

F2CMARKET: A WEB-BASED FARMER-TO-CONSUMER MARKETPLACE PLATFORM

Tatipamula Santosh Ravi, Dr. E. Srikanth Reddy

¹Department of Master of Computer Applications, Vaageswari College of Engineering, Karimnagar, Telangana, India – 505 527

²Professor, Department of CSE (AIML), Vaageswari College of Engineering, Karimnagar, India - 505527

Project Repository: [GitHub – F2CMarket](#)

Email: ¹santoshtatipamula520@gmail.com | Student ID: 24S41F0087

Abstract

F2CMARKET is a web-based farmer-to-consumer marketplace designed to connect farmers and consumers directly through a single digital platform. The system provides role-based access for consumers, farmers, and administrators. Consumers can browse and filter agricultural products, manage a cart and wishlist, place orders, and submit reviews and ratings. Farmers can manage profiles, publish products, upload images, and monitor orders, while administrators manage users, farmer verification, and marketplace activity. The implementation uses React.js and Vite with Tailwind CSS, Firebase Authentication and Cloud Firestore, Clouinary, OpenStreetMap with Leaflet, and EmailJS. The documented testing process covered unit, integration, system, and user acceptance testing. Eighteen functional test cases were executed and all eighteen passed. The completed system provides a practical and modular foundation for direct agricultural commerce within the defined project scope.

Keywords— agricultural e-commerce, farmer-to-consumer marketplace, React.js, Firebase, Cloud Firestore

I. INTRODUCTION

Agricultural marketing in many regions continues to depend on intermediary-based channels. Farmers may have limited access to nearby consumers, while consumers may have difficulty identifying local agricultural products, comparing information, and obtaining clear details about source and availability. Digital marketplaces provide an opportunity to reduce this gap by connecting sellers and buyers through a direct online channel.

F2CMARKET was developed as a dedicated web marketplace for agricultural products. The system is intended to provide farmers with tools for product listing and order monitoring and consumers with tools for product discovery, purchasing, and feedback. Unlike a general e-commerce application, the proposed platform includes farmer-specific workflows, location-aware services, role-based access, and administrative farmer verification.

The project was implemented as an academic software system using React.js, Vite, Tailwind CSS, Firebase Authentication, Cloud Firestore, Clouinary, OpenStreetMap, Leaflet, and EmailJS. The project documentation reports successful testing of the major application modules and identifies future work such as online

payments, real-time delivery tracking, multilingual support, analytics, and mobile applications.

II. LITERATURE SURVEY

Shwetha and Mayya examined the expansion of agricultural business through e-commerce and discussed digital platforms including eNAM, AgriStack, AgriBazaar, DeHaat, and NinjaCart. Their discussion identifies benefits of wider market access and reduced dependence on intermediaries, while noting challenges involving connectivity, digital literacy, payment access, and consumer trust [1].

Li, Gao, and Qiao studied the relationship between farmers' e-commerce participation and adoption of green production technologies. Their empirical analysis provides evidence concerning the wider effects of online market participation, but the work does not implement a farmer-consumer software platform [2].

Tupe investigated e-commerce adoption among small and marginal farmers in India. The study identifies distrust of online transactions, delivery or transport problems, and limited training as important barriers to adoption [3].

These studies indicate that digital agricultural commerce has potential but that usability, trust,

access, and implementation remain important. F2CMARKET addresses the implementation side by integrating direct listings, role-based access, location services, ordering, reviews, cloud data storage, and administrative verification in one application.

III. MATERIALS AND METHODS

A. System Design

F2CMARKET uses a modular web architecture. The React.js client provides the interface for consumer, farmer, and administrator workflows. Firebase Authentication manages sign-in and user identity, while Cloud Firestore stores marketplace records. Cloudinary is used for product images, OpenStreetMap and Leaflet provide location and map functionality, and EmailJS supports selected application email communication.

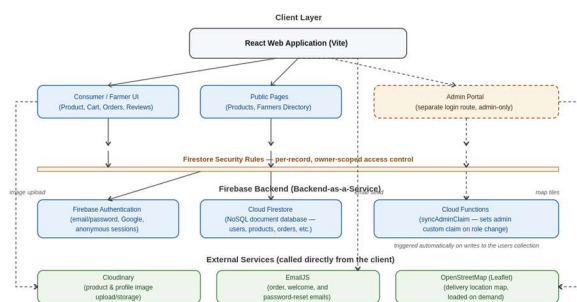


Fig. 1. Overall system architecture of F2CMARKET.

B. Functional Modules

- **Authentication and role-based access:** registration and login are provided for consumers, farmers, and administrators, with role-specific permissions.
- **Product management:** farmers can add, update, remove, and publish agricultural products and maintain product information.
- **Product discovery:** consumers can search and filter products using keywords, category, price, rating, and location information.
- **Cart, wishlist, and orders:** consumers can manage selected products, place orders, and view order history; farmers can monitor incoming orders.
- **Reviews and ratings:** consumers can provide feedback after purchasing products.
- **Location services:** browser geolocation, OpenStreetMap, Leaflet, and reverse geocoding support delivery-address selection.

