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AgroGo-Connecting Organic Farmers and Consumers

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Abstract: ***The traditional agricultural supply chain in India often depends on middlemen who drive up consumer prices while giving farmers little profit.***
This imbalance leads to financial instability, with some cases resulting in farmer suicides. Consumers also suffer, paying more for produce that often loses freshness and quality before it reaches them. To tackle these issues, this paper introduces AgroGo, an Android-based mobile app built with Kotlin and Firebase Fire store. The app creates a direct digital marketplace between farmers and consumers, reducing the need for middlemen. AgroGo allows farmers to upload product details with images, manage their inventory in real time, and set fair prices. It integrates with the Razor pay API to provide secure and flexible digital payment options.
For consumers, AgroGo offers access to fresh, seasonal produce through easy search and filtering features, real-time order tracking, and options for delivery or pickup.
AgroGo also includes product listing, orders dashboards, smart inventory management, especially for rural communities. By promoting transparency and supporting digital integration, the platform boosts farmer profits, builds consumer trust, and encourages rural digitization. In summary, AgroGo is more than just a transactional platform. It is a socio-technical innovation that helps transform agriculture into a sustainable, transparent, and fair ecosystem. The system empowers farmers to engage in the digital economy while enhancing food security and efficiency in the agricultural supply chain.
Keywords: Agriculture, Firebase, Android, Farmer–Consumer Marketplace, Digital Agriculture, E-Commerce, Razor pay, Fire store Database

I. INTRODUCTION

For millions of Indian families, farming isn't just a job, it's their lifeline and a steady part of our economy. Picture a farmer waking at dawn to care for crops in the relentless sun, all to feed the nation. However, behind this vital work is a world of heartbreak: crushing debts from a child's education, a sudden family illness, low prices that barely cover costs, and middlemen who take away hard-earned profits. In too many villages, these burdens have turned lives into tragedies, with farmer suicides serving as a harsh reminder.

We can't ignore this anymore. It's time to create systems that support, protect, and honour these unsung heroes. But there is hope. In our tech savvy world, we can change this story. We can connect remote fields to urban kitchens and create a smarter, more caring India. Enter Agrogo, a simple digital link from farmer to consumer. No more middlemen taking a cut; just direct sales where farmers receive a fair share of the value. Imagine biting into crisp veggies straight from the source, knowing your money is easing a family's burden paying off that medical bill or covering a child's school fees.

Existing agricultural e-commerce applications, such as FarmKart and E-Greengrocers, have attempted to connect farmers directly to consumers. However, these platforms show limitations in offline availability, inventory management, and comprehensive analytics, restricting their effectiveness in rural contexts.AgroGo addresses these limitations by providing a farmer-friendly digital marketplace that ensures pricing control, instant order notifications, and actionable business insights.

II. LITERATURE REVIEW

The rapid growth of mobile technologies has significantly influenced the agricultural sector, offering farmers new ways to market their produce, reduce wastage, and access real-time data. Several research efforts have explored mobile-based agricultural solutions to address farmer centric challenges such as supply chain inefficiencies, pricing, and weather forecasting.

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The integration of digital platforms into agriculture has been widely explored to improve farmer profitability and reduce the influence of intermediaries. Several researchers have focused on mobile applications as a means to connect farmers directly with consumers, thereby creating fairer and more transparent marketplaces.

One such initiative is the Farm Era application proposed by Thamizhselvi et al., which provides a unified digital platform for farmers to market their produce directly [5].

The system integrates producer registration, product listing, and transportation services to minimize wastage of perishable products while improving income levels. Built on Firebase for efficient data handling, the platform supports farmers in transporting goods beyond local markets [1],[4].

However, Farm Era does not incorporate predictive supply-demand mechanisms or real-time weather-based advisory systems, limiting its capacity to support decision-making in dynamic agricultural conditions [6], [7].

Similarly, Bawankule introduced a multi-functional Android-based application that combines buy sell transactions, weather forecasting, and shared transportation services to enhance farmer profitability [6],[10]. This system provides detailed weather forecasts, including parameters such as temperature, humidity, rainfall, and wind, enabling farmers to take preventive measures against crop damage.

The inclusion of a shared transportation module reduces logistics costs, while direct farmer to consumer sales eliminates intermediary commissions. Despite these strengths, the system still lacks intelligent demand prediction, scalable storage solutions, and real-time pricing analytics, all of which are essential for long-term sustainability and cross-regional distribution.

