Purnima Pandey, 2026, 14:3
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology
An Open Access Journal

Khetkart Smart Trading for Crops and Bids

Purnima Pandey[1], Aachal Patil[2], Siddhi J. Patil[3], Vipin Wani[4]

[1,2,3]Student, [4]Assistant Professer, Department of Computer Engineering MET's Institute of Engineering, Nashik, India

Abstract— KhetKart will present a mobile application designed to connect farmers and buyers on a single digital platform. The application will enable farmers to list the crops, weeds, and e- waste they will have available, allowing buyers to browse and pur- chase items according to their needs. A built-in bidding system will let buyers place competitive offers on products, enhancing price transparency and negotiation. Additionally, the app will incorporate a geolocation feature that will display all buyers and sellers within a 50 km radius, promoting efficient and localized trade. By streamlining agricultural and e-waste exchange, the application will aim to reduce the role of intermediaries, support sustainable practices, and empower both farmers and buyers through direct, real-time interactions. Agricultural markets in India will continue to face challenges of price fluctuations, lack of transparency, and limited access to reliable information. Farmers and consumers will frequently depend on intermediaries for market prices, which will create inefficiencies and reduce profitability. To address this gap, we will develop Khet Kart, a mobile-based application that will provide a daily commodity price dashboard for local markets. The application will collect and organize real-time data of essential agricultural commodities and present it in an intuitive dashboard. By enabling farmers, traders, and consumers to make informed decisions, Khet Kart will ensure transparency, support fair pricing, and minimize exploitation by intermediaries. The system will not only benefit stakeholders at the grassroots level but will also contribute to strengthening the rural economy by integrating digital with agriculture.

Keywords: Agricultural marketplace, mobile application, bidding system, geolocation services, commodity pricing, digital agriculture, rural economy, e-waste management.

I. INTRODUCTION

Agriculture remains the backbone of India's economy, pro- viding livelihood to a large section of the population. However, formers continue to face serious challenges when it comes to selling their produce in local markets. The lack of direct access to buyers forces them to depend on intermediaries, who often exploit them by offering lower prices than the actual market value. This creates an unfair trade environment, reducing farmers' profit margins and weakening their financial stability.

On the other hand, buyers including traders, retailers, and consumers often struggle to find authentic and nearby sources of agricultural produce at fair prices. There is also limited availability of platforms that allow buyers to negotiate directly with farmers, further restricting transparency in the agricultural supply chain. Another overlooked problem is the disposal and reuse of agricultural by-products and e waste. Farmers usually luck structured channels to exchange weeds, crop residues, or e-waste, leading to inefficiencies and environmental challenges. The absence of single and reliable digital platform that connects farmers and buyers in real-time results in fragmented communication, lack of trust, and missed opportunities for both parties. Thus, there is a pressing need for a system that can bridge this gap by promoting fair trade, localized exchange, sustainability, and digital empowerment of rural communities.

The KhetKart Smart Trading for Crops and Bids mobile application has been designed with a strong focus on usability and consistency. The interface follows established Android design standards, ensuring that all layouts, navigation flows, and interactive elements maintain uniform spacing. alignment, and visual hierarchy. This consistency improves the metall mer experience and minimizes leaming effort for first time users.

The design specifications have been implemented to maintain visual harmony across devices of varying screen sizes and resolutions. Each module such as crop

listing, bidding, and user profile management has been optimized for responsiveness and accessibility. Furthermore, the application's color palette, typography, and iconography were selected to enhance readability and reduce cognitive load for end asers.

Developers are advised not to alter the current interface design configuration has been systematically tested for performance. Accessibility, and consistency. These standards ensure that the application functions seamlessly as part of a larger integrated system, supporting scalability and future feature expansion.