- **Administration:** administrators can manage users, products, marketplace activity, and farmer verification.

C. Technology Implementation

The frontend is implemented with React.js and Vite and uses Tailwind CSS and shadcn/ui for responsive interface development. Firebase Authentication provides account authentication and Cloud Firestore provides cloud data management. Cloudinary stores and optimizes product images, while OpenStreetMap and Leaflet support interactive maps and location-aware operations. EmailJS is integrated for selected communication functions [4]–[11].

IV. RESULTS AND DISCUSSION

A. Functional Testing

Testing was performed at unit, integration, system, and user acceptance levels. Unit testing checked individual functions and components. Integration testing examined communication between the React frontend and Firebase and the behavior of Cloudinary, EmailJS, and OpenStreetMap/Leaflet integrations. System testing followed complete consumer, farmer, and administrator workflows. User acceptance testing evaluated whether the main user roles could complete their intended activities.

The documented test suite covers five major areas: user authentication, product management, order management, location services, and administrative operations. Table 1 records 18 executed test cases, 18 passed cases, and no failed cases.

Module	Executed	Passed	Failed	Result
User Authentication	4	4	0	Pass
Product Management	4	4	0	Pass
Order Management	4	4	0	Pass
Location Services	3	3	0	Pass
Administrative Operations	3	3	0	Pass
Total	18	18	0	Pass

Table 1. Summary of F2CMARKET test results.

B. Validation and Observed Results

During development, the project documentation records several issues that were corrected and revalidated, including Firebase authentication and access problems, Firestore data access errors, inconsistent product filtering, image upload and retrieval issues, location detection and address retrieval problems, and responsive layout inconsistencies. The affected modules were tested again after correction.

The implemented workflows include consumer login, product browsing, checkout, successful order placement and order history; farmer product creation and publication; and administrator login, farmer verification, and marketplace management. These workflows demonstrate that the core marketplace functions operate together within the defined academic project scope.

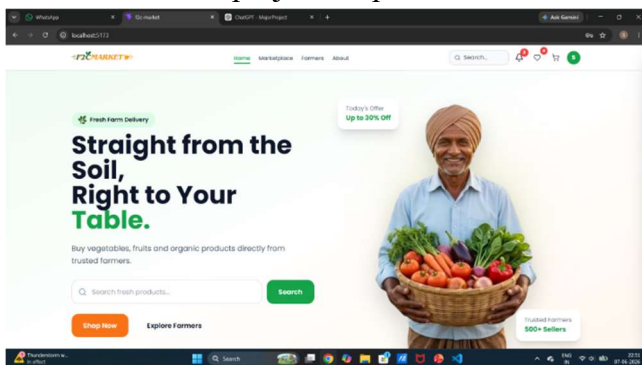


Fig. 2. Home page of the F2CMARKET system.

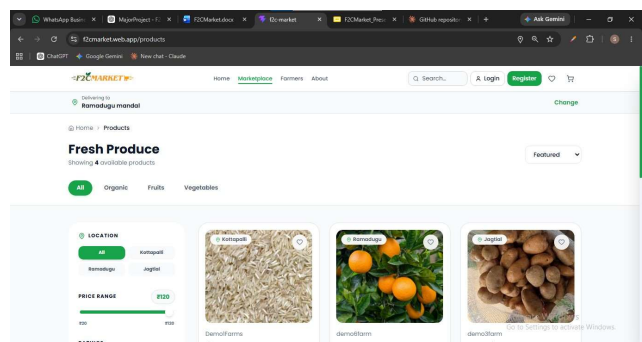


Fig. 3. Products page with marketplace browsing.

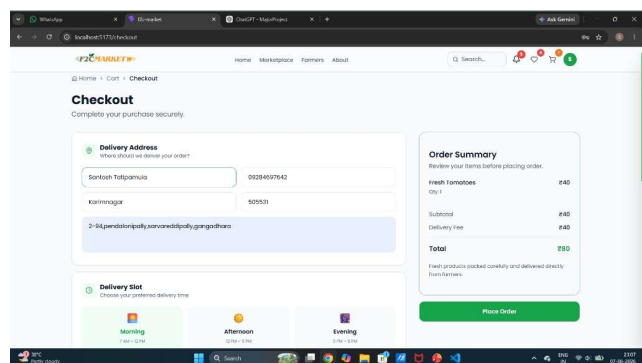


Fig. 4. Checkout page with location-aware delivery information.

