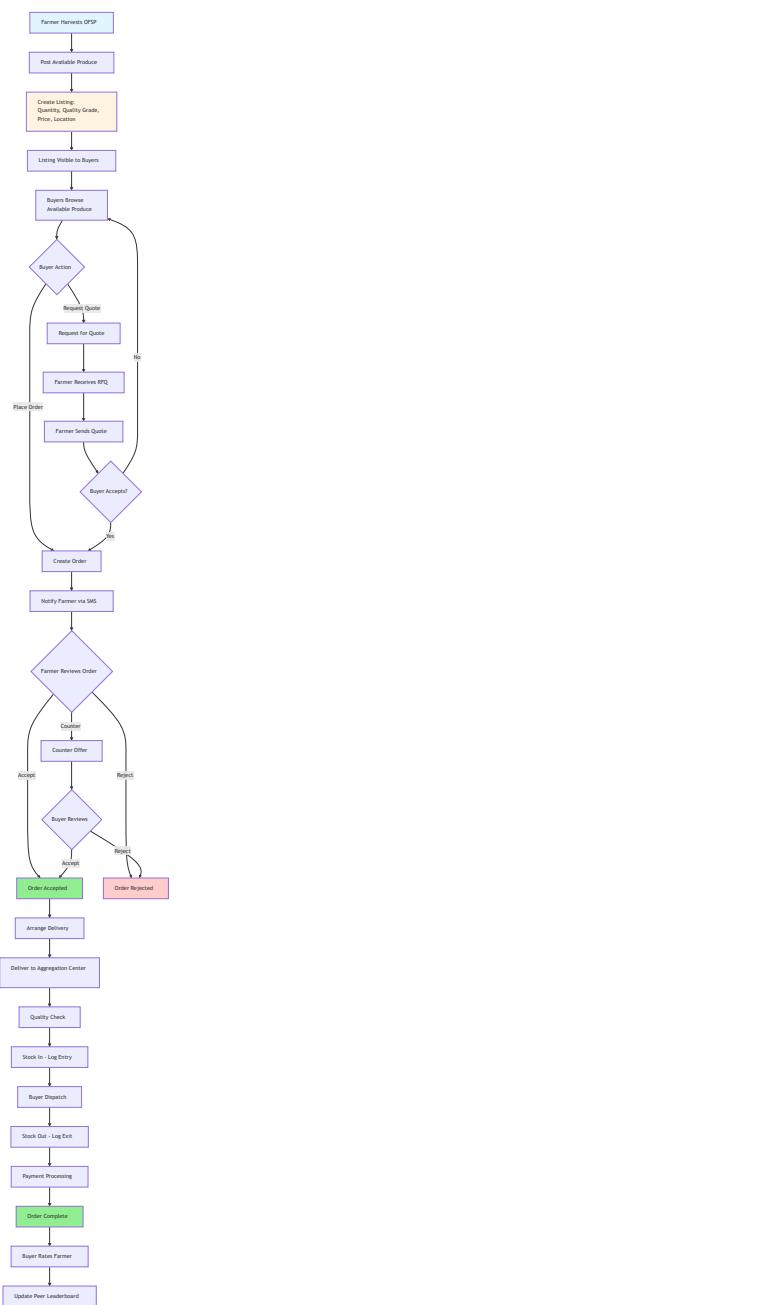


Technical Proposal Part 2: Core Platform Features

5. Core Platform Features

5.1 Marketplace Module

Order Management Flow:



Key Features:

Feature	Description
Produce Listing	Farmers post available OFSP with quantity, quality grade, price, photos, location
Search & Filter	Buyers search by location, quantity, quality grade, price range, variety
Order Creation	Buyers place orders directly or request quotes from farmers
Negotiation	Built-in messaging for price negotiation between farmers and buyers
Order Tracking	Real-time status updates (pending, accepted, in-transit, delivered, completed)
Smart Matching	Algorithm suggests farmers to buyers based on location, capacity, rating
Bulk Orders	Buyers can aggregate orders from multiple farmers
Recurring Orders	Set up weekly/monthly standing orders for consistent supply

