

AI in Agricultural Marketing: A Mobile Application Framework for Smart Agricultural Ecosystem Development

Hariprasath B¹, Saranesh T², Saiyogesh R³, Arthy S⁴, Jaiharini G⁵, Santhya S⁶

¹*Assistant Professor, Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi – 642103, Tamil Nadu, INDIA*

^{2,3,4,5,6} *IV B.Sc. (Hons.) Agriculture, Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi – 642103, Tamil Nadu, INDIA*

Abstract—Agriculture plays a vital role in ensuring food security and economic development, yet farmers continue to face persistent challenges such as limited market access, dependency on intermediaries, lack of real-time advisory services, and difficulty connecting with buyers and value-addition industries. These constraints reduce profitability and hinder the overall growth of the agricultural sector. The convergence of Artificial Intelligence (AI) and mobile technology offers a promising pathway to address these challenges and improve agricultural marketing efficiency. This paper presents the design and conceptual framework of “AI in Agricultural Marketing,” a mobile application that functions as a digital ecosystem connecting farmers, consumers, agricultural input suppliers, food-processing industries, fertilizer companies, and value-addition enterprises. The application uses location-based services to help farmers identify nearby input shops, establishes direct linkages between farmers and value-addition companies, enables farmer-to-consumer commerce, and delivers AI-powered real-time agro-advisory services covering pest and disease management, fertilizer recommendation, irrigation scheduling, and market intelligence. By analyzing crop, weather, and market data, the proposed system supports informed decision-making, reduces marketing inefficiencies, and strengthens farmer incomes. The paper situates the proposed application within the existing body of literature on AI-enabled agriculture and agribusiness, outlines its system architecture and key functional modules, and discusses the expected outcomes for farmers, consumers, industries, and the agricultural sector as a whole.

Index Terms—Artificial Intelligence; Agricultural Marketing; Mobile Application; Agro-Advisory

Services; Value Addition; Direct Marketing; Smart Agriculture; Farmer Empowerment.

I. INTRODUCTION

Agriculture remains the backbone of many developing economies, including India, providing livelihood opportunities to millions of farmers. Despite considerable advances in agricultural production, farmers continue to face significant challenges in marketing their produce. The presence of intermediaries, lack of real-time market information, limited access to quality agricultural inputs, inadequate advisory services, and poor connectivity with buyers often translate into reduced profits for producers, while consumers and agro-based industries struggle to obtain fresh produce directly from farmers at reasonable prices.

The rapid growth of Artificial Intelligence, mobile technology, and digital communication infrastructure provides an opportunity to bridge these long-standing gaps. Recent reviews of AI applications in agriculture report that machine learning, computer vision, and data analytics are already reshaping precision farming, resource management, and supply-chain optimization, enabling real-time monitoring and more informed decision-making across the value chain (Sharma & Kumar, 2025). AI-driven tools are also being applied specifically to postharvest management and market prediction, improving food-distribution efficiency and reducing supply-chain losses (Sharma & Kumar, 2025). At the same time, structured literature reviews of AI in agribusiness note that

many of these innovations remain fragmented, underscoring the need for integrated platforms that connect farmers, consumers, and industry stakeholders within a single system (Barbosa Neves et al., 2023).

This paper proposes an AI in Agricultural Marketing mobile application that acts as a comprehensive digital ecosystem for agricultural stakeholders. The application is designed to facilitate direct communication between farmers and buyers, provide location-based services for input procurement, connect farmers with processing and value-addition industries, offer real-time agro-advisory services, and enable consumers to purchase fresh produce directly from farmers.

II. LITERATURE REVIEW

A growing body of research documents the expanding role of AI across the agricultural value chain. Reviews of AI applications in Indian agriculture highlight adoption in crop monitoring, yield prediction, irrigation management, and pest and disease detection, while also identifying persistent barriers such as limited digital literacy, infrastructure constraints, and data-privacy concerns among smallholder farmers (Naresh, Kumar, & Singh, 2021; Gupta, Mehta, & Sharma, 2022).

On the marketing side, systematic literature reviews of digital agricultural marketing channels find that AI, big data analytics, blockchain, and the Internet of Things collectively enhance the efficiency, personalization, and automation of agricultural marketing platforms, allowing agribusinesses to optimize customer engagement, streamline supply chains, and tailor experiences for both farmers and consumers (Business Research Journal review, 2025). However, the same body of work notes recurring challenges, including integration complexity across diverse marketing channels and digital skill gaps among stakeholders.

AI-enabled advisory delivery has also received attention. Chatbot and conversational-assistant systems with multilingual natural-language-processing support have been shown to improve accessibility of agricultural information for farmers with limited literacy, particularly when combined with SMS or Interactive Voice Response channels for low-connectivity rural areas (Mittal & Mehar, 2016;

as cited in recent AI-agriculture reviews). Complementary work on price-prediction and demand-supply matching models suggests that statistical, machine-learning, and hybrid forecasting approaches can materially improve farmers' marketing decisions when integrated into a single advisory interface (IJARCCE review, 2025).

