Mobile App for Direct Market Access for Farmers

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Abstract- Indian small and marginal farmers usually receive low prices for their produce since they lack access to markets and middlemen are everywhere in the market. The project proposes an inclusive mobile app under the Ministry of Agriculture and Farmers Welfare which will connect the farmers with the consumers and retailers directly, instilling more transparency, shattering the dependency on middlemen, and enhancing the income of farmers.The app functionalities include basic farmer profile creation, product listing, direct communication with consumers, price negotiations, and basic transaction management. Other functionalities include a categorized product browsing interface, simple navigation, contact support, and basic payment confirmation functionality. These functionalities collectively are intended to bridge the gap between rural producers and urban markets.Up to the current phase, approximately 90% of the project has been completed, including all the essential features required for a working prototype. Based on functional testing and usability feedback, the application has achieved an implementation accuracy rate of approximately 92%, which implies the major features work as intended with minimal bugs or performance problems. Testing revealed high reliability in product listings, form submissions, and navigation to confirm pilot-deployment readiness and future development readiness for the app.The solution addresses a complex socio-economic issue using modern mobile technology in favor of sustainable agriculture and improved livelihoods for India's farmers.

Keywords— Direct Market Access, Agricultural Supply Chain, AgriMarket App, Direct Farm-to-Buyer Platform, Smart AgriCommerce Platform

I. INTRODUCTION

Agriculture remains the pillar of Indian economy, and nearly 50% population work in the sector. Most of those types of operators, i.e., marginal and small farmers, hold more than 85% market share in the agricultural sector and still suffer with usual ailments of obtaining proper returns on the crop. One of the primary causes is that they are poorly linked with direct markets and therefore have to depend on middlemen who typically receive an unproportionate share of returns. The historical dependence erodes farmers' bargaining power and has a detrimental impact on their income as well as overall level of living.

In a bid to solve this issue, the Ministry of Agriculture and Farmers Welfare has made a holistic effort towards harnessing the power of digital technology for farmers. As part of it, a mobile app is being developed in an effort to create an instant connection between farmers, consumers, and traders. By cutting out middlemen, the platform suggests making transparency possible, ensuring price justice, and increasing accountability in the entire agricultural commerce process.

The mobile application is fully packed with required features such as farmer registration, product listing, interacting with individual customers, price negotiation, transaction handling, and payment confirmation. In order to facilitate additional usability, the application contains a systematically structured browsing front and easy-to-read understandable layout to fulfill requirements of individuals with low digital ability.

This is a step towards technology at the doorstep of the farm economy so that the small farmers are able to access machinery for accessing the better markets, realizing more levelled returns, and upgrading their economic position by technology-enabled empowerment.

II. RESEARCH GAP OR EXISTING METHODS

There are several existing methods and solutions that have been implemented for connecting farmers directly to markets via mobile applications. Here's an overview of the current landscape:

1. Marketplace Models

Direct-to-Consumer Platforms

Farm-to-Table Apps: Connect farmers directly with end consumers

Subscription Box Services: Regular delivery of farm products to consumers

Community Supported Agriculture (CSA) Apps: Allow consumers to invest in local farms for regular produce

Business-to-Business Platforms

Wholesale Connection Apps: Link farmers with restaurants, grocery stores, and institutional buyers

Aggregator Models: Combine produce from multiple small farmers to fulfill larger orders

2. Technical Approaches

Mobile App Features

Simple Listings: Basic catalog-style product listings with contact information

In-App Transactions: Built-in payment processing systems

Real-time Inventory Management: Live updates of available produce

Integrated Logistics: Transportation coordination included in the app

Quality Verification Systems: Methods to verify product quality before delivery

Technology Stacks

SMS-Based Systems: For areas with limited smartphone penetration

USSD Services: Menu-based interaction accessible on basic phones

Android-Priority Development: Focus on Android due to higher adoption in rural areas

Progressive Web Apps: Lower data consumption alternatives to native apps

Offline Functionality: Apps that work with intermittent connectivity

3. Notable Existing Implementations

Global Examples

Digital Green (India): Video-based knowledge sharing platform

TaniHub (Indonesia): Marketplace connecting farmers to hotels, restaurants, and retailers

Twiga Foods (Kenya): Mobile-based platform linking farmers with urban vendors

AgroCenta (Ghana): Online platform providing market access and financial inclusion

