International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

A Comprehensive Study on Kisan Mandi and Its Impact

Kareena Jethwani
Department of Computer Science & Engineering
Acropolis Institute of Technology and Research
Indore (M.P),India
missjethwani03@gmail.com

Lakshita Maheshwari
Department of Computer Science & Engineering
Acropolis Institute of Technology and Research
Indore (M.P),India
maheshwarilakshita11@gmail.com

Prof. Aaquib Multani
Department of Computer Science & Engineering
Acropolis Institute of Technology and Research
Indore (M.P),India
aaquibmultani@acropolis.in

Abstract

The Agriculture Digital Marketplace is designed to revolutionize the agricultural sector by providing farmers with a direct platform to sell their produce, ensuring fair pricing by eliminating middlemen. The platform leverages cutting-edge technology to facilitate seamless transactions, improve market access, and empower farmers with modern agricultural practices. It integrates key services such as real- time pricing insights, secure digital payment gateways, and logistics support to enhance trade efficiency. Additionally, the system offers warehouse rental services, enabling farmers to store their produce safely and reduce post-harvest losses. A dedicated educational hub provides training modules, tutorials, and expert advice to help farmers adopt advanced farming techniques, improve yield quality, and optimize resource utilization. By offering a transparent and structured ecosystem, this platform ensures financial sustainability, reduces exploitation, and fosters agricultural growth by bridging the gap between farmers, buyers, and logistical services.

Keywords: Agriculture, Digital Marketplace, Direct Selling, Fair Pricing, Warehouse Rental, Farmer Education, Supply Chain, Agricultural Innovation.

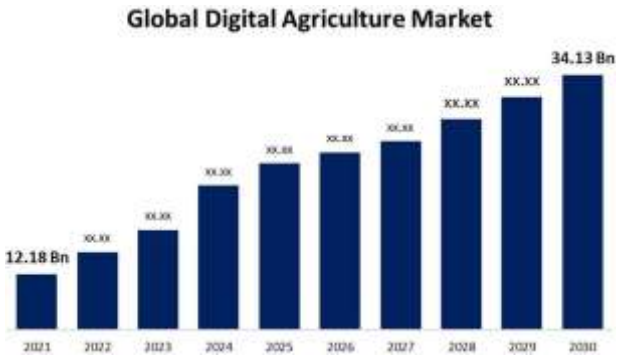
Introduction

Agricultural supply chains in many regions suffer from inefficiencies caused by the presence of multiple intermediaries who manipulate pricing, ultimately reducing farmers' profit margins. These middlemen create an uneven playing field where farmers struggle to receive fair compensation for their produce. Additionally, post-harvest losses remain a critical issue due to the unavailability of adequate storage facilities, forcing farmers to sell crops at lower prices to prevent spoilage. Many farmers also face difficulty accessing larger markets due to geographical constraints and a lack of digital literacy, further limiting their opportunities to negotiate better deals. Furthermore, the absence of modern farming knowledge prevents them from optimizing their agricultural practices, leading to lower productivity and profitability. These challenges collectively hinder the economic growth of farmers and restrict their ability to contribute effectively to the agricultural supply chain.

To overcome these limitations, the Agriculture Digital Marketplace provides a comprehensive digital platform where farmers can directly engage with buyers, eliminating the need for intermediaries and ensuring a transparent pricing model. The platform also integrates a secure transaction system, allowing seamless financial exchanges between buyers and sellers.

By incorporating a warehouse rental service, farmers gain access to cost-effective storage solutions, reducing post-harvest losses and enabling them to sell their produce at the right time for maximum profit. Furthermore, the educational hub empowers farmers with knowledge on advanced agricultural techniques, enhancing productivity and efficiency. The introduction of digital solutions in agriculture has already demonstrated a significant improvement in trade efficiency, market accessibility, and financial stability for farmers worldwide. This paper explores the development and implementation of the Agriculture Digital Marketplace, detailing how cutting-edge technology can revolutionize agricultural trade, empower farmers, and promote sustainable farming practices.

Literature Review



The integration of digital platforms in agriculture has been widely studied, with researchers identifying key benefits and challenges associated with their implementation. Several studies indicate that digital marketplaces have the potential to enhance pricing transparency, reduce reliance on intermediaries, and create better economic opportunities for farmers. However, certain gaps remain in existing solutions, including limited access to secure storage, inadequate training for farmers, and issues related to digital adoption in rural areas.

Key Findings from Literature:

1. **Reduction of Middlemen and Fair Pricing:** Research suggests that eliminating intermediaries in the agricultural supply chain allows farmers to receive better prices for their produce. A study by FAO (2023) highlights that direct farmer- to-buyer transactions can increase farmer profits by up to 30%.

