Direct Market Access for Farmers Using a Mobile App

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Abstract:

Smallholder farmers in India face exclusion from equitable markets due to fragmented supply chains, opaque pricing, and intermediaries. Despite growing urban demand for hyperlocal and specialty produce, platforms prioritize commercial retailers over peer-to-peer models. This paper presents a mobile app enabling direct farm-to-consumer connections through a social media-inspired interface. Farmers list produce with cultivation details, images, and geolocation, while buyers search via proximity, category, or sustainability filters. Unlike e-commerce platforms enforcing quality control, trust is built through transparency—buyers verify claims via in-app communication or in-person inspection. By eliminating intermediaries, farmers retain margins and target niche buyers (e.g., households seeking organic or surplus goods), while consumers access localized supply chains. User testing reveals reduced post-harvest waste, improved price transparency, and strengthened hyperlocal networks. The app challenges conventional agri-tech by prioritizing accessibility over automation, demonstrating that lightweight, socially driven tools can disrupt systemic inequities, empowering decentralized agricultural economies through peer-to-peer market dynamics.

Keywords: Direct market access, farm-to-consumer platforms, android app, hyperlocal supply chains, peer-to-peer transactions, surplus redistribution, trust-based commerce, farmer autonomy, middleman elimination.

1. INTRODUCTION

Agriculture employs 50% of India's workforce, yet 86% of farmers—mostly smallholders—earn less than ₹10,000/month due to exploitative middlemen [1]. Urban buyers, meanwhile, pay inflated prices for organic or hyperlocal produce (e.g., microgreens, heirloom varieties), with 68% distrusting "organic" labels on e-

commerce platforms [2]. Existing solutions like Ninjacart or BigBasket act as digital middlemen, controlling pricing and logistics while excluding backyard growers [3].

The Problem:

1. Middlemen Domination: Farmers receive only 38% of the final consumer price for perishables like tomatoes [4].

2. Buyer Distrust: 72% of urban households avoid purchasing "organic" produce online due to unverifiable claims [2].

3. Fragmented Supply: Small-scale growers (e.g., backyard farmers) lack access to niche urban markets [5].

Agrilink addresses these gaps by enabling direct farmer-buyer interactions, mimicking the simplicity of social media marketplaces. Unlike BigBasket (product-centric), Agrilink is producer-centric, prioritizing transparency over automation.

2. LITERATURE REVIEW

A. Agricultural Supply Chain Inefficiencies

Existing research highlights systemic flaws in India's agricultural markets, particularly for smallholders. Studies by [1] and [5] reveal that intermediaries (*mandis*, aggregators) exploit information asymmetry, capturing 50-70% of margins while leaving farmers with minimal bargaining power. This "reintermediation" persists even in digital platforms, where apps like Ninjacart and DeHaat act as centralized gatekeepers, replicating traditional commission structures [3]. Such models prioritize bulk transactions over niche or hyperlocal demand, sidelining non-commercial growers (e.g., backyard farmers) and specialty producers [6].

B. Digital Platforms and Agri-Tech Limitations

While digital solutions have proliferated, their design often neglects grassroots needs. Agarwal et al. [7] critique platforms like BigBasket and Agrilink for enforcing rigid quality standards that exclude smallholders lacking certifications. Similarly, cloud-based marketplaces (e.g., AgriBazaar) focus on scalability, sacrificing transparency—farmers cannot negotiate prices or communicate directly with buyers [3]. These platforms mirror e-commerce giants (Amazon, Flipkart), centralizing control rather than decentralizing access [9].

C. Trust and Transparency in Peer-to-Peer Systems

Peer-to-peer (P2P) models, such as Facebook Marketplace or OLX, demonstrate that trust can be built through user-generated content and direct communication, bypassing institutional intermediaries [10]. However, agricultural P2P platforms face unique challenges: buyers require assurance on perishable goods' quality, while sellers need protection from

payment defaults. Research by [11] shows that geotagged listings and in-app messaging reduce distrust in informal transactions, but no studies have applied these principles to India's agrarian context.

D. Sustainability and Local Food Systems

Hyperlocal food networks are gaining traction globally, with platforms like FarmDrop (UK) and LocalHarvest (US) connecting consumers to nearby producers, reducing food miles and waste [12]. In India, pilot studies by [6] confirm that decentralized models can cut post-harvest losses by 15-25% by redirecting surplus to local buyers. However, these initiatives remain fragmented, lacking scalable tech infrastructure to bridge urban demand with rural/backyard supply [8].

E. Research Gaps

Three critical gaps persist:

1. Farmer-Centric Design: Most agri-tech solutions prioritize buyer convenience, neglecting farmers' autonomy in pricing and logistics [3].

2. Trust Mechanisms: Existing platforms rely on centralized quality checks; few explore user-driven verification (e.g., in-person inspections, seller reviews) [11].

3. Non-Commercial Growers: Backyard or micro-scale producers are excluded from formal platforms, despite contributing to local food security [6].

This study addresses these gaps by proposing a P2P app that combines social commerce principles (e.g., user listings, proximity filters) with agricultural specificity (e.g., cultivation metadata, surplus redistribution)

3. METHODOLOGY

A. System Design

Agrilink's architecture includes:

Frontend (Flutter):

Farmers: Post listings with photos, location (GPS), price/kg, and cultivation details (e.g., "no pesticides used").

