

E-PDS

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SMART RATION SHOP APP: STREAMLINE PUBLIC DISTRIBUTION SYSTEM

Abstract

The Smart Ration Shop App is an innovative digital platform designed to modernize India's Public Distribution System (PDS) by enhancing transparency, efficiency, and accountability in ration delivery. The system integrates role-based access for beneficiaries, ration shop owners, and government officials, creating a seamless flow of information across all stakeholders. Beneficiaries can log in to check ration stock, book tokens, make secure digital payments, and track their booking history. Shop owners are empowered to update inventory in real time, monitor stock movement, and ensure accurate distribution. Government officials benefit from centralized dashboards to oversee stock levels, detect irregularities, and generate performance insights. A key feature of the app is the **complaint and refund mechanism**, inspired by e-commerce models like Amazon. If beneficiaries receive incorrect quantities, damaged goods, or face non-delivery, they can raise complaints within two hours and request refunds or replacements. Shop owners address these issues directly, while unresolved complaints are escalated to government authorities for prompt resolution. This feature builds trust, minimizes corruption, and ensures fairness. By integrating Aadhaar authentication, QR-based booking, stock monitoring, digital payments, and grievance redressal, the Smart Ration Shop App represents a transformative step toward a transparent, people-centric, and efficient PDS ecosystem.

Keywords

Smart Ration Shop, Public Distribution System (PDS), Aadhaar Authentication, QR Code, Token Booking, Stock Monitoring, Digital Payment, Complaint & Refund System, Transparency, Governance, Artificial Intelligence, Mobile Application, Rural Accessibility.

Problem Statement

The current Public Distribution System (PDS) faces major challenges such as manual record-keeping, lack of transparency, stock mismanagement, and corruption. Beneficiaries often deal with long queues, uncertain shop status, and no access to real-time stock updates. Shop owners and government officials struggle with monitoring and accountability. These inefficiencies highlight the urgent need for a digital, transparent, and automated system to ensure fair and efficient ration distribution.

Objectives

- Ensure secure beneficiary authentication – Aadhaar, Smart Card, and OTP-based login.
- Provide real-time stock visibility of ration items and shop status.
- Simplify ration booking and payment through secure token-based system.
- Assist ration shop owners with easy stock management and shop status updates.
- Support government monitoring via centralized dashboards and reports.
- Improve transparency and reduce corruption by maintaining digital records.
- Generate automated AI-based reports for insights and planning.
- Enable complaint and refund mechanism – Allow users to raise complaints within 2 hours of purchase and request refunds or replacements, ensuring fairness and accountability.

Expected Outcomes

1. Transparent ration distribution
2. Reduced manual errors and fraud
3. Real-time stock monitoring
4. Digital token booking system
5. Online payment and receipts
6. Improved communication between people, shops, and government
7. Data-driven governance through AI reports
8. Scalability across districts and states
9. **Quick complaint redressal and refund option to boost user trust**

Methodology

The proposed Smart Ration Shop application is developed by integrating mobile, web, and backend technologies to digitalize and streamline the Public Distribution System (PDS). The methodology is divided into several stages:

1. Requirement Analysis

- Gather requirements from stakeholders (Government, Shop Employees, Beneficiaries).
- Identify additional **Complaint & Refund Module** requirements.

2. System Design

- **Frontend:** Android app includes complaint submission and refund request option (like Amazon).
- **Backend:** Node.js APIs handle complaints, refund approvals, and escalations.
- **Database:** MySQL stores complaints, refund requests, and resolution status.
- **Integration:** Link complaints with booking IDs and payment records.

3. Module Development

• User Module:

Register/login using Aadhaar & Smart Card.

Book ration, make payments, raise complaints/refunds within 2 hours.

• Shop Module:

Shop owners receive complaints, verify issues, and approve/deny refunds.

• Government Module:

Officers monitor unresolved complaints, enforce accountability, and approve escalations.

• AI/Analytics Module:

Analyze complaint trends, fraud attempts, and generate service-quality reports.

4. Integration

- Link complaint system with booking + payment history.
- Enable notifications for complaint status updates.

5. Testing

- Test complaint submission, refund approval, and government escalation workflows.

6. Deployment

- Deploy complaint + refund APIs on the same backend server.
- Ensure refund workflow is connected with payment gateway.