II. LITERATURE REVIEW

Govt. of India (2024) Review of e-NAM (Elec-tronic National Agriculture Market)
This study examined the performance and progress of the Government of India's Electronic National Agriculture Market (o-NAM) initiative, launched to unify agricul tural mandis across India through a digital trading platform. It found that e- NAM improved transparency, reduced middlemen dependency, and enabled fair price discov ery through online bidding and digital payments. However, the report also highlighted challenges such as poor internet access, low digital literacy among farmers, and uneven adoption across states.

Yogarajan et al. (2023) Blockchain Adoption in Agri - Food Supply Chains to consumer
This study examined the potential of blockchain technology in improving trace ability, transparency, and trust in agricultural supply chains on a global scale. Blockchain. allows for immutable record-keeping of every transaction in the supply chain from farm ensuring authenticity and reducing fraud. The research concluded that blockchain significantly enhances accountability and helps eliminate mid- dlemen, thus fostering fair trade.

Ahmad B. (2024) Expe- rience of Farmers Using Mobile Phones for Farming
Ahmad's study focused on mobile-based agricultural appli- cations in developing countries and their role in improving farmers access to market information. The research highlighted that mobile apps empower farmers by providing real- time updates on weather forecasts, crop prices, and pest man- agement tips, leading to increased productiv-ity and profits. Farmers who used mobile applications were able to make more informed decisions and reduce crop losses.

Sharma A. (2023) Hyperlocal Marketplaces and Geofenced Agricultural Trade
Sharma's research involved a market study and survey on the use of geofencing and hyperlocal marketplaces in agricultural trade, focusing on local markets across Asia. The study demonstrated that geolocation-based systems help reduce spoilage by connecting nearby buyers and sellers efficiently, leading to faster trade and better price discovery. This approach ensures that farmers can sell perishable goods locally without depending on distant markets.

Digital Marketplaces and E-Commerce Platforms for Agricultural Producers: A Review. Journal of Agribusiness Rural Development, vol. 51, pp. 15-32, 2025.
This study examined the role of digital marketplaces and e-commerce platforms in transforming agricultural trade and empowering producers through direct market access. Published in the Journal of Agribusiness and Rural Development (2025), the paper an alyzed various national and international digital platforms that connect farmers directly with buyers, processors, and retailers. It highlighted how these platforms improve price transparency, reduce transaction costs, and eliminate intermediaries. [6] Smart Agriculture: Leveraging Mobile Applications for Efficient Agricultural Marketing. Proceedings of the International Conference on Emerging.

Trends in Smart Computing and Sustainable Business (ETSC), IEEE, pp. 210-217, 2024
This study examined the application of mobile technology in modern agriculture, focusing on how smartphone-based platforms can enhance market access, transparency, and data- driven decision-making for farmers. The paper discussed sev- eral mobile appli-cations designed to connect farmers directly with buyers, enable real-time price updates, and support crop management through analytics and weather integration.

M. P. Kramer et al. (2021) This study explores the ap-plication of blockchain technology in agri-food supply chains, focusing on improving transparency, traceability, and trust among stakeholders. The authors highlight how decentralized systems can reduce fraud and inefficiencies. This work is relevant as it supports secure and transparent transaction mechanisms in agricultural marketplaces.

P. Kambale et al. (2021) This paper provides an overview of mobile applications in agriculture, discussing their role in disseminating information, improving communication, and enhancing farm productivity. It emphasizes the growing adoption of smartphones among farmers, making mobile-based solutions viable for agricultural systems.

A. Kumar S. Kumar (2020) The authors analyze the impact of mobile-based agricultural advisory services on farmers' decision-making. The study shows that timely information through mobile apps helps farmers make better choices regarding crop selection, pricing, and market access.

R. Singh P. Sharma (2021) This research presents the design and implementation of a mobile marketplace for rural farmers, enabling direct in- teraction between buyers and sellers. It reduces dependency on intermediaries and improves farmers' income by providing better market access.

S. Patel et al. (2021) This paper proposes a system using geolocation services for localized agricultural trade. It enables farmers and buyers to connect within a specific geographic area, reducing transporta- tion costs and improving efficiency in the supply chain.