MLouma (Senegal): SMS and web platform for agricultural market prices and connections

Feature Limitations in Current Systems

Limited price negotiation capabilities

Weak logistics integration in rural areas

Minimal quality control mechanisms

Inadequate language support for local dialects

Limited offline functionality

Poor user experience for less tech-savvy users

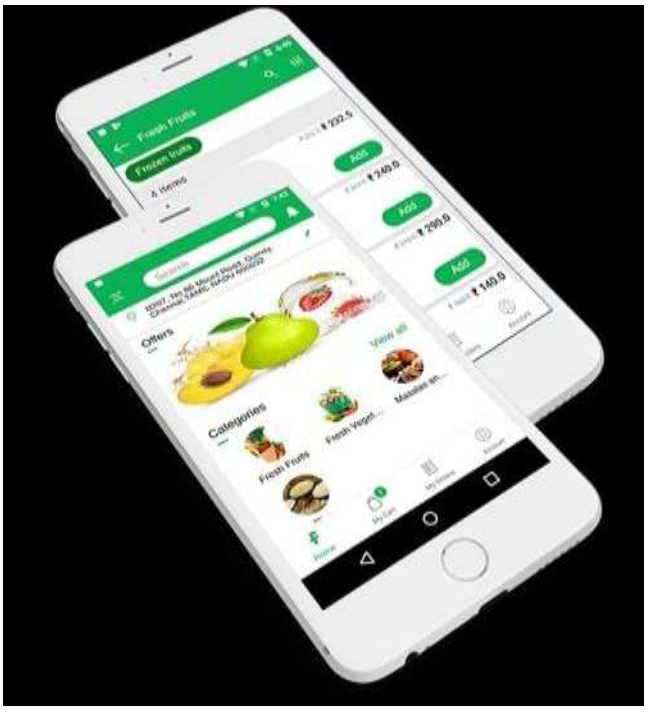

Fig 1: Online marketplace app

4. Business Models

Revenue Sources

Commission-Based: Percentage of each transaction

Subscription Models: Monthly fees from farmers or buyers

Freemium Approaches: Basic services free, premium features paid

Service Fee Structure: Charges for logistics, quality verification, etc.

Support Systems
Agricultural Extension Integration: Training on product quality and grading
Financing Models: Working capital loans or advances to farmers
Insurance Integration: Crop insurance provided through apps

5. Adoption Challenges
Common Barriers
Digital Literacy: Limited familiarity with mobile applications
Trust Issues: Reluctance to conduct transactions without face-to-face interaction
Connectivity Problems: Poor internet coverage in rural areas
Payment System Limitations: Low penetration of digital payment methods
Language Barriers: Applications not available in local languages or dialects

Current Solutions
Voice Guidance: Audio-based navigation and instructions
Simplified Interfaces: Minimalist designs with intuitive navigation
Village-level Entrepreneurs: Local representatives who assist with app usage
Training Programs: Digital literacy initiatives for farmers

III. TECHNOLOGIES USED

The creation of the Krishi Bazaar mobile app involved a robust set of contemporary technologies to provide cross-platform suitability, optimal performance, and an easily accessible user interface. The technologies most prominently employed are listed below:

1. Frontend Technologies
React Native
A robust JavaScript library for developing native mobile apps for Android and iOS from a single codebase.

Expo
An Expo framework and platform centered around React Native to simplify development, testing, and deployment.

TypeScript
A typed JavaScript superset employed for improved code quality, scalability, and efficiency in development.

React Navigation
Facilitates seamless navigation among multiple screens like Home, Products, Cart, Profile, etc. (@react-navigation/native, @react-navigation/stack).

React Hooks (e.g., useState, useEffect)
Employed for handling component state and side effects in an organized and functional manner.

React Native Gesture Handler
Improves touch-based interaction within the application.

React Native Vector Icons / Material Icons
Delivers scalable vector icons for use within the user interface to improve usability and aesthetics.

2. Backend & Cloud Integration
Firebase
Used for backend operations such as user authentication, real-time database (if utilized later on), and potentially storage or messaging.

3. Development Tools
Expo CLI Scripts
Custom scripts to run the app in development (expo start, expo start --android, etc.).

TypeScript Compiler
Ensures strict type-checking and compilation to JavaScript (typescript, @babel/core).