Structured reviews of AI and new business models in agriculture similarly emphasize the potential of AI to generate new value propositions for farmers and agri-entrepreneurs, while cautioning that the lack of farmer understanding and the need for sustained investment remain major barriers to adoption (Barbosa Neves et al., 2023). Taken together, the literature points to a clear opportunity: an integrated, mobile-first platform that combines input discovery, direct market linkages, and AI-based advisory services within one application, rather than treating these as separate tools. The present work builds on this literature by proposing such an integrated system tailored to the needs of smallholder and mid-scale farmers.

III. NEED FOR THE STUDY

Agricultural marketing is a critical component of the agricultural value chain. Farmers often face difficulties such as:

- Dependence on middlemen for selling produce.
- Lack of awareness about current market prices.
- Difficulty in locating nearby agricultural input suppliers.
- Limited access to scientific advisory services.
- Inadequate linkage with food-processing and value-addition industries.
- Poor market intelligence and forecasting capabilities.
- Reduced bargaining power due to fragmented markets.

Artificial Intelligence can address these challenges by providing intelligent recommendations, predictive analytics, and real-time information. A mobile-based platform can ensure easy accessibility even in rural areas, where smartphone penetration continues to increase rapidly. There is therefore a growing need for an integrated AI-powered agricultural marketing platform that enhances market access, improves transparency, and strengthens the agricultural supply chain.

IV. OBJECTIVES OF THE STUDY

The primary objective of this study is to design an AI-enabled mobile application that improves agricultural marketing efficiency and farmer income. The specific objectives are:

- To connect farmers directly with consumers and beneficiaries.
- To identify and display nearby agricultural input shops.
- To establish linkages between farmers and value-addition companies.
- To provide AI-based real-time agro-advisory services.
- To reduce the role of intermediaries in agricultural marketing.
- To improve market transparency and accessibility.
- To enhance farmer profitability through informed decision-making.
- To create a sustainable and digitally connected agricultural ecosystem.

V. PROPOSED SYSTEM AND METHODOLOGY

The proposed system consists of an AI-powered mobile application that serves as a common platform for farmers, consumers, agro-industries, fertilizer companies, food-processing units, and agricultural experts. The application uses Artificial Intelligence, GPS technology, cloud computing, and mobile communication systems to deliver customized services to users.

5.1 System Workflow

- Farmers register their profiles and details of crops cultivated.
- Consumers and industries register their requirements.
- AI algorithms match demand and supply based on location, quantity, and crop availability.
- The application recommends nearby input suppliers.
- Real-time agro-advisory services provide solutions related to crop production and plant protection.
- Processing industries connect directly with farmers for procurement.

- Users receive notifications regarding market opportunities, disease outbreaks, and agricultural advisories.

This integrated workflow is designed to establish a transparent and efficient agricultural marketing network.

VI. KEY FEATURES OF THE MOBILE APPLICATION

6.1 Agri Input Shops Nearby

The application uses GPS technology to identify and display nearby agricultural input stores, allowing farmers to search for seeds, fertilizers, pesticides, and farm machinery, compare availability, and obtain navigation assistance. Expected benefits include easier procurement of inputs, reduced transportation costs, faster access to farm resources, and improved crop management.

6.2 Linkage with Value-Addition Companies

The application enables farmers to connect directly with food-processing industries, export companies, retail chains, agro-based industries, and contract-farming organizations. Industries can post procurement requirements while farmers showcase produce availability, supporting better price realization, elimination of unnecessary intermediaries, and longer-term business relationships.

6.3 Farmer–Consumer Connectivity

Consumers can search for nearby farmers, view available produce, place orders directly, and track delivery status, while farmers can market fruits, vegetables, grains, dairy, and value-added products directly through the platform. This supports fresher produce for consumers, better profits for farmers, transparent pricing, and reduced supply-chain costs.

6.4 Real-Time Agro-Advisory Services

The application incorporates AI-powered advisory services covering pest identification, disease diagnosis, fertilizer recommendation, irrigation scheduling, weather-based crop management, nutrient-deficiency detection, and market-trend analysis. AI models analyze field data, weather information, and crop conditions to generate personalized recommendations that improve

productivity, reduce production losses, and support scientific decision-making.

VII. ROLE OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence serves as the core technology underpinning the proposed system across several functional areas:

7.1 Market Prediction

AI analyzes historical and current market data to predict price trends and demand fluctuations, consistent with findings that AI-based forecasting models can improve market-related decision-making for farmers (IJARCCE review, 2025).