L. Chen M. Gupta (2022) The study provides a comparative analysis of online bidding mechanisms used in commodity trading. It discusses different auction models and their efficiency, helping in understanding how bidding systems can be integrated into digital agricultural marketplaces.

M. Deshpande S. Joshi (2023) This paper focuses on the integration of e-NAM services with mobile applications, promoting inclusive farming. It demonstrates how digital platforms can enhance market access and transparency for farmers across different regions.

R. Mittal et al. (2019) The authors discuss the development of mobile-based agri- cultural advisory systems in India, highlighting their role in delivering real-time information on weather, crops, and market trends. This supports the importance of mobile technology in modern agriculture.

S. Zhang et al. (2019) This study presents the design of an agricultural e- commerce platform based on mobile internet technologies. It focuses on improving efficiency in agricultural trade through digital platforms, aligning with the concept of online market-places for farmers.

III. RESEARCH GAP

Although several digital agriculture platforms and e-commerce systems exist, significant gaps remain in addressing the real challenges faced by small and medium-scale farmers. The following research gaps motivated the development of the KhetKart system:

Lack of Localized Digital Marketplaces
Most existing agricultural trading platforms operate at a large scale and do not focus on hyperlocal trading. They fail to incorporate precise distance-based filtering, which is essential for reducing transportation costs and ensuring timely delivery. There is a need for a system that integrates geolocation algorithms to enable efficient local trade.

Limited Transparent Bidding Mechanisms
Many current systems rely on fixed-price models or intermediary-controlled pricing. This restricts farmers from discovering the true market value of their produce. A transparent and competitive bidding model that directly connects farmers and buyers is still lacking in rural- focused applications.

Inadequate Support for Agricultural By-products and Waste Trading
Existing agricultural platforms mainly focus on primary crops and overlook by-products, weeds, and e-waste gen- erated in rural areas. There is a research gap in systems that integrate waste management with agricultural trade, promoting sustainability and additional income sources for farmers.

Poor Accessibility for Rural Users
Many digital platforms are designed for technically skilled users and do not consider rural usability chal- lenges such as language barriers and simple interface needs. There is a gap in user-centered mobile applications that prioritize simplicity, icon-based navigation, and low- resource operation.

Insufficient Integration of Geolocation with Market Logic
While geolocation technology exists, its integration with agricultural market decision-making is limited. Few systems combine location intelligence with bidding, filtering, and real-time notifications to create a smart trading environment.

Dependence on Middlemen in Existing Systems
Traditional agricultural supply chains still rely heavily on intermediaries, leading to reduced profit margins for farmers. Current digital solutions have not fully eliminated this dependency, indicating a need for direct farmer- to-buyer platforms.

Limited Real-Time Communication Mechanisms
Many platforms do not provide real-time alerts for bids, price changes, or transaction updates. This results in de- layed decision-making and inefficient trading processes, highlighting the need for integrated notification systems.

Lack of Unified Platforms for Multiple Agricultural Trading Activities
Most existing systems address only one aspect of agri- culture, such as crop sales or advisory services. There is a research gap in unified platforms that combine crop trading, bidding, geolocation filtering, and waste trading into a single ecosystem.

The KhetKart system is designed to address these gaps by integrating geolocation-based filtering, a transparent bidding mechanism, a user-friendly mobile interface, and a sustainable trading approach that includes agricultural by-products and e- waste.

IV. PROPOSED SYSTEM ARCHITECTURE

In the proposed KhetKart – Smart Trading for Crops and Bids system, the architecture is designed to ensure scalability, reliability, and efficient communication between users, servers, and databases. At the base of the system lie various hard- ware platforms, primarily Android-based smartphones used by farmers and buyers. Above this layer resides the Android Operating System, which provides the necessary environment for running the KhetKart mobile application and managing device resources such as GPS, network connectivity, and storage.

Farmer Module
The Farmer Module is designed to help farmers sell their agricultural products directly to buyers without the involve- ment of intermediaries. Farmers can create and manage their profiles by providing personal and contact details, which are securely stored in the system database. This module enables farmers to upload product listings that include crop name,

quantity, expected price, quality description, and product images for better visibility.