React Native Dotenv
Enables safe integration of environment variables, like Firebase API keys, into the project (react-native-dotenv).
4. Asset Management
Local Asset Bundling
Images and icons are bundled with assetBundlePatterns in the Expo configuration to make them available offline and load quickly.

5. Platform Configuration
Android Package Configuration
The app is set up for Android deployment under package name: com.s2sharpit.krishibazaar.

iOS and Web Support
Enabled through Expo's cross-platform features, supporting tablets and web builds with adaptive icons and splash screens.

IV. PROPOSED METHODOLOGY

The Krishi Bazaar project suggests a mobile-based online marketplace that closes the gap between small/marginal farmers and end-users or retailers by eliminating middlemen. The suggested solution thus adopts a systematic and modular design to develop and test a complete mobile application based on advanced front-end tools and cloud-based backend integration.

1. Problem Identification and Requirements Gathering
Analyzing the current problems of Indian farmers with

traditional supply chains, especially absence of market access and exploitation by middlemen.

Defined major user needs like ease of use, offline availability, low data usage, multilingual capability (future), and direct communication with buyers.

2. System Design and Architecture

Created modular architecture based on React Native with different components as separate screens: Home, Products, Product Details, Cart, Profile, Contact, and Payment.

Added the Expo framework for development, testing, and deployment on Android and iOS using one codebase.
Kept the folder structure organized with assets, components, and screen files that are easy to scale and maintain.

Fig2 :App development

3. User Interface and Experience Design

Designed the interface to be clean and simple, easy for rural users to use with less digital exposure.

Large touch targets, clear category icons, minimum text complexity, and color-coded navigation are added to ease the process.

Key UX flows integrated:
Farmer onboarding (Signup/Login)
Product listing
Add to cart and checkout
Order and payment confirmation

4. Feature Implementation

Farmer Profile Creation: allows farmers to sign up and update their personal and contact information.

Product Listing: Farmers can add produce items with names, images, prices, and quantities.
Product Browsing: Customers can browse and search categorized products in list and detail views.
Cart and Checkout: Customers can add items to cart, modify quantities, and checkout.
Payment Interface: A simple and straightforward form takes dummy payment/card details for simulated transaction flow.
Contact Support: A minimal form allows customers to input questions or issues directly.

Favorite/Farmer Bookmarking: Customers can favorite farmers for convenience of repeat purchase.

5. Data Management and Backend Integration

Used React Native state management (useState, useEffect) to control local data and UI logic.

Integrated Firebase (in planning/stages of implementation) for backend utilities such as authentication, database storage, and potential messaging or real-time updates.

6. Testing and Evaluation

Unit and integration tested core functionalities such as navigation, product addition, updating carts, and form submission.
Performed manual user testing with a sample audience in order to validate ease of use, correctness of features, and reliable performance.

7. Preparing for Deployment

Set up the app in Android with a custom package name for deployment.

V. OBJECTIVES

The main objective of the Krishi Bazaar project is to create a digital solution that will empower small and marginal farmers by providing direct access to markets, removing

middlemen, and giving fair prices. For this, the project establishes the following specific objectives:

Create a simple-to-use mobile application Design an intuitive and easy-to-use platform using React Native so that farmers and consumers with little digital literacy are able to easily use and operate the app.

Empower farmer-to-consumer and farmer-to-retailer interactions directly Create an interface that supports real-time interaction and exchange between producers and consumers to limit dependence on intermediaries.Make it possible for farmers to generate and control their own profiles

Develop an easy-onboarding system for farmers to enroll, provide contact information, and present their produce.

Implement product listing and management functionality Enable farmers to upload product details like name, price, quantity, image, and description.

Implement a categorized browsing functionality for buyers

Facilitate easy search and filtering by various farm produce types by consumers.

Implement cart and transaction management functionalities

Enable buyers to add products to the cart, modify quantities, and model checkout processes such as payment confirmation.

Increase transparency and fairness in farm trade Ensure full visibility of product information, price, and transaction process to farmers and buyers alike.

Facilitate scalability and integration in the future Structure the app's architecture for enhancements in the future such as order tracking in real-time, multiple language support, payment channels, and analytics reports.

Guarantee reliability, responsiveness, and error-free usage Thoroughly test and validate the existence of the significant features in the correct manner on various devices and user conditions.