In addition to these efforts, large-scale platforms such as the National Agriculture Market (eNAM) and Big Basket have provided partial solutions. eNAM functions as an online trading portal but is hindered by poor storage facilities, distress sales due to lack of credit, and limited transportation infrastructure [11], [12]. Big Basket, while effective in connecting consumers with fresh produce, operates with high variable costs, minimum order constraints, and provides no direct pricing benefits to farmers [13]. These shortcomings highlight persistent gaps in ensuring both farmer empowerment and consumer affordability.

Other contributions include IEEE's Crop Shop (2019), which sought to maximize farmer profit through e-market mechanisms but lacked transport integration, and the Agriculture Economic Research Association (2017), which outlined strategies for doubling farmer income without providing strong technological enablers for supply demand alignment or logistics [8]. Research on agricultural e-commerce ecosystems also emphasizes transparency and cost reduction, yet falls short of offering comprehensive inventory management, seasonal availability tagging, advanced analytics, or multi-mode payment solutions [3],[4].

From this body of work, it is evident that while existing systems have advanced transparency and reduced intermediary exploitation, they remain fragmented and limited in scope. Current solutions lack a holistic approach that integrates real-time inventory management, predictive analytics, seasonal tagging, secure digital payments, multi-language support, and offline synchronization for rural accessibility. This gap underscores the need for an integrated system such as AgroGo, which aims to combine these capabilities to create a sustainable, transparent, and farmer centric digital marketplace.

III. RESEARCH GAP

A comparative analysis of FarmKart, E-Greengrocers, Urban Farming, IJRASET's Agricultural Marketing app, Farm Era App, and the Cloud-Based Agriculture Marketing System reveals several persistent limitations:

1) All reviewed apps depend on continuous internet connectivity.
2) Limited vernacular support discourages participation by non-technical farmers.
3) None of the systems provide full inventory control.
4) Shopping-cart checkout, flexible delivery, and secure multi-mode payments are absent or only partially implemented.
5) Analytics for earnings and top-selling products are missing.

IV. RESEARCH OBJECTIVE

1) Enable direct market access between farmers and consumers without intermediary commissions.
2) Provide real-time inventory management, product listing (image, name, category, description, price, quantity), browse, cart and search with product name and as well with category Icon.
3) Support secure multi-mode payments (UPI, wallet, cash on delivery) through Razor pay API.
4) Deliver advanced analytics dashboards for earnings tracking, top-selling products.
5) Improve digital inclusion by offering an intuitive UI with vernacular language support.

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V. PROPOSED SYSTEM

AgroGo is developed using Kotlin for Android and Firebase Fire store for real-time data management.
Key modules include:

1) Farmer Dashboard: Product listing with images, stock list, price setting, and stock-out tag.
2) Consumer Dashboard: Advanced product search, Browse, shopping cart.
3) Payment Gateway: Razor pay API for UPI, wallet, and COD transactions.

a) *Registration Page (Role Selection Screen):* This is the entry point of the Agrogo app, where users select whether they are logging in as a Farmer or a Consumer. Role-Based Navigation: Based on the user's choice, the app directs them to the corresponding login/registration flow. Firebase Authentication: Secure sign-in using Firebase Authentication (Email/Password, Phone OTP, or Google Sign-In) ensures user data integrity. User-Friendly UI: A clean, mobile-first design with large buttons and minimal steps helps even non-technical farmers access the platform easily.

b) *Farmer Dashboard:* Once a farmer successfully logs in, they are taken to the Farmer Dashboard, which acts as the central control hub for all farmer-related operations. Key modules include Product Management: Farmers can add, edit, or remove products with details like images (stored in Firebase Storage), descriptions, prices, quantity. Inventory Tracking: Real-time updates of stock levels. Farmers can mark items as sold out or restocked instantly. Order Management: Farmers receive real-time notifications of new orders from Fire store. Orders can be confirmed. Earnings & Insights: Total sales, monthly income, and top-selling products to help farmers plan future crops or pricing. Profile & Settings: Farmers can update personal details

c) *Consumer Dashboard:* For consumers, the dashboard provides a seamless shopping and order tracking experience. Core features include Marketplace View: A dynamic list of farm products fetched in real-time from Fire store, with filters for location, farmer name, product category, and price range. Shopping Cart & Checkout: Consumers can add multiple items to a cart, choose delivery or pickup, and pay securely using Razor pay or UPI.