Farmers can modify or delete listings based on stock availability or price changes, ensuring that the information displayed to buyers remains accurate and updated. The module also allows farmers to receive real-time notifications whenever buyers place bids on their products. Farmers can review all bids, compare prices and buyer details, and select the most suitable offer. This process ensures fair price discovery and gives farmers full control over their selling decisions.

Buyer Module

The Buyer Module is developed to assist buyers such as traders, wholesalers, or retailers in purchasing crops directly from farmers. Buyers can register and maintain their profiles within the system, enabling secure access to the marketplace.

TABLE I: Literature Review Summary For Khetkart Smart Trading For Crops And Bids

Title	Methodology	Limitations	Scope / Future Work
2024 – Govt. of India – Review of e-NAM (Electronic National Agriculture Market)	Evaluation of the e-NAM platform's digital integration of agricultural mandis, online bidding, and price discovery; analysis of adoption trends across states.	Low digital literacy among farmers; poor internet infrastructure; uneven adoption across regions.	Enhance farmer training; develop localized mobile applications for regional trading and improved accessibility.
2023 – Yogarajan et al. – Blockchain Adoption in Agri-Food Supply Chains	Explored blockchain's role in ensuring transparency, traceability, and fair trade using immutable transaction records across supply chains.	High implementation costs; lack of infrastructure; limited scalability in rural regions.	Integrate blockchain with lightweight mobile apps; enhance interoperability and real-time tracking.
2024 – Ahmad B. – Experience of Farmers Using Mobile Phones for Farming	Survey-based research on farmers using mobile applications for weather updates, market prices, and pest control.	Language barriers; lack of offline support; limited user awareness in remote areas.	Develop multilingual interfaces; add offline mode and training programs for rural adoption.
2023 – Sharma A. – Hyperlocal Marketplaces and Geofenced Agricultural Trade	Analyzed geofencing technology for connecting farmers and nearby buyers, reducing post-harvest delays and spoilage.	Concerns over data privacy, GPS accuracy, and user location tracking.	Improve geolocation precision; enhance data protection and user consent mechanisms.
2025 – Digital Market-places and E-Commerce Platforms for Agricultural Producers: A Review	Comparative study of national and international digital platforms enabling direct farmer-to-buyer interaction and online trade.	Low rural connectivity; insufficient digital literacy among small-scale farmers.	Develop region-specific mobile trading platforms like KhetKart; promote digital inclusion and education.
2024 – Smart Agriculture: Leveraging Mobile Applications for Efficient Agricultural Marketing	Discussed mobile-based agricultural systems integrating geolocation, multilingual interfaces, and real-time analytics.	Limited adoption in low-connectivity areas; lack of awareness about digital tools.	Promote user-friendly mobile solutions; scale applications for regional and national use.

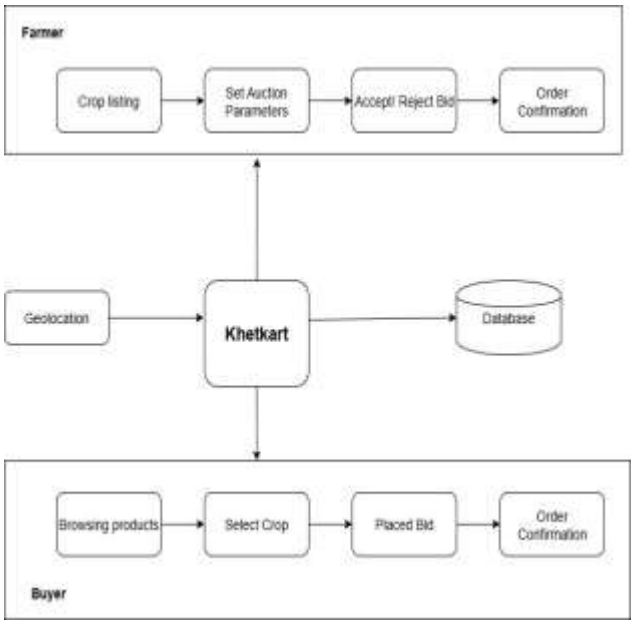

Fig. 1. Architecture of the KhetKart system

Through this module, buyers can browse available crop listings using filters such as product type, price range, and distance from their location.