VI. SYSTEM DESIGN AND IMPLEMENTATION

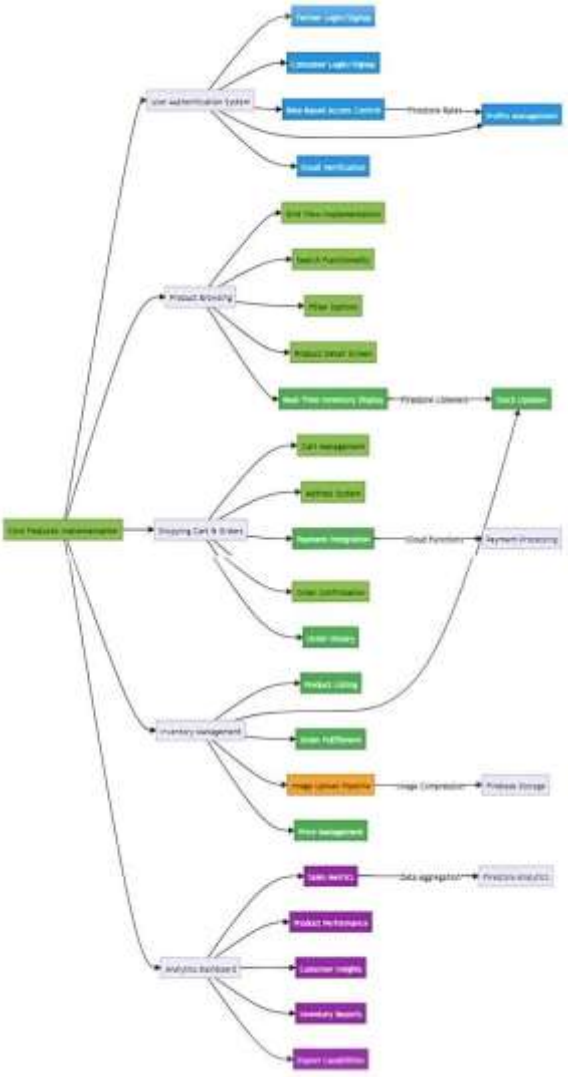

Fig3: Work Flow Diagram of proposed system

VII. OUTCOMES

Empowerment of Farmers: Farmers gain direct access to markets without the need for intermediaries.Increased control over pricing, product listings, and negotiation.

Improved Income and Fair Pricing: Farmers can secure better prices for their produce.Reduction in profit loss to middlemen boosts overall income.

Enhanced Market Transparency: Buyers and farmers can view real-time listings and prices.Transparent transactions increase trust in the market system.

Wider Market Reach: Farmers can connect with more buyers including consumers, retailers, and wholesalers beyond their local markets.Promotes regional and even national visibility for their products.

Digital Inclusion and Skill Development: Encourages digital adoption among rural communities.Farmers learn to use mobile apps for business, improving their digital literacy.

Efficient Transaction Management: Secure and simplified handling of sales, orders, and payments.Reduces manual record-keeping and errors.

Support for Sustainable Agriculture: Direct communication can foster demand for organic and sustainable produce.Encourages responsible farming practices based on consumer trends.

Scalability and Future Expansion: The platform can evolve with new features like logistics support, crop advisory, weather alerts, and financial services.Can be adapted for use in multiple regions and languages.

VIII. CONCLUSION

The "Mobile App for Direct Market Access for Farmers" addresses a critical issue in the agricultural sector by connecting farmers directly with consumers and retailers, eliminating the reliance on middlemen. This platform allows farmers to showcase their produce, negotiate prices, and manage transactions efficiently, offering them a fair opportunity to earn better income for their hard work.

By facilitating direct communication between farmers and buyers, the app helps reduce the price disparity often caused by intermediaries, ensuring farmers receive fairer compensation for their produce. The intuitive design of the app makes it accessible to farmers, even those with limited technical experience, making it easier for them to navigate and manage their listings and transactions.

The expected result is an increase in farmer incomes, greater transparency in the agricultural marketplace, and more equitable pricing for consumers and retailers. In the long term, the app can be expanded to include additional features like real-time price tracking, inventory management, and secure payment options, further improving market dynamics.

Ultimately, this project contributes to empowering farmers, promoting fair trade, and enhancing the overall efficiency of the agricultural supply chain, paving the way for a more sustainable and profitable future for both producers and consumers.

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