C. Discussion

The main practical value of F2CMARKET is the integration of agricultural marketplace functions around direct farmer-consumer interaction. The platform combines product publication, ordering, role-based administration, location-aware services, cloud data management, and image handling instead of limiting the system to a basic product catalogue.

The current implementation is an academic and demonstration system. It does not claim to provide the full operational infrastructure of a large commercial marketplace. In particular, online payment integration and live delivery tracking remain future enhancements.

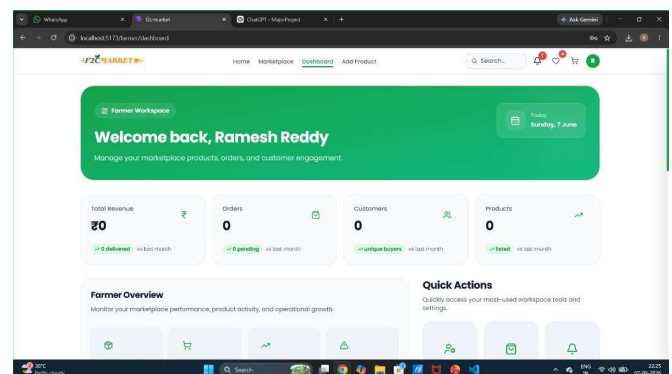


Fig. 5. Farmer dashboard for product and order management.

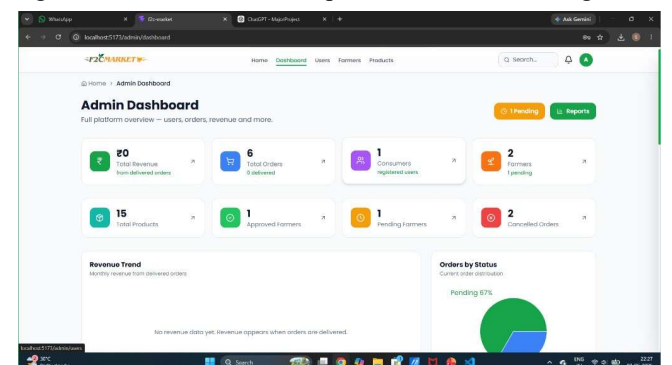


Fig. 6. Administrator dashboard for marketplace administration.

V. CONCLUSION

F2CMARKET demonstrates a practical approach to direct agricultural commerce through a dedicated web marketplace. The application provides role-based authentication, product management, product discovery, cart and wishlist functionality, ordering, reviews and ratings, location-aware services, cloud-based data management, image management, and administrative verification.

The implementation uses React.js, Vite, Tailwind CSS, Firebase, Cloudinary, OpenStreetMap, Leaflet, and EmailJS. The documented testing

process executed 18 functional test cases and recorded 18 passes with no failures. The resulting platform satisfies the defined project objectives and provides a foundation for future enhancements including secure online payments, real-time delivery tracking, push notifications, AI-based recommendations, multilingual interfaces, mobile applications, analytics, inventory forecasting, and integration with agricultural schemes and digital payment services.

ACKNOWLEDGMENT

The author expresses sincere gratitude to Dr. E. Srikanth Reddy, Professor, Department of CSE (AIML), Vaageswari College of Engineering, for his valuable guidance, continuous support, and constructive suggestions throughout the development of the F2CMARKET project. The author also thanks the Head of the Department, faculty members, laboratory staff, and Vaageswari College of Engineering for the facilities and support provided during the project work.

REFERENCES

- [1] S. Shwetha and S. Mayya, "Expansion of Agricultural Business Through E-Commerce," *International Journal of Creative Research Thoughts (IJCRT)*, vol. 13, no. 6, June 2025.
- [2] Z. Li, K. Gao, and G. Qiao, "From Online Markets to Green Fields: Unpacking the Impact of Farmers' E-Commerce Participation on Green Production Technology Adoption," *Agriculture*, vol. 15, no. 14, Art. no. 1483, 2025.
- [3] J. T. Tupe, "Adoption of E-Commerce by Small and Marginal Farmers in India: Challenges and Opportunities," *Journal of Emerging Technologies and Innovative Research (JETIR)*, vol. 11, no. 12, Dec. 2024.
- [4] React Team, "React Documentation." <https://react.dev>
- [5] Google, "Firebase Documentation." <https://firebase.google.com/docs>
- [6] Google, "Cloud Firestore Documentation." <https://firebase.google.com/docs/firestore>
- [7] Cloudinary Ltd., "Cloudinary Documentation." <https://cloudinary.com/documentation>
- [8] OpenStreetMap Foundation, "OpenStreetMap Documentation." <https://www.openstreetmap.org>
- [9] Leaflet Contributors, "Leaflet Documentation." <https://leafletjs.com>
- [10] Tailwind CSS, "Tailwind CSS Documentation." <https://tailwindcss.com/docs>
- [11] EmailJS, "EmailJS Documentation." <https://www.emailjs.com/docs/>