d) *Notifications:* Instant push notifications via Firebase Cloud Messaging (FCM) alert users about order confirmations.

e) *Data Handling:* Agrogo leverages Google Firebase as its primary backend infrastructure to manage all critical data, including farmer profiles, consumer accounts, product details, orders, payments. The system is designed with real-time synchronization, ensuring that any updates made by farmers or consumers are immediately reflected across all connected devices without the need for manual refreshes.

f) *Database Management:* Fire store Database Used to store dynamic data such as farmer profiles, consumer details, product listings, order information, inventory updates. Data is organized into structured collections and documents (e.g., Farmers, Consumers, Products, Orders, Ratings), enabling efficient querying and scalability. Real-time listeners ensure instant updates for product availability, order status, and transaction changes, creating a seamless user experience for both farmers and consumers.

g) *Media Storage:* Firebase Storage Handles all image uploads such as product photos, farmer profile pictures,etc. Media files are securely stored in cloud buckets with unique file paths linked to the respective product or user document in Firestore.Storage rules restrict unauthorized access, allowing only authenticated users to upload or modify their own media files.

h) *Authentication and Security:* Firebase Authentication Ensures secure sign-in for farmers and consumers using email/password, phone number (OTP), or Google Sign-In.All credentials are protected with industry-standard encryption and Firebase's built-in security mechanisms.

i) *Role-Based Access Control:* Farmers and consumers have different access levels to protect sensitive data and prevent unauthorized modifications. Farmers can manage only their own products, orders, and analytics, while consumers can access order history and feedback.

j) *Payment Data Security:* Razor pay API Integration Used for secure UPI, wallet, and card transactions. Payment details are never stored in Firebase; instead, encrypted tokens Razor pay transaction IDs are recorded for order verification.

k) *System design*

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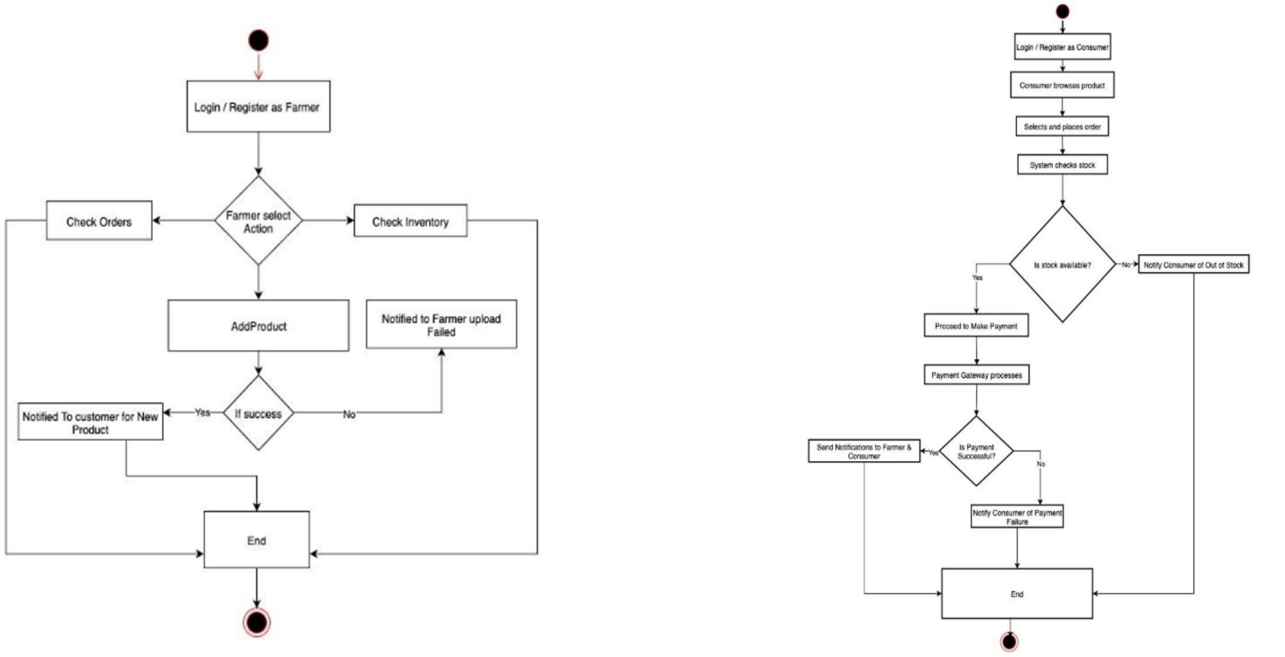