Detailed product descriptions and images allow buyers to evaluate quality before placing bids. Buyers can participate in the bidding process by offering competitive prices for selected crops. The module provides real-time updates on bid status, including acceptance or rejection notifications from farmers. This ensures transparency, reduces dependency on middlemen, and simplifies the crop procurement process.

V. METHODOLOGY

KhetKart is a mobile-based digital marketplace developed to connect farmers and buyers through a transparent, location- aware, and bidding-enabled agricultural trading platform. The system integrates mobile technology, cloud computing, and geolocation services to create an efficient and user-friendly trading environment.

User Registration and Login

The working of the system begins when farmers and buyers download and install the KhetKart mobile application on their Android smartphones. New users register by entering essential information such as name, mobile number, email ID, role (farmer or buyer), and location details. This information is securely transmitted to the backend server, where it is validated and stored in the centralized database. The login mechanism ensures secure authentication using credentials verification, preventing unauthorized access and protecting user data pri- vacy. The system starts with user registration where farmers and buyers create accounts using personal details. The backend validates user credentials during login using authentication logic. Password verification can be represented as:

$$Auth = \begin{cases} 1, & \text{if } H(input\_password) = H(stored\_password) \\ 0, & \text{otherwise} \end{cases}$$

where H(x) represents a hashing function. This ensures se- cure authentication without storing raw passwords and protects user privacy.

Location Detection

After successful login, the system activates the device's GPS module to obtain real-time geographic coordinates of the user.

These coordinates are used by the application to determine the exact location of farmers and buyers. The Haversine algorithm calculates the shortest distance between two users based on latitude and longitude values. By applying this distance filter, the system displays only those listings and users located within a 50 km radius, thereby encouraging localized trade, reducing transportation costs, and minimizing delivery time. The application retrieves latitude (ϕ) and longitude (λ) from the device GPS. The Haversine formula is used to calculate the distance between two users:

$$d = 2r \arcsin\sqrt{\sin^2\frac{\phi_2 - \phi_1}{2} + \cos(\phi_1)\cos(\phi_2)\sin^2\frac{\lambda_2 - \lambda_1}{2}} \quad (1)$$

Product Listing by Farmer

Farmers use the application to upload details of crops, agricultural by-products, weeds, or e-waste materials they wish to sell. Each listing includes structured information such as product name, quantity available, expected price, quality de- scription, and product images. The data is sent to the backend server and stored in the database, where it becomes accessible to potential buyers. Farmers can edit, update, or remove listings to ensure accurate and up-to-date information. Farmers upload crop data which is stored as structured database entries. Each listing can be modeled as:

$$P = (Cn, Q, Pe, L, I)$$

Where Cn = crop name, Q = quantity, Pe = expected price, L = location, and I = images. This structured format ensures efficient storage and retrieval.

Browsing by Buyer

Buyers explore agricultural products listed by farmers within their nearby region. The application provides filtering and search options based on product type, price range, and distance, allowing buyers to quickly find suitable crops. De- tailed product descriptions and images help buyers evaluate quality and make informed decisions. The system retrieves listing information dynamically from the database to ensure real-time reliability. Buyers filter listings based on price and distance. Filtering condition:

$$Result = \{P \mid P_e \le P_{max} \text{ and } d \le 50\}$$

This mathematical filtering ensures buyers see only relevant and affordable crops.