2. **Digital Storage Solutions:** Studies indicate that improper

storage conditions contribute significantly to post-harvest losses. The World Bank (2023) reports that nearly 40% of agricultural produce is wasted due to inadequate storage facilities. Integrating warehouse rental services within digital marketplaces can mitigate these losses.

3. **Farmer Education and Training:** Various reports emphasize the importance of continuous learning in improving farming efficiency. AgriTech (2023) found that farmers who undergo digital training programs experience a 25% increase in crop yield and a reduction in resource wastage.

4. **Challenges in Digital Adoption:** Although digital platforms provide immense benefits, rural areas face challenges such as low digital literacy and unreliable internet connectivity. Studies suggest that incorporating multilingual support and offline-accessible educational content can increase platform adoption rates among farmers.

5. **Integration of Secure Payment Systems:** Ensuring secure and transparent financial transactions is critical for gaining farmer trust. Research by WFP (2023) indicates that integrating payment gateways such as UPI, mobile wallets, and direct bank transfers enhances transaction security and accessibility.

6. **Scalability and Market Expansion:** Many studies suggest that well-designed agricultural marketplaces have the potential to scale beyond local markets, enabling farmers to reach national and even international buyers. This expansion can significantly increase farmer earnings and market competitiveness.

This literature review highlights the critical aspects required for a successful digital agricultural marketplace. While existing platforms have made strides in addressing agricultural challenges, this study aims to bridge the remaining gaps by integrating direct sales, secure storage, financial security, and educational training into a single, user-friendly platform.

Features

1. User Interface Features: The platform offers an intuitive and user-friendly interface tailored to meet the needs of farmers, buyers, and warehouse owners. A dedicated dashboard provides real-time insights, transaction details, and notifications, ensuring users have complete control over their operations. The system is designed to support role-based access, allowing different stakeholders to perform their specific tasks efficiently. The platform also prioritizes mobile accessibility, enabling users to manage their activities from any location, even in remote areas.

2. Marketplace and Trading System: The digital marketplace is designed to empower farmers by providing a user-friendly platform where they can independently list their produce. Each product listing includes clear descriptions, high-quality images, and transparent pricing details, making it easier for buyers to understand what they're purchasing. This direct-to-consumer approach helps farmers showcase the quality of their crops while reaching a broader audience without relying on intermediaries.Buyers can effortlessly browse through a wide variety of available crops, compare prices across different sellers, and place orders directly with the farmers. By removing middlemen from the transaction process, the platform ensures that farmers retain a greater share of the profits.

3. Secure Payment and Financial Transactions: A secure and efficient payment system is integrated into the platform, offering multiple payment options, including UPI, credit/debit cards, mobile wallets, and direct bank transfers. Encrypted transactions ensure the safety of user data and financial details. The system also includes an escrow service that holds payments until both parties confirm successful transactions, increasing trust between buyers and farmers.

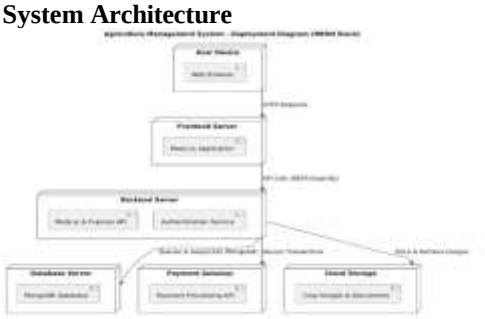
4. Logistics and Delivery Tracking: The platform features a logistics management system that connects farmers with transport services to streamline the delivery of agricultural produce. Real-time tracking enables buyers and sellers to monitor shipments, ensuring timely and efficient deliveries. Notifications provide updates on transit status, estimated delivery times, and potential delays, enhancing reliability in supply chain management.

5. Educational Hub and Farmer Training: To bridge the knowledge gap, the platform includes an extensive training module with video tutorials, articles, and expert insights on modern farming techniques. Farmers can learn about crop rotation, soil health management, pest control, and efficient irrigation techniques. A discussion forum allows users to interact with experts and peers, fostering a community-driven learning experience. Updates on government schemes and subsidies are also provided to ensure farmers take full advantage of available financial assistance programs.

6. Security and Data Protection: User security is a top priority, and the platform incorporates multi-factor authentication (MFA) to prevent unauthorized access. All transactions and user data are encrypted, ensuring confidentiality and data protection. Additionally, role-based access control restricts critical system functionalities to authorized users only, minimizing security risks.