Fig.1 Flow Diagram for Farmer and Consumer

VI. RESULT

Prototype testing with a small group of farmers and consumers demonstrated:

1) Farmers successfully listed products and managed stock without prior technical training.

2) Secure payment options and order tracking increased buyer confidence.

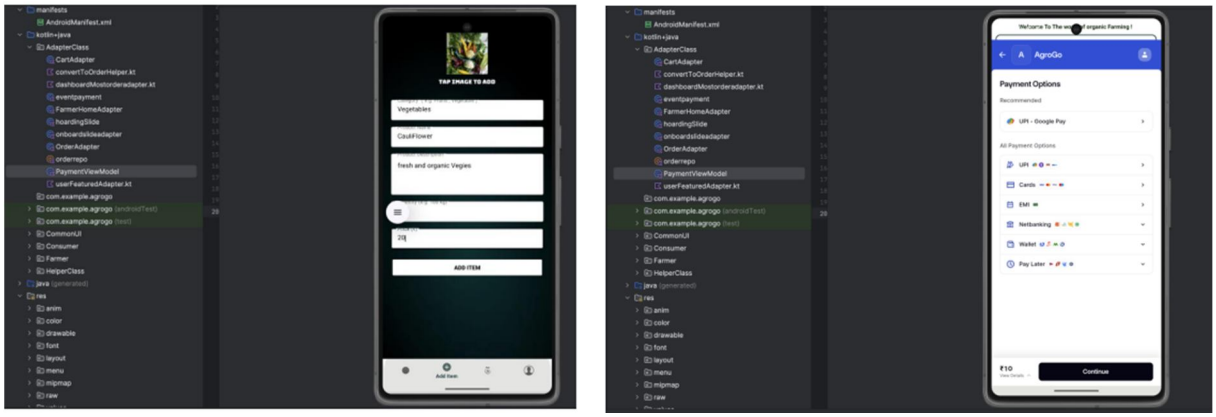


Fig.2 Farmer uploading product and Payment

VII. CONCLUSION AND FUTURE WORK

AgroGo provides an integrated, scalable, and farmer-centric solution for bridging the gap between producers and consumers while ensuring fair pricing, secure transactions, and data driven insights. By leveraging Kotlin for Android development and Firebase Fire store for real time cloud synchronization, AgroGo delivers a robust platform that addresses the key pain points of traditional agricultural markets. The application incorporates a Farmer Dashboard that enables growers to upload product details with images, set dynamic pricing, manage stock levels, and tag crops with seasonal availability. This feature not only empowers farmers to remain in full control of their inventory but also helps consumers plan purchases according to seasonal trends.

The Consumer Dashboard provides a seamless buying experience with advanced searchand filtering options, a shopping cart, and real-time order tracking.