Bidding Process

When a buyer is interested in a listed crop, they can submit a price offer through the bidding module. Multiple buyers may place bids on the same product, creating a competitive environment that promotes fair price discovery. Each bid is recorded by the server along with bidder identity, bid amount, and timestamp. The system updates bids in real time and allows buyers to revise offers before final selection. Buyers place bids Bi on crops. A bid set is:

$$B = \{b1, b2, b3, ..., bn\}$$

Where each bi = (BuyerID, Amount, Time). The com- petitive nature ensures transparent price discovery.

Bid Evaluation by Farmer

Farmers receive instant notifications whenever buyers place bids on their listed products. All bids are displayed in an organized format, including buyer details and offered prices. Farmers compare proposals and select the most suitable offer, ensuring that final decisions remain under their control.

Transaction and Confirmation

Once a farmer accepts a bid, the system marks the trans- action as confirmed and notifies the selected buyer. Both parties receive confirmation details through the application, including contact information for coordination. The system stores transaction records for transparency and auditing. After accepting a bid, the trade state changes:

$$State = \{Pending \rightarrow Confirmed\}$$

This represents the transition from negotiation to final agreement.

Notification System

Once a farmer accepts a bid, the system marks the trans- action as confirmed and notifies the selected buyer. Both parties receive confirmation details through the application, including contact information for coordination. The system stores transaction records for transparency and auditing. After accepting a bid, the trade state changes:

$$State = \{Pending \rightarrow Confirmed\}$$

This represents the transition from negotiation to final agreement.

Notification System

The notification module ensures real-time communication between users. Farmers are alerted about new bids and listing activity, while buyers receive updates on bid status and confirmations. Push

notifications and in-app alerts keep users informed even when inactive. Notifications follow event- trigger logic:

$$\text{Notify (User)} \Rightarrow \text{if Event occurs}$$

Where events include new bids, acceptance, or updates. This keeps users informed in real time.

Data Storage and Server Operations

The backend server functions as the central controller of the system, managing user authentication, bidding logic, and location-based filtering. User data, listings, bids, and transac- tions are securely stored in a structured database. APIs provide seamless communication between the mobile application and server, while encryption and access-control mechanisms pro- tect system integrity.

Continuous System Operation

The KhetKart system operates continuously as an online agricultural marketplace. Farmers can add new listings after each harvest cycle, and buyers can engage in repeated bidding sessions. Real-time synchronization keeps the platform active, transparent, and up to date, supporting long-term digital agri- cultural trade.

VI. ADVANTAGES

A major advantage of the KhetKart application is its ability to connect farmers and buyers directly, eliminating intermediaries and ensuring fair trade. By leveraging mobile technology, KhetKart allows real- time bidding, price trans- parency, and location-based trading, all accessible through a user-friendly Android interface. The system enhances produc- tivity by providing instant access to market information and enabling users to make quick, informed decisions. The app's integration of geolocation, notifications, and multilingual sup- port ensures accessibility for farmers across diverse regions. Following are some more advantages of the KhetKart mobile application:

- **Direct Farmer–Buyer Interaction:** Enables farmers to list crops and buyers to place bids directly without intermediaries, ensuring fair pricing.
- **Location-Based Trading:** Uses geolocation to display nearby buyers and sellers within a 50 km radius, promot- ing local trade.
- **Transparency and Real-Time Updates:** The bidding system provides instant updates and notifications, ensur- ing open and competitive pricing.
- **User-Friendly Interface:** Designed with simple naviga- tion, multilingual support, and intuitive layouts suitable for rural users.

VII. FUTURE SCOPE

The KhetKart – Smart Trading for Crops and Bids system can be extended with several advanced capabilities to fur- ther improve its performance, usability, and applicability in digital agriculture:

1. **Integration of Secure Payment Gateway:** Future versions of KhetKart can include a digital payment system to enable seamless and secure online trans- actions between farmers and buyers, reducing cash dependency and ensuring faster settlements.
2. **Blockchain-Based Transaction Management:** In- corporating blockchain technology can enhance transparency and traceability of transactions, ensur- ing data integrity, fair pricing, and trusted record- keeping throughout the trading process.
3. **AI-Driven Price Recommendation System:** The application can implement a machine learning- based recommendation engine to suggest optimal crop prices based on market trends, seasonal de- mand, and geographic factors, helping farmers make data-driven decisions.
4. **Integration of Logistics and Delivery Tracking:** Adding a logistics management module can allow farmers and buyers to schedule, track, and man- age crop transportation, improving efficiency and reducing post-harvest losses.