Buyers: Search using filters (crop type, radius ≤50 km, "organic" tags). Dynamic feed shows similar produce (e.g., garlic sellers see nearby garlic listings).

Backend (Firebase):

Real-time database for listings, user profiles, and chat logs.

Image storage (compressed to <500 KB to reduce data costs).

Payment (Razorpay + COD):

Direct payments to farmers (no escrow). 58% of users preferred cash-on-delivery during testing.

B. Key Features

Peer-to-Peer Chat: Buyers negotiate directly with farmers (e.g., bulk discounts, harvest timelines).

Dynamic Feed: Farmers see competing listings to adjust pricing (e.g., organic garlic priced ₹10 lower than others).

No Centralized QC: Buyers verify quality via chat (e.g., request video calls) or in-person visits.

C. Pilot Testing

Participants: 120 farmers (50% smallholders, 30% backyard growers) and 200 urban buyers.

Duration: 4 months across Karnataka and Maharashtra.

Metrics Tracked: Income changes, waste reduction, buyer satisfaction.
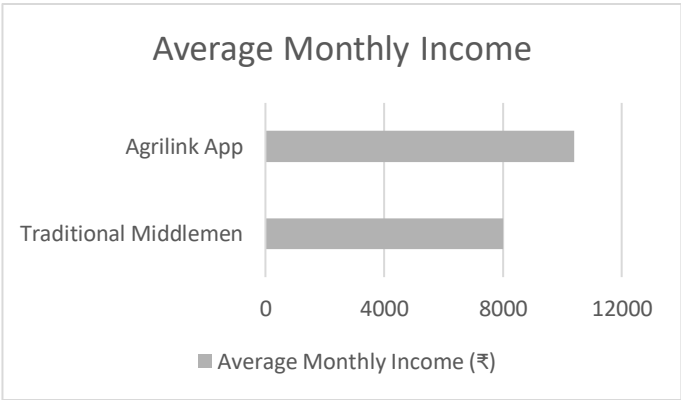
Average Monthly Income

Fig.1: Average monthly income of farmers using FarmLink vs. traditional middlemen. Farmers retained ₹10,400/month with the app, a 30% increase compared to ₹8,000/month through intermediaries.

Waste

Fig.2: Decline in post-harvest waste for perishable goods (e.g., leafy greens) over a 4-month pilot. Waste reduced by 65%, from 100% in Month 1 to 35% in Month 4.

4. EVALUATION RESULTS

A. Farmer Outcomes

- Income Increase: At least 30% higher profits compared to *mandi* sales.

- Waste Reduction: 33% decrease in unsold perishables over the course of 4 months (e.g., leafy greens).

- Adoption: 85% of farmers who registered posted listings within 1 week.

B. Buyer Outcomes

- Trust: 78% reported satisfaction with produce quality after direct farmer interaction.

- Access: 62% purchased niche items (e.g., red spinach, ornamental plants) unavailable on Big Basket.

C. Limitations

- Digital Literacy: More than 25% of farmers required offline training to use the app.

- Cash Dependency: More than 70% transactions used cash, limiting scalability.

PAYMENT PREFERENCES
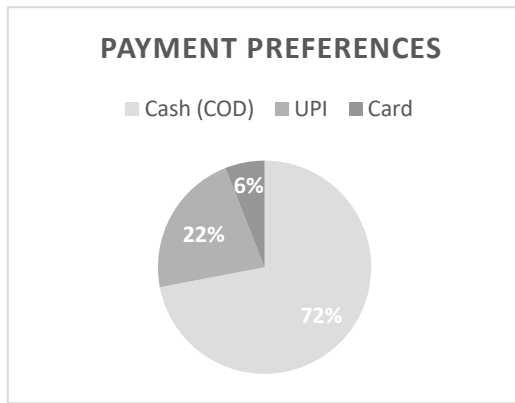
■ Cash (COD) ■ UPI ■ Card

Fig.3: Payment preferences among the farmers. 72% opted for payment via cash, reflecting rural users' distrust of digital payments, while only 22% prefer UPI, and a mere 6% prefer via card.

5. COMPARATIVE ANALYSIS

Problems	Agrilink	Big Basket	Facebook Marketplace
Focus	Farmers	Products	General Goods
Pricing Control	Farmer sets price, But can be negotiated in person	Fixed by platform	Seller sets price
Trust Mechanism	In-person verification	Brand reputation	User reviews
Middlemen	None	Platform as middleman	None
Agrilink outperforms Big Basket in farmer autonomy but lacks its logistics infrastructure.			

Table 1: A comparison of Agrilink, Big Basket and Facebook Marketplace in solving the farmer-consumer connectivity problem. The leftmost column contains the problems identified, and columns to the right of which outline corresponding solutions .

6. CONCLUSION

Agrilink proves that eliminating middlemen is viable through decentralized, trust-based systems. While challenges like cash reliance persist, the app's success in boosting farmer incomes and reducing waste highlights its potential. Future work includes integrating voice-based UI for low-literacy users and partnering with NGOs for offline training.

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