5.1.1 Live Order Tracking System

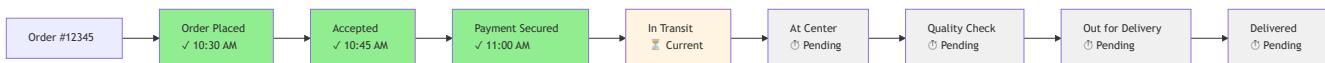
Real-Time Order Journey with 8 Status Stages:

Stage	Description	Notifications	Actions
1. Order Placed	Buyer creates order	SMS to farmer	Farmer can accept/reject
2. Order Accepted	Farmer accepts order	SMS to buyer	Payment initiated
3. Payment Secured	Buyer payment in escrow	SMS to both parties	Farmer prepares delivery
4. In Transit	Farmer delivering to center	Real-time updates	GPS tracking (optional)
5. At Aggregation Center	Produce delivered	SMS to buyer & manager	Quality check begins
6. Quality Approved	QC passed, stock logged	SMS to buyer with photos	Ready for buyer pickup
7. Out for Delivery	Buyer collecting/dispatching	Location updates	ETA calculation
8. Delivered & Complete	Buyer confirms receipt	Payment released to farmer	Rating & review

Live Tracking Features:

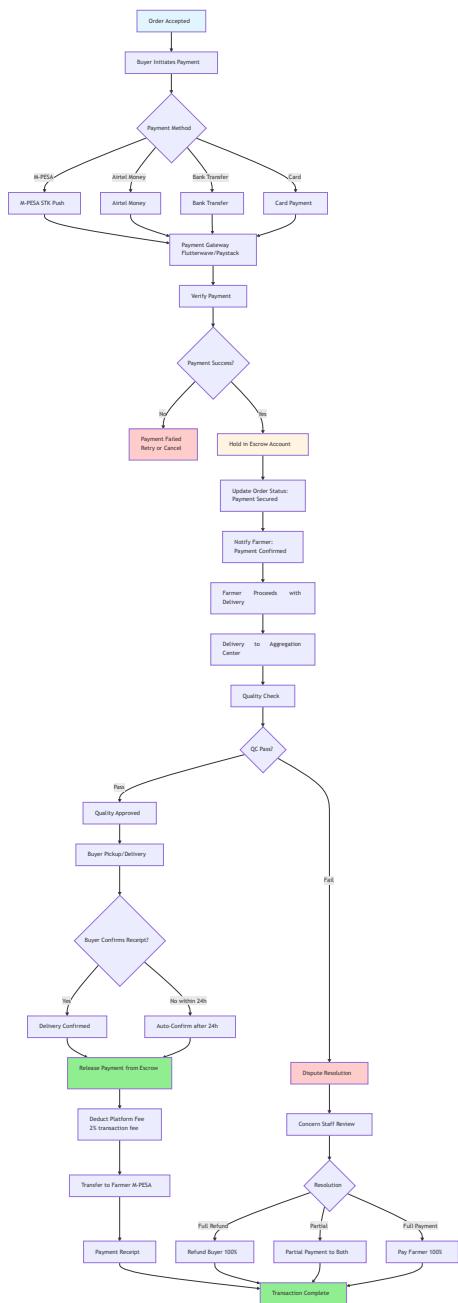
Feature	Description
Visual Timeline	Interactive timeline showing all status changes with timestamps
Real-Time Notifications	SMS + in-app push notifications at every stage
Photo Documentation	Upload photos at aggregation center (quality check) and final delivery
GPS Tracking (Optional)	Track delivery vehicle location in real-time for large orders
ETA Calculation	Estimated arrival time based on distance and traffic data
Multi-Party Dashboard	Farmer, buyer, county officers all see live status
Status History	Complete audit trail with user actions and timestamps
Dispute Flagging	Mark issues at any stage for Concern staff intervention

Tracking Dashboard View:



5.1.2 Escrow Payment System

Secure Payment Flow:



Escrow System Features:

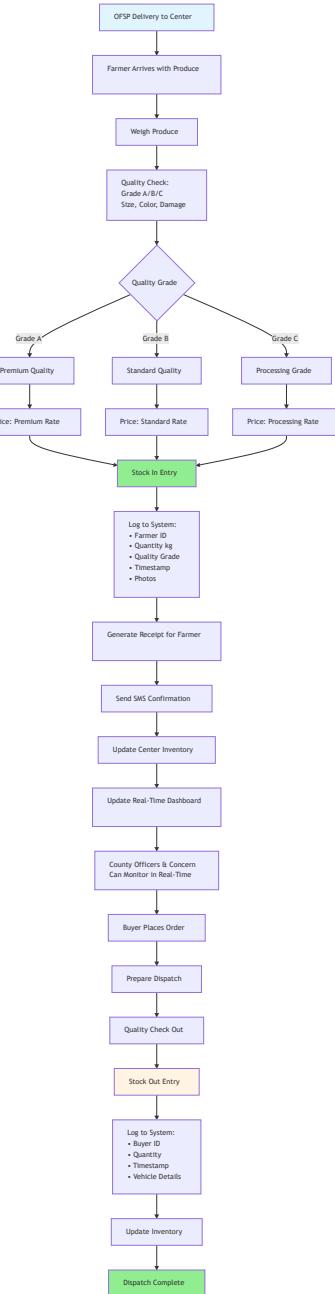
Feature	Description
Payment Hold	Buyer payment held in secure escrow account until delivery confirmation
Multi-Payment Methods	M-PESA, Airtel Money, bank transfer, card payments
Automatic Release	Payment auto-released 24 hours after delivery if no dispute
Dispute Resolution	Concern staff can review disputes and authorize full/partial payments
Transaction Fees	2% platform fee deducted at payment release (sustainable revenue)
Instant Confirmation	Real-time payment verification and SMS confirmation
Payment History	Complete transaction log for farmers and buyers
Failed Payment Handling	Automatic retry mechanism and alternative payment options
Refund Processing	Automated refund to buyer if order cancelled before delivery
Farmer Protection	Payment guaranteed once quality check passes
Buyer Protection	Money back guarantee if produce doesn't meet quality standards

Payment Status Tracking:

Status	Meaning	Money Location	Next Action
Pending	Order created, no payment	N/A	Buyer initiates payment
Processing	Payment in progress	Payment gateway	Wait for confirmation
In Escrow	Payment held securely	Escrow account	Farmer delivers produce
Quality Check	At aggregation center	Escrow account	Quality verification
Ready for Release	QC passed, awaiting confirmation	Escrow account	Buyer confirms receipt
Released	Payment sent to farmer	In transit to farmer	Farmer receives M-PESA
Completed	Farmer received payment	Farmer's account	Transaction closed
Disputed	Issue flagged	Escrow account (frozen)	Concern staff review
Refunded	Cancelled/rejected	Returned to buyer	Refund processed

5.2 Aggregation Center Management

Stock Tracking Flow:

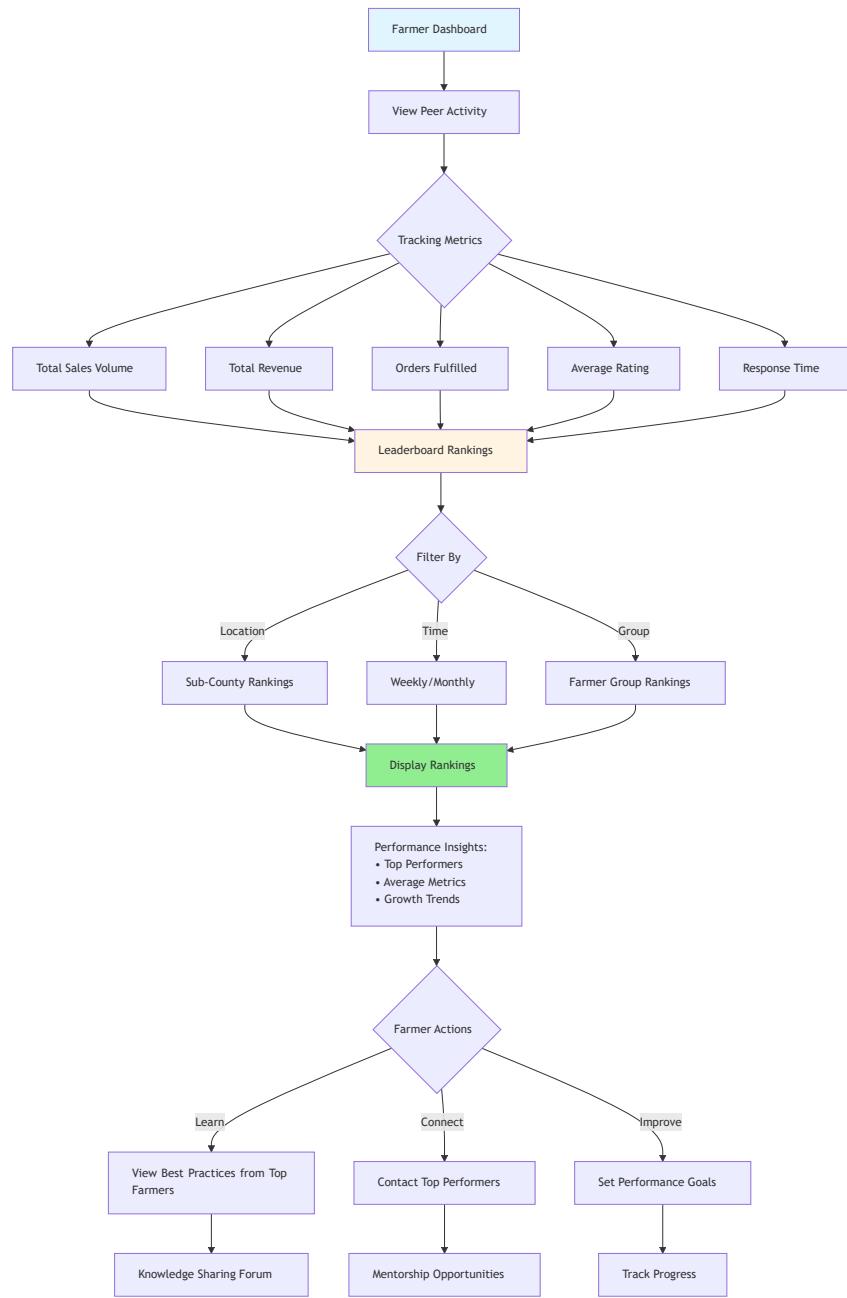


Aggregation Center Features:

Feature	Description
Stock In Tracking	Record all incoming produce: farmer, quantity, quality, timestamp, photos
Stock Out Tracking	Record all outgoing produce: buyer, quantity, dispatch time, vehicle
Quality Grading	Classify OFSP into Grade A/B/C based on standard parameters
Real-Time Inventory	Live view of current stock levels by grade and variety
Storage Management	Track storage duration, alert for aging stock
Wastage Tracking	Record and analyze post-harvest losses
Photo Documentation	Capture images at stock in/out for quality verification
Receipt Generation	Automatic receipt for farmers with QR code for verification
Temperature Logging	Optional sensor integration for storage conditions
Capacity Management	Alert when center approaching capacity

5.3 Peer Monitoring & Leaderboards

Peer Activity Tracker:



Peer Monitoring Features:

Feature	Description
Leaderboards	Rankings by sales volume, revenue, order fulfillment, ratings
Performance Metrics	Individual farmer stats vs. peer averages
Sub-County Rankings	Competition within local areas (Kangundo, Kathiani, Masinga, Yatta)
Farmer Group Rankings	Group-level performance comparisons
Best Practices	Top performers can share tips and techniques
Anonymized Data	Farmers see peer performance without identifying individuals (optional)
Growth Tracking	View own improvement over time vs. peers
Achievement Badges	Earn badges for milestones (100kg sold, 5-star rating, etc.)

