Functional Requirements Document (FRD)

Farmer Mobile Application – KisanConnect

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# Executive Summary

This Functional Requirements Document (FRD) defines the design and implementation specifications for KisanConnect, a next-generation digital agriculture platform for small and medium-scale Indian farmers. The application combines hyper-local weather, mandi prices, AI-driven crop advisories, financial tracking, IoT-based irrigation, blockchain notarization, and integration with schemes, insurance, and sustainability programs. The design emphasizes open-source, cloud-native scalability, multilingual accessibility, and affordability.

# Table of Contents

1. 1. Introduction
2. 2. Core Functional Requirements
3. 3. Farmer-Centric Features
4. 4. Financial & Resource Management
5. 5. Technical & Architectural Requirements
6. 6. Blockchain Integration
7. 7. IoT Integration
8. 8. Digital Payments & Insurance
9. 9. Sustainability & Carbon Credits
10. 10. Farmer Training & Knowledge Resources
11. 11. Security & Privacy
12. 12. Non-Functional Requirements
13. 13. Deployment & Scalability
14. 14. Monitoring & Logging
15. 15. Testing & Quality Assurance
16. 16. Regulatory & Compliance
17. 17. Future Roadmap & Enhancements
18. 18. Risks & Mitigation
19. 19. Glossary
20. Appendix: Architecture Diagrams

# 1. Introduction

KisanConnect is a mobile-first platform to empower Indian farmers with timely, trusted, and personalized information. It addresses critical needs such as weather, pest control, market access, irrigation, financial tracking, and access to subsidies and insurance. The solution adopts open-source technologies, blockchain for trust, AI for decision support, and IoT for precision agriculture.

# 2. Core Functional Requirements

- Hyper-local 7-day forecasts with rainfall, humidity, wind speed, frost risk, and extreme weather alerts  
- Real-time mandi price data with historical trends, price alerts, and e-marketplace integration  
- AI-powered crop advisory: pest detection, nutrient deficiencies, integrated pest management (IPM)  
- Government schemes with personalized eligibility, reminders, and CSC linkages

# 3. Farmer-Centric Features

- Rich farmer profile: landholding, soil type, irrigation, lease/ownership, crops, location, optional KYC  
- Offline-first access with SMS/Bluetooth sync  
- Multilingual & voice-enabled chatbot assistant  
- Community forum with moderation, expert tagging, and cross-language AI translation

# 4. Financial & Resource Management

- Input cost ledger with PDF/Excel export  
- Yield tracking with AI-based estimation and digital receipts  
- Water management: IoT sensors, irrigation budgeting, SMS fallback

# 5. Technical & Architectural Requirements

Mobile frontend via Flutter/React Native. Backend microservices on Kubernetes or serverless. PostgreSQL/MongoDB for structured data, S3/GCS for media. ML with TensorFlow/PyTorch. Blockchain notarization for immutability. Open APIs for banks, insurance, and government systems.

# 6. Blockchain Integration

Blockchain records: advisory hash, yield logs, subsidy disbursement, input bills. Tamper-proof proof for insurance claims and audits. Hyperledger Fabric with public hash anchoring.

# 7. IoT Integration

Low-cost soil moisture and weather sensors. Data ingestion via IoT Core. Time-series DB for analysis. Irrigation advisories computed from real-time data.

# 8. Digital Payments & Insurance

- UPI-based payments for inputs/produce  
- Auto-sync with expense ledger  
- Crop insurance claim auto-fill using notarized data  
- Subsidy direct-benefit transfer integration

# 9. Sustainability & Carbon Credits

Track organic adoption, reduced water, minimal chemicals. Generate farmer carbon profiles. Provide access to carbon credit markets for additional income.

# 10. Farmer Training & Knowledge Resources

Localized tutorials, podcasts, cropping calendars, and seasonal reminders. Access to expert talks and FPO/NGO collaboration content.

# 11. Security & Privacy

End-to-end encryption for images and personal data. Consent management for data sharing. Role-based access controls. DPDP Act compliance.

# 12. Non-Functional Requirements

- Performance: optimize for 2GB RAM devices  
- Scalability: 100M+ users  
- Cost: < ₹5 per farmer/month  
- Availability: 99.9% uptime with DR in multi-region cloud

# 13. Deployment & Scalability

Kubernetes-based microservices or serverless. Multi-region DB replication. Auto-scaling for traffic bursts. CI/CD pipelines for continuous delivery.

# 14. Monitoring & Logging

Use ELK/EFK stack or cloud-native observability. Distributed tracing for microservices. Alerting integrated with on-call systems.

# 15. Testing & Quality Assurance

Unit (>80% coverage), integration, load, and field pilot testing. Continuous monitoring of AI accuracy. Feedback loops from farmers.

# 16. Regulatory & Compliance

Compliance with India’s DPDP Act, RBI guidelines for UPI, NABARD rules for FPOs. Blockchain audit trails for transparency. AI explainability compliance.

# 17. Future Roadmap & Enhancements

- Digital marketplace with logistics partners  
- Financial scoring for microcredit access  
- On-device AI models for offline detection  
- Expansion to livestock management  
- State-specific adaptations

# 18. Risks & Mitigation

- Risk: Low smartphone penetration → Mitigation: SMS & IVR access  
- Risk: AI misdiagnosis → Mitigation: Human expert escalation  
- Risk: Data privacy concerns → Mitigation: Consent + encryption  
- Risk: Connectivity gaps → Mitigation: Offline-first + sync

# Appendix: Architecture Diagrams

System Architecture

A screenshot of a computer flowchart

AI-generated content may be incorrect. Advisory Notarization Data Flow Diagram

A black and white diagram

AI-generated content may be incorrect.

IOT Ingestion Diagram

A diagram of a computer

AI-generated content may be incorrect. Permissioned Ledger + Public Anchoring Diagram

A diagram of a service

AI-generated content may be incorrect.