Mobile App for Direct Market Access for Farmers

M.Sriram, Student
Department of Computer Science and Engineering,
Presidency University

Shaik Noor Mahammad, Student
Department of Computer Science and Engineering,
Presidency University

Mr.Pakruddin.B
School of Computer Science and Engineering,
Presidency University

S.Srinivas, Student
Department of Computer Science and Engineering,
Presidency University

V.Dheeraj, Student
Department of Computer Science and Engineering,
Presidency University

Varshitha N L,Student
Department of Computer Science and Engineering,
Presidency University

Abstract— The supply chains that are bifurcated have middlemen constituencies, which take away most of the consumer price margins and give the farmer little to nothing. The Indian agricultural sector is indeed the largest employer in terms of workforce. Primitive rural infrastructure, nontransparency pertaining to pricing in the usually traditional mandis, and very poor technology adoption aggrandize all these factors forcing the farmers to take any price, just there at that moment. That's why 'Mobile App for Direct Market Access' becomes relevant to fill those gaps with a digital platform connecting farmers as well consumers, retailers, and institutional buyers. Farmers acquire here a dashboard through which to showcase their merchandise, check live market data, set their casts, track their sales, get their payday, and analyze their performance. The buyers, on the other hand, are able to search, compare, and order produce traceably, securely paid, and with feedback systems-all through the app. The app also goes offline and incorporates logistics. This is going to create a bigger margin of profit-three for the farmers. Also, a larger share of splashing profits for the farmers along with access to formal financial service against their digital records of transactions becomes possible. For consumers, it means the acquisition of fresh produce at much lesser rates, but with transparency of procurement. Thus, this innovation represents the timely dimension for an inclusive growth revolution in the restructuring of agricultural trading with empowered and engaged stakeholders, meaningfully contributing to adoption of such changes.

Keywords— Direct Market Access, Agricultural Supply Chain, AgriMarket App, Direct Farm-to-Buyer Platform, AgriCommerce, Smart AgriCommerce Platform

I. INTRODUCTION

Despite constituting nearly 40 percent of the Indian workforce, this sector is faced with acute market access problems. The more enmeshed the supply chain is with village aggregators, commission agents, wholesalers, and retailers, the more estranged the farmer from the consumer. Thus, on an average, farmers get only 10-15 percent of the final consumer price; the consumer ends up paying much higher prices for a stale or, in many cases, untraceable produce. Very often, conditions are aggravated by information asymmetry and poor infrastructure with high logistics cost. Especially those small and marginal farmers in rural areas face difficulties in accessing urban markets. Then there is now technological advancement that has transformed all other industries, but agriculture has not really embraced a much up-to-date trend in

agricultural marketing. This has not been able to change from its traditional way of reaching producers and

consumers by means of direct digital links. This intervention, "Mobile App for Direct Market Access for Farmers," attempts addressing this by establishing a platform that will create direct contact between farmers and consumers, retailers, or institutional buyers without an intermediary and creating a more transparent, efficient marketplace.

Farmart is the proposed solution and a cross-platform mobile application built in Flutter and Firebase, intended to change the emergence of agricultural commerce in India. It has two different interfaces—one for farmers and the other for consumers. It has a dashboard developed for farmers, which integrates product listing, instant market information, stock management, and sales analysis. Other commercial functionalities include vernacular facilitation and offline operation with safe payment options. For the consumers, the app will allow them to search for farm produce under different categories, view traceability information, price compare, and make direct purchases. This structure emphasizes real-time data synching, secure authentication, and optimization for working with low connectivity. This application has been executed among agricultural communities surrounding Bangalore, but the design accommodates future scaling out to the multiple landscapes of agriculture in India.

The importance of this project goes far beyond the economic aspect for many farmers and consumers. Farmart benefits financial sustainability in the long run through farm commerce and helps the farmers make formal financial services through the generation of digital transaction records. The said platform provides real-time inventory management and optimizes logistics to reduce post-harvest losses, thus dealing with environmental issues and further promoting global sustainability. Yet another breathtaking model on how technology creates opportunity for economic inclusiveness while in vehement resistance to the systemic impediments posed against it by the traditional sectors. Going forward, AIanalytics and sustainability tracking hold a lot of exciting potentials, and Farmart will be a leader in innovative smart agriculture by providing a good example of how digital innovations can reshape the traditional supply chain towards sustainable development.

II. RELATED WORK

[1] Saniya Patil et al. designed a Farmer Trader Android Application that allows farmers direct access to markets without intermediaries. The application allows instant access to market data while supporting multiple languages (English and Marathi) and provides location service and filtering for browsing. While some real potential exists for improving farmer incomes by getting them better access to markets and higher income through transparency, the study also reiterates that digital literacy among farmers is crucial for fully utilizing the application.

[2] A mobile application using machine learning for crop price prediction and direct market access for farmers developed by Karan Gurjar et al. The app provides information on real-time access to markets, monitors crop health, and easy communication with buyers. The research highlights the need for reliable data and regular updating of the machine-learning model to make sure that predictions are correct, discusses the challenges of adding technology with traditional farming practices, and hence the importance of farmer education for wider use.

