [Logout](#)

Order's

Manufacturer	Medicine	Order Date	Quantity	Price	Distributor Price	Status	Supplier	Pharmacist	Update Price	Assign
ash	paracetamol 500mg	April 25, 2025, 9:23 a.m.	20	100.00	20.00	Verified	None	ashiba	update price	assign
ash	clonaz	April 25, 2025, 9:41 a.m.	20	200.00	0.00	Pending	None	None	update price	assign

Drug Supply Chain Tracking System Medicine Messages Orders [Logout](#)

Update Medicine

Price

[Update Price](#)

Drug Supply Chain Tracking System Medicine Messages Orders [Logout](#)

Assign Order

Select Supplier

Select Pharmacist

[Assign](#)

Drug Supply Chain Tracking System Medicine Messages Orders [Logout](#)

Message's

Group	Priority	Topic	Date	View	Join
ash	High	ash	2024-03-07 10:00:00	View	Join

supplier:



Pharmacist:



VI. CONCLUSION

The Drug Inventory and Supply Chain Management system provides an efficient, web-based solution to streamline pharmaceutical inventory tracking, order processing, and supply chain visibility. By integrating automated order management, QR code-based tracking, and role-based access control, the system enhances accuracy, reduces wastage, and ensures timely medicine distribution. The proposed system overcomes the limitations of traditional manual and standalone software solutions, providing real-time inventory updates and improving communication between manufacturers, distributors, suppliers, and pharmacists. This project demonstrates the potential of digital transformation in pharmaceutical logistics, ensuring transparency, efficiency, and optimized inventory management.

REFERENCES

1. Research papers on pharmaceutical supply chain management.

2. Studies on the impact of digitalization in drug inventory systems.
3. Python and Django documentation for web application development.
4. SQLite/MySQL official documentation for database management.
5. Existing case studies on supply chain automation in the pharmaceutical industry.