5.4 County Officer & Concern Staff Dashboards

Monitoring Dashboard:



Dashboard Features:

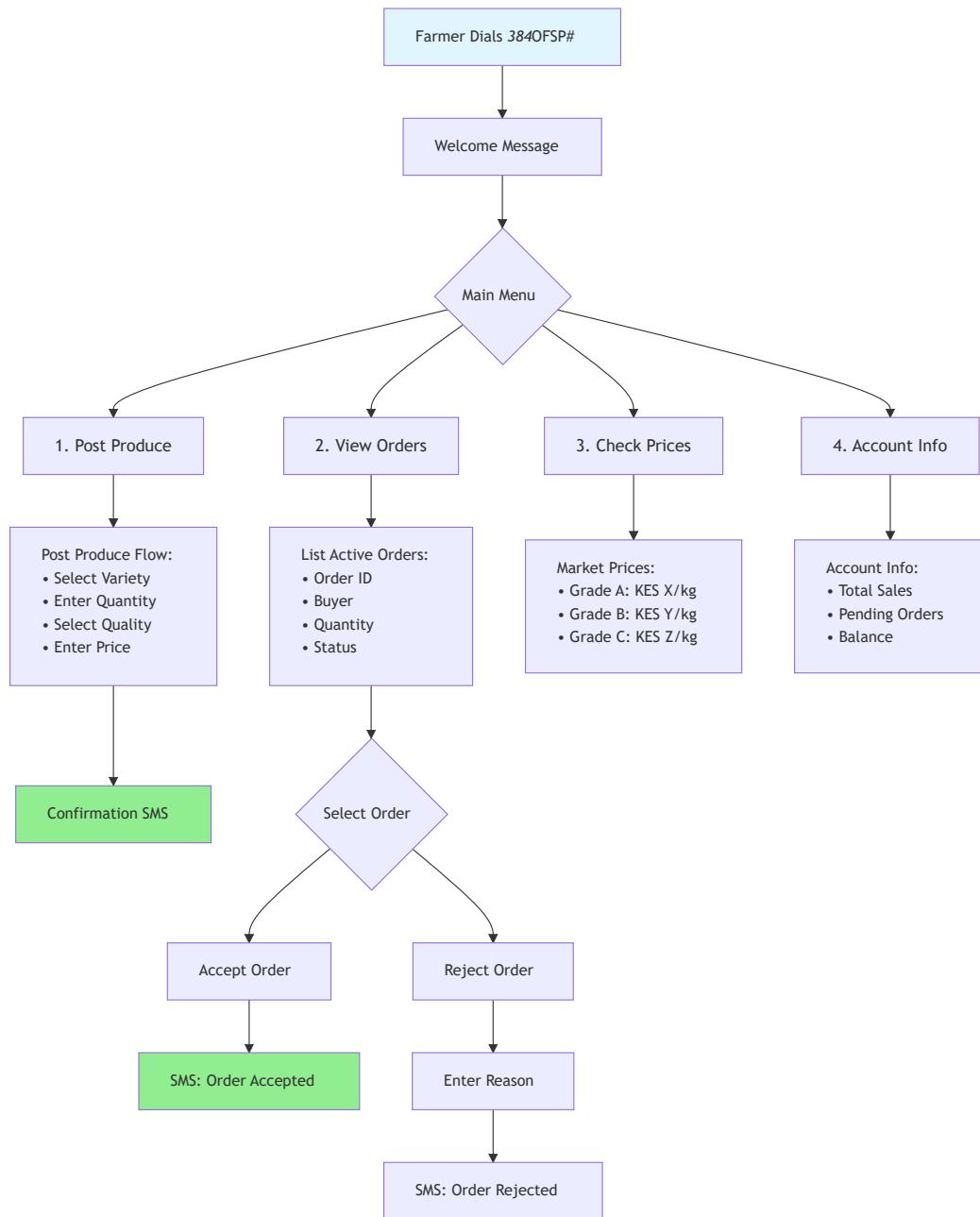
Feature	Description
Real-Time Metrics	Live KPIs updated every 5 seconds
Farmer Management	View all farmers, filter, search, view profiles, deactivate accounts
Order Management	View all orders, filter by status, intervene in disputes
Aggregation Monitoring	Real-time view of all centers, stock levels, alerts
Geographic Maps	Visual map of farmers, buyers, centers in Machakos County
Performance Analytics	Trends, comparisons, forecasts
Data Export	Excel, PDF, CSV export for all reports
Alert System	Automated alerts for anomalies (price spikes, stock-outs, etc.)
User Management	Create/edit users, assign roles, reset passwords
Audit Logs	Track all system actions for accountability

5.5 Multi-Channel Access

Access Channels:

Channel	Target Users	Features
Web Application	County Officers, Concern Staff, Tech-savvy farmers	Full functionality, dashboards, reports, admin tools
Mobile PWA	Farmers, Buyers	Core marketplace features, offline mode, optimized for 2G/3G
USSD (384OFSP#)	Farmers with feature phones	Post produce, check orders, view prices, receive SMS confirmations
SMS Notifications	All users	Order confirmations, price alerts, delivery updates, reminders
WhatsApp (Optional)	All users	Market info broadcast, customer support, order status queries

USSD Flow:



6. Technical Implementation Details

6.1 Database Schema

Core Entities:

Entity	Key Fields	Purpose
Users	id, name, phone, email, role, sub_county, farmer_group, status	User accounts and authentication
Listings	id, farmer_id, variety, quantity, quality_grade, price, location, photos, status	OFSP produce listings
Orders	id, listing_id, buyer_id, farmer_id, quantity, price, status, delivery_date	Order transactions
AggregationCenters	id, name, location, capacity, manager_id, sub_county	Aggregation center details
StockMovements	id, center_id, type (in/out), farmer_id/buyer_id, quantity, quality_grade, timestamp, photos	Stock tracking
Inventory	id, center_id, variety, quality_grade, quantity, last_updated	Real-time inventory
Prices	id, variety, quality_grade, price, date, source	Market price history
Notifications	id, user_id, type, message, channel (SMS/email/push), status, sent_at	Notification logs
PeerMetrics	id, farmer_id, sales_volume, revenue, orders_fulfilled, avg_rating, period	Leaderboard data
AuditLogs	id, user_id, action, entity, timestamp, ip_address	System audit trail

6.2 API Endpoints

Core API Structure:

Endpoint	Method	Purpose	Access
/api/auth/register	POST	User registration	Public
/api/auth/login	POST	User authentication	Public
/api/listings	GET	Browse produce listings	All users
/api/listings	POST	Create produce listing	Farmers
/api/orders	GET	View orders	Farmers, Buyers
/api/orders	POST	Create order	Buyers
/api/orders/:id/accept	PUT	Accept order	Farmers
/api/aggregation/stock-in	POST	Log stock in	Center Managers
/api/aggregation/stock-out	POST	Log stock out	Center Managers
/api/aggregation/inventory	GET	View inventory	Officers, Staff
/api/peers/leaderboard	GET	View peer rankings	Farmers
/api/dashboard/metrics	GET	Dashboard KPIs	Officers, Staff
/api/reports/generate	POST	Generate reports	Officers, Staff
/api/notifications/send	POST	Send notification	System
/api/ussd/callback	POST	USSD interactions	USSD Gateway

6.3 Security Implementation

Security Measures:

Component	Implementation
Authentication	JWT tokens with 24-hour expiry, refresh tokens for mobile
Authorization	Role-based access control (RBAC), middleware validation
Data Encryption	AES-256 encryption at rest, TLS 1.3 in transit
Password Security	Bcrypt hashing with salt, minimum 8 characters, complexity requirements
API Rate Limiting	100 requests/minute per user, 1000/minute per IP
Input Validation	Server-side validation, SQL injection prevention, XSS protection
Data Privacy	Kenya Data Protection Act (2019) compliant, GDPR-aligned
Audit Logging	All critical actions logged with user, timestamp, IP
Backup	Daily automated backups, 30-day retention, point-in-time recovery
DDoS Protection	Cloudflare CDN with DDoS mitigation

6.4 Performance Optimization

Optimization Strategy:

Aspect	Implementation	Target Metric
Page Load Time	Code splitting, lazy loading, image optimization	<3s on 3G
API Response Time	Redis caching, database indexing, query optimization	<500ms (p95)
Offline Mode	Service workers, IndexedDB local storage	Full CRUD offline
Image Optimization	WebP format, responsive images, lazy loading	<100KB per image
Database	Indexes on foreign keys, query optimization, connection pooling	<100ms queries
CDN	Static assets served via Cloudflare CDN	<50ms asset delivery
Caching	Redis for sessions, API responses (5-min TTL)	80% cache hit rate
Mobile Data	Progressive image loading, data compression	<1MB per page