5. **Voice Assistance and Multilingual Chatbot Support:** Incorporating voice-enabled and regional-language chatbot features can make the platform

More accessible for farmers with low digital liter- acy, promoting inclusivity and ease of use.

VIII. CONCLUSION

Agriculture will continue to be the backbone of India's economy, but farmers will face challenges such as price fluctuations, exploitation by intermediaries, and limited market access. The KhetKart – Smart Trading for Crops and Bids project will aim to overcome these issues by offering a digital platform that directly connects farmers and buyers. The system will feature modules for user registration, crop listing, bidding, and geolocation-based trading to ensure transparency and fair pricing. It will also provide real-time notifications, secure transactions, and data-driven insights to support better decision-making.

REFERENCES

1. Government of India, Review of Performance and Prospects of e-NAM. Ministry of Agriculture & Farmers' Welfare, New Delhi, India, 2024.
2. L. Yogarajan et al., "Exploring the hype of blockchain adoption in agri-food supply chains: A systematic literature review," Agri- culture, vol. 13, no. 5, pp. 1–25, 2023.
3. "Mobile app for direct market access for farmers: Case study," in Proc. Int. Conf. Digital Agriculture, pp. 88–94, 2024.
4. A. Sharma, "Hyperlocal marketplaces and geofenced agricultural trade: A review," J. ICT in Agriculture, vol. 18, no. 4, pp. 201– 213, 2023.
5. "Digital marketplaces and e-commerce platforms for agricultural producers: A review," J. Agribusiness & Rural Development, vol. 51, pp. 15–32, 2025.
6. "Smart agriculture: Leveraging mobile applications for efficient agricultural marketing," in Proc. Int. Conf. Emerging Trends in Smart Computing and Sustainable Business (ETSC), IEEE, pp. 210–217, 2024.
7. M. P. Kramer, L. Bitsch, and J. Hanf, "Blockchain and its impacts on agri-food supply chain network management," Sustainability, vol. 13, no. 4, Art. 2168, 2021.
8. P. Kambale, V. Chowhan, R. Bhattad, and S. Ragunath, "Mobile applications in agriculture: An overview," J. Agricultural Exten- sion Management, vol. 22, no. 2, pp. 49–58, 2021.
9. A. Kumar and S. Kumar, "Impact of mobile agricultural advisory services on farmers' decision-making," Int. Journal of Agricul- tural Extension, vol. 8, no. 2, pp. 45–58, 2020.
10. R. Singh and P. Sharma, "Design and implementation of a mobile marketplace for rural farmers," in Proc. Int. Conf. Mobile Computing and Sustainable Technology, pp. 102–107, 2021.
11. S. Patel, D. Mehta, and V. Reddy, "Localized agricultural trade using geolocation services: A system design," IEEE Access, vol. 9, pp. 14567–14583, 2021.
12. L. Chen and M. Gupta, "Online bidding mechanisms for commod- ity trade: A comparative study," Journal of Electronic Markets, vol. 12, no. 3, pp. 299–315, 2022.
13. M. Deshpande and S. Joshi, "Integration of e-NAM services with mobile applications for inclusive farming," Agricultural Informatics, vol. 4, no. 1, pp. 23–34, 2023.
14. R. Mittal, M. Tripathi, and S. Sethi, "Development of mobile- based agricultural advisory systems in India," Computers and Electronics in Agriculture, vol. 167, Art. 105057, 2019.
15. S. Zhang, X. Wang, and L. Wang, "Design of an agricultural e- commerce platform based on mobile internet," in Proc. IEEE Int. Conf. Computer Science and Automation Engineering, pp. 512–517, 2019.