7. Performance and Scalability: The system is built on a scalable cloud-based architecture that ensures optimal performance even as the number of users grows. Advanced database management techniques enable quick data retrieval and seamless processing of high-volume transactions. The platform is designed to handle peak usage efficiently, preventing delays and system downtimes.

System Architecture



This deployment diagram represents the physical deployment architecture of KISAN MANDI:AN Agriculture Marketplace built using the MERN stack (MongoDB, Express.js, React.js, Node.js). It illustrates how different components are deployed across various nodes/devices and how they interact with each other.

1. User Device
- Component: Web Browser
- Description: Acts as the client where users (farmers, admins, etc.) interact with the system via a browser-based interface.
- Communication: Sends HTTP requests to the frontend server.

2. Frontend Server
- Component: React.js Application
- Description: Hosts the frontend part of the application, responsible for displaying the UI and capturing user actions.
- Communication: Sends API requests (REST/GraphQL) to the backend server.

3. Backend Server
- Components: Node.js & Express API, Authentication Service
- Description: Processes requests from the frontend, handles business logic, authentication, and communicates with other backend services like the database, payment, and cloud storage.
- Communication:
  - Queries the MongoDB database for data
  - Sends and receives data from the payment gateway
  - Stores and retrieves media from cloud storage

4. Database Server
- Component: MongoDB Database
- Description: Stores all system data including user details, crop records, transaction history, etc.
- Communication: Interacts with the backend server through MongoDB queries and responses.

5. Payment Gateway
- Component: Payment Processing API
- Description: Handles secure payment transactions such as subscriptions, product purchases, or service fees.
- Communication: Receives secure transaction requests from the backend server.

6. Cloud Storage
- Component: Crop Images & Documents
- Description: Stores multimedia content such as crop images, reports, and documents.
- Communication:Backend server stores and retrieves files.

CRITICAL REFLECTION

While the Agriculture Digital Marketplace introduces a transformative approach to agricultural trade, it also presents several challenges that must be addressed to maximize its effectiveness. Below is an in-depth analysis of its strengths, limitations, and areas for improvement:

1. Elimination of Middlemen and Fair Pricing

- The direct-to-buyer model ensures farmers receive fair market prices without exploitation by intermediaries.
- Farmers can negotiate pricing transparently, leading to better financial stability.
- However, small-scale farmers unfamiliar with direct market interactions may require additional support and training.

2. Reduction of Post-Harvest Losses

- The integration of warehouse rental services allows farmers to store produce safely, reducing wastage.
- Farmers can sell their products at optimal times rather than being forced to accept lower prices due to lack of storage.
- Limited awareness about warehouse benefits among rural farmers may hinder adoption. Awareness programs and incentives could encourage more participation.

3. Improved Market Accessibility

- The platform connects farmers with a broader buyer network, enhancing market reach.
- Buyers can browse available products, compare prices, and place orders conveniently.
- Some farmers in remote areas with poor internet connectivity may struggle to access the platform. Offline functionalities or SMS-based order systems could help address this issue.

4. Digital Literacy and Adoption Barriers

- Many farmers, especially in rural areas, have limited experience with digital platforms.
- User-friendly interfaces and multilingual support can ease the transition.
- Government and private sector collaborations could help provide training workshops to bridge the digital divide.

5. Financial Security and Digital Payments

- The inclusion of secure payment gateways (UPI, mobile wallets, direct bank transfers) ensures safe transactions.

o The escrow system prevents fraud by holding payments until successful delivery confirmation.

o However, trust issues with online payments may deter farmers from adopting digital transactions. Financial literacy programs and collaborations with trusted banking institutions can help build confidence.

6. Logistics and Delivery Management

o Farmers gain access to transportation services, ensuring smooth and timely deliveries.

o Real-time tracking enhances supply chain transparency.

o High transportation costs for small-scale farmers could still pose challenges. Grouping deliveries or subsidized logistics partnerships could help lower costs.

7. Educational Hub and Knowledge Enhancement

o Farmers can access training on modern farming techniques, resource optimization, and sustainable practices.

o The platform provides government scheme updates, keeping farmers informed about available support.

o Continuous updates and expert interactions will be necessary to maintain relevance and engagement.