7.2 Pest and Disease Detection

Image-recognition techniques, including convolutional neural network–based classification, identify crop diseases and pest infestations from photographs uploaded by farmers, reflecting broader trends in AI-enabled early disease detection reported in recent agricultural technology reviews (Sharma & Kumar, 2025).

7.3 Recommendation Engine

The AI recommendation engine suggests suitable crops, optimal markets, input requirements, and harvesting schedules based on farm-specific data.

7.4 Personalized Advisory

Each farmer receives customized recommendations based on crop type, soil conditions, weather forecasts, and market demand.

7.5 Demand–Supply Matching

AI automatically connects buyers and sellers based on their requirements and geographic proximity, reducing search and transaction costs for both sides of the market.

VIII. EXPECTED OUTCOMES

8.1 For Farmers

- Improved market access.
- Increased income and better price realization.
- Reduced dependency on intermediaries.
- Improved crop productivity.

8.2 For Consumers

- Access to fresh produce.
- More affordable pricing.
- Improved food quality.

8.3 For Industries

- Reliable sourcing of raw materials.
- Reduced procurement costs.
- Better supply-chain management.

8.4 For the Agricultural Sector

- Enhanced market transparency.
- Improved marketing efficiency.
- Digital transformation of agricultural marketing.

IX. DISCUSSION

The proposed AI in Agricultural Marketing application addresses several of the structural inefficiencies identified in the literature on Indian and global agricultural marketing, particularly farmer dependence on intermediaries and fragmented access to market information (Naresh, Kumar, & Singh, 2021). By combining location-based input discovery, direct market linkages, and AI-based advisory services in a single interface, the system responds to calls in the literature for more integrated digital agricultural platforms rather than isolated point solutions (Business Research Journal review, 2025).

At the same time, prior studies caution that AI adoption in agriculture faces barriers including limited digital literacy, infrastructure gaps in rural areas, and data-privacy concerns (Gupta, Mehta, & Sharma, 2022). These barriers are directly relevant to the proposed application and suggest that successful deployment will depend on multilingual and voice-enabled interfaces, offline or low-bandwidth functionality such as SMS-based alerts, and farmer training programs to support digital literacy, consistent with recommendations in recent AI-agriculture reviews (Sharma & Kumar, 2025).

In summary, the application offers several potential advantages: increased farmer income; reduced role of intermediaries; direct farmer-to-consumer marketing; better access to agricultural inputs; improved linkage with processing industries; AI-powered decision support; real-time advisory services; enhanced productivity and profitability; a stronger agricultural

value chain; and support for sustainable agricultural development.

X. CONCLUSION

Artificial Intelligence has the potential to reshape agricultural marketing by creating a more transparent, efficient, and farmer-centric ecosystem. The proposed AI in Agricultural Marketing mobile application integrates farmers, consumers, input suppliers, agro-industries, and advisory services into a single digital platform. By leveraging AI technologies, GPS-based services, and real-time communication systems, the application addresses major challenges faced by farmers in marketing and production.

The system promotes direct market linkages, improves access to agricultural resources, provides intelligent advisory support, and supports profitability. Future work should focus on pilot implementation and empirical evaluation of the platform's impact on farmer income, market transparency, and input-access efficiency, building on the empirical and review literature summarized above. Ultimately, this AI-driven approach can serve as a model for future smart agricultural marketing systems and support the broader digital transformation of the agricultural sector.

REFERENCES

- [1] Barbosa Neves, J., et al. (2023). Artificial intelligence and new business models in agriculture: A structured literature review and future research agenda. *British Food Journal*, 125(13), 436–458. <https://doi.org/10.1108/BFJ-01-2023-0072>
- [2] Gupta, S., Mehta, A., & Sharma, R. (2022). Barriers to AI adoption in Indian agriculture: An empirical study. *Asian Journal of Agricultural Extension, Economics & Sociology*, 40(3), 1–10.
- [3] IJARCCCE. (2025). Smart agriculture assistant: An AI-powered approach to agricultural advisory and market decision support. *International Journal of Advanced Research in Computer and Communication Engineering*, 14(11).
- [4] Naresh, R., Kumar, S., & Singh, P. (2021). Artificial intelligence in Indian agriculture. *International Journal of Computer Applications*, 183(32), 1–5.
- [5] Review of Artificial Intelligence Applications and Their Impact on Agricultural Production and Marketing in India. (2023). *Journal for ReAttach Therapy and Developmental Diversities*.
- [6] Sharma, R., & Kumar, A. (2025). Revolutionizing agriculture: A comprehensive review of artificial intelligence applications in enhancing properties of agricultural produce. *Food Chemistry: X (IFPFS 2024 Special Issue)*. <https://doi.org/10.1016/j.fochx.2025>
- [7] Systematic literature review of digital and AI-enabled agricultural marketing channels: Disruptive innovation and the future of digital agriculture. (2025). *Business Research Journal*.