7. Maintenance

- Regular monitoring of complaint redressal timelines.
- Continuous updates to ensure fairness and prevent misuse

Project Requirements

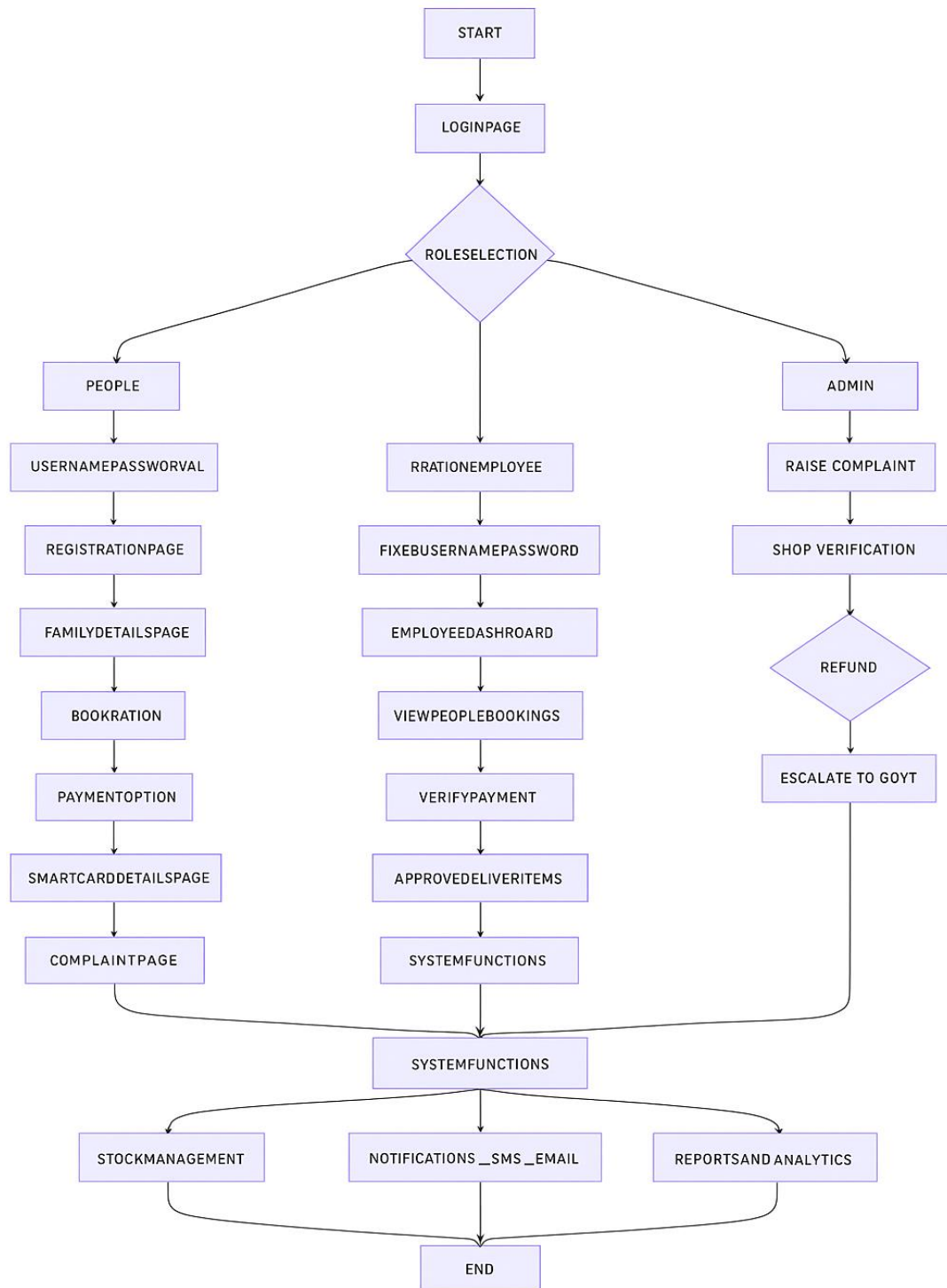
Hardware Components

1. Android Device (People App)
2. Android Device / Tablet (Employee)
3. Computer / Laptop (Admin / Officer use)
4. QR Code Scanner (USB / Camera)
5. Smart Ration Card (QR / RFID)
6. Thermal Receipt Printer
7. Wi-Fi Router / Internet Dongle
8. Power Backup (UPS)
9. Optional: Biometric Fingerprint Scanner
10. Misc (Cables, Connectors, Maintenance)

SOFTWARE REQUIREMENTS

Tool / Platform	Purpose
Android Studio/vs code	Mobile app frontend (People Login, Ration booking, Notifications)
Node.js + Express	Backend server (APIs, Authentication, Transactions)
MySQL / XAMPP	Database for storing ration records, user data
Firebase / Twilio	OTP verification, SMS alerts, Push notifications
Payment Gateway (UPI/NetBanking)	Online ration payment processing
Web Dashboard (React.js)	Admin, District & Shop officer portal
AI Report Generator	Monthly usage trends, fraud detection insights

FLOWCHART



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