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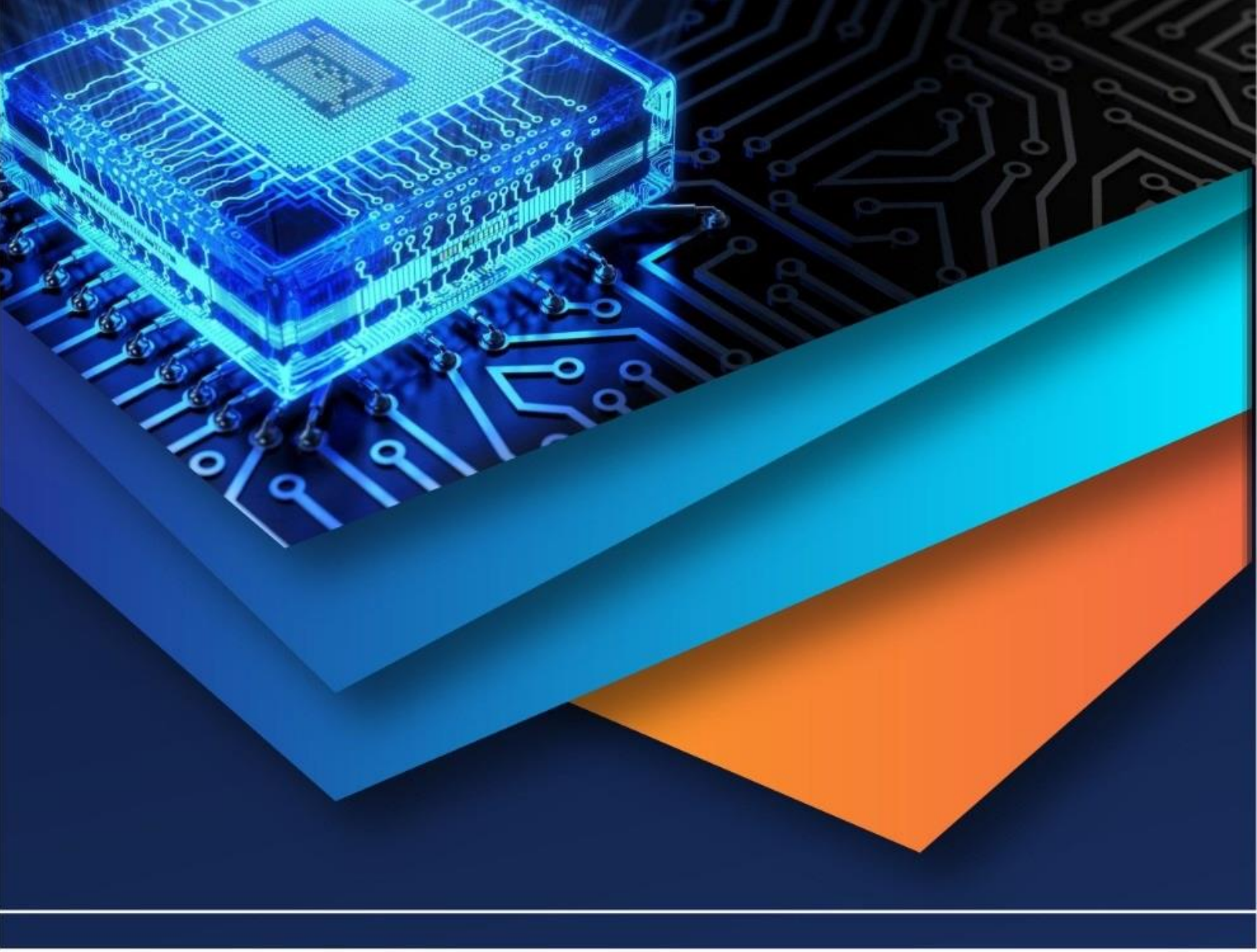
This ensures that consumers receive fresh produce at competitive prices while avoiding intermediaries. A major strength of AgroGo lies in its secure multi-mode payment system, integrated through the Razor pay API, which supports UPI, debit/credit cards, digital wallets, and cash-on-delivery. This versatility builds trust among both farmers and consumers by guaranteeing quick and secure transactions. AgroGo also introduces an Analytics Dashboard that provides farmers with earnings summaries, product performance insights, and top-selling crop reports. These insights allow farmers to make data-driven decisions, such as adjusting prices, planning crop cycles, and optimizing product availability for maximum profitability.

To improve adoption in rural areas, AgroGo is designed with multilingual support, enabling users to interact with the platform in their local vernacular languages. This inclusivity reduces the technological barriers for farmers with limited technical or linguistic proficiency. Future enhancements will include offline caching, allowing farmers to list products, update stock, and view order history even with inconsistent internet connectivity. An AI-based crop demand forecasting engine will further empower farmers by predicting market trends and suggesting optimal planting strategies based on historical sales data and regional demand. Additionally, logistics integration with real-time route optimization is planned to streamline the delivery process and reduce transportation costs. By combining real-time inventory control, secure payments, advanced analytics, and intuitive multilingual interfaces, AgroGo sets a new benchmark for digital agriculture platforms. It not only provides a marketplace but also acts as a decision-support system, enabling farmers to operate with greater independence, efficiency, and profitability. With future upgrades in AI, offline capabilities, and intelligent logistics, AgroGo is poised to become a sustainable digital ecosystem that can scale across rural India and other developing agricultural economies.

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