8. Scalability and Future Growth Potential

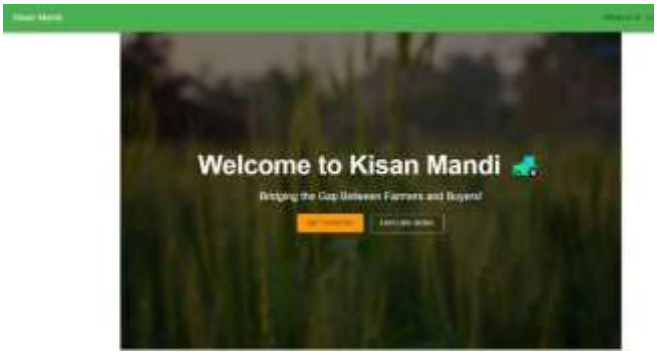
o The platform is designed with a scalable architecture, allowing expansion to accommodate more users.

o AI-driven insights could be introduced to provide predictive market trends, enhancing farmer decision-making.

o Future developments could include blockchain integration for improved transaction security and traceability.

System UI

1. Home Page



2. Sign up page

3. Sign in page

4. Product Page

5. **Profile Page**

6. **Order Placing Page**

Conclusion

The Agriculture Digital Marketplace is a transformative solution aimed at bridging critical gaps in the agricultural sector, including inefficient supply chains, unfair pricing, and limited access to essential farming knowledge. By eliminating middlemen, the platform empowers farmers to negotiate fair prices directly with buyers, thereby increasing their profit margins and ensuring more sustainable livelihoods. Furthermore, the integration of warehouse rental services provides a vital solution to post-harvest losses, allowing farmers to store their produce securely and sell at optimal market conditions rather than being forced into distress sales.

The platform's educational hub plays a crucial role in addressing the knowledge gap that exists in rural farming communities. By offering training modules, expert insights, and access to government schemes, the platform helps farmers implement modern techniques, leading to improved productivity and efficiency. Additionally, the inclusion of logistics support and secure digital transactions enhances transparency in trade, ensuring that both buyers and sellers can engage in transactions with confidence.

Despite these benefits, the successful implementation of the Agriculture Digital Marketplace relies on overcoming certain challenges. The digital literacy gap among farmers must be addressed through training initiatives and multilingual support, while internet accessibility in remote areas remains a crucial factor in determining the platform's reach and adoption. Additionally, secure payment integration and trust- building initiatives are essential to ensure smooth financial transactions between buyers and sellers.

Acknowledgment

We would like to express our heartfelt gratitude to the following individuals and institutions for their support and guidance throughout the development of our agriculture marketplace platform:

Prof. Aaquib Multani– Whose valuable insights and mentorship played a pivotal role in shaping the direction of our project.

Dr. Kamal Kumar Sethi – Head of Department, whose continuous encouragement and belief in our project served as a constant source of motivation.

Acropolis Institute of Technology and Research, Indore – For providing us with the necessary resources and a conducive environment for the successful completion of this endeavor.

Team: - For their tireless dedication and innovative contributions in creating the agriculture marketplace platform. We are truly grateful for the support and encouragement from these individuals and institutions, without which this project would not have been possible. Thank you for your support.

References

We acknowledge the following sources:

[1]. Xiaolan Fu & Yundan Gong. (2023). The Role of E-commerce in Agricultural Development: Evidence from China. Journal of Development Economics. https://www.sciencedirect.com/science/article/pii/S030438782030161\

[2].David Rose & Jason Chilvers. (2018). Adoption of Digital Technologies in Agriculture: A Systematic Review. Journal of Agricultural Education and Extension. https://www.tandfonline.com/doi/full/10.1080/1389224X.2018.1492741

[3].Muhammad A. Khan & Kamran Shafique. (2020). Blockchain Technology in Agriculture: Applications and Challenges. Computers and Electronics in Agriculture. https://www.sciencedirect.com/science/article/pii/S016816992030230 0

[4].John Thompson & Bill Vorley. (2014). E-Marketplaces in Agriculture: A Tool for Empowering Farmers in Developing Countries. International Journal of Agricultural Sustainability. https://www.tandfonline.com/doi/abs/10.1080/14735903.2014.947059

[5].World Bank. (2023). Warehouse & Inventory Management. https://www.worldbank.org/en/topic/agriculture
[6].FAO. (2023). Digital Agriculture & Marketplaces. https://www.fao.org/digital-agriculture/en/

[7]**E-commerce in agri-food sector: a systematic literature review**
https://www.tandfonline.com/doi/abs/10.22434/IFAMR2017.0035

[8]**Rural e-commerce development experience from China – FAO**
https://openknowledge.fao.org/handle/20.500.14283/CB4960 EN

[9]**E-commerce development and its contribution to agricultural non-point source pollution control in China**
https://www.sciencedirect.com/science/article/abs/pii/S0301479723014019

[10]**Agricultural E-commerce: Attitude segmentation of farmers**
https://www.sciencedirect.com/science/article/pii/S0168169922002599