[3] Carlos Hinojosa et al. introduced AgroTIC, an application for Colombian farmers that uses image processing and machine learning for crop health monitoring and to connect farmers directly to merchants. The app contains features for vegetation index calculations and disease detection. The authors stress how technology can improve crop quality and production while decreasing the digital divide by emphasizing user-friendly interfaces for smallholder farmers and also addressing concerns about data ownership and digital platforms' privacy.

[4] In this study, the authors Jeffrey K. O'Hara and Sarah A. Low explored the issue of online markets in direct-toconsumer (DTC) sales for rural farms. It finds that rural farms that in DTC sales are not very experienced and also far away from metropolitan areas are more inclined to adopt online selling. Digital connectivity has shown a decrease in the transaction costs incurred and also an increase in market access, necessitating the intervention of policy support and infrastructure development, including issues related to broadband adoption, and government programs that emerge to increase digital literacy among farmers.

[5] Analyzed the setting of a digital data platform for agriculture in Spain by Juan D. Borrero and Jesús Mariscal.

It aggregates data, gives decision-making tools, and creates a better connection between farmers. The research identifies fundamental elements in the platform's governance and model for data development, addressing concerns about data ownership, privacy, and the transparency of governance. The study raises the need for user-friendly interfaces along with continuous updates to ensure the platform remains relevant and effective. It concludes that these digital platforms can increase farmers' incomes and foster market efficiency while decreasing dependence on intermediaries.

[6]   Namita Singh et al developed an AI chatbot Farmer.Chat , which provides personalized agricultural recommendations to smallholder farmers in India. This multilingual voice supported offline chatbot enables farmers from various sections to deal with it. Researches show how AI is being integrated in agronomic activities and how farming technologies can be further pushed, exploring the possibility of extending AI applications in agricultural communication and other farming tasks.

[7]   K. Sughasini et al. presented a mobile application dedicated to farmers and consumers without any mediation: direct to the agribusiness retailers. Farmers use the app to post products, negotiate prices, and complete the transaction while using location services, filtering, and logistics management on the application. The emphasis in this research is on intuitive interfaces considering rural infrastructural limitations, noting that mobile technology could improve farmer income significantly and take agriculture towards sustainability by eliminating intermediaries.

[8]   B. Ashokkumar studied digital interventions in Indian agriculture through the Soil Health Card Portal, e-NAM, and a plethora of agritech startups'. This study analyses the digital platforms empowering farmers regarding market access and income increase, besides discussing government policies and support systems that enable the increased adoption of digital agriculture programmes. It concludes by focusing on aspects linked to intermediary elimination in digital marketing platforms to improve farmer income and work efficiency while enhancing the sustainability of agricultural practice.

[9]   Pratik Supe et al. examined Android applications for farmer market access. They identified currently existing deficiencies such as real-time price negotiations and lack of user-friendliness. The study proposes improvements to empower farmers to track expenses and manage transactions without intermediaries. Needing usability features addressing low digital literacy among farmers, the research shows how mobile applications could improve farmer income and market efficiency, as well as promote more sustainable agricultural practices.

[10]   C.V.N. Pradeeth et al. created the FarmConnect mobile application to build direct connections among farmers, consumers, and retailing outlets. Farmers can post produce, change prices, and transact with others through the app, which also includes very interesting features such as real time updates, chat systems, and secured modes of payment processing. It emphasizes the nostrums of strict quality testing and use feedback for improvement functionality, concluding that mobile application usage can massively increase the farmer's income markets and efficiency at lowering reliance on intermediaries, promoting sustainable agriculture.

[11]   Sunil Mhamane et al. presented an Android application that creates an immediate link between farmers, retailers, and food processing companies. The app has enabled the transmission of immediate market information to farmers to enhance direct sales while reducing intermediation. It has features for price negotiation, transaction management, and product posting, which, supported by user-friendly design and minimal technical requirements, have enhanced usability for farmers to reduce information asymmetries, improve access to the marketplace, and provide transparency in transactions.

[12]   Nufauza et al. examined an eMarket application for farmers developed during COVID-19, using the Rapid Application Development (RAD) model. The application has product listing, price negotiation, and communication through WhatsApp. Limited market access and price instability are challenges bemoaned, how digital platforms assist farmers to sell directly without middlemen thereby enhancing transparency and efficiency. The study proposes additional features based on user feedback for future improvements.

[13]   Sasha Pesci et al. studied the use of digital sales and marketing technologies by farmers in California during the COVID-19 pandemic and found that farmers who use online selling techniques have seen increasing

sales and profits. It also draws attention to the problems of the digital divide and calls for training and infrastructure support to aid farmers in embracing suitable technologies, mentioning how these platforms enable farmers to cope with crises-induced market disruptions and lessen reliance on intermediaries, with government and nonprofit organizations playing vital roles in providing support intended to bridge that digital divide.

[14]   Akash Ronad et al. developed the online application APLMOP, giving farmers direct access to agro-based industries without interference from middlemen, thus utilizing real-time data and logistics integration for a better market access. The study addressed problems that farmers face in traditional markets such as price manipulation and limited market information, which were concluded toward offering direct selling platforms as a viable option to improve farmer income and market efficiency with price transparency and lower costs related to intermediaries.

[15]   Shalaka Shirke et al. developed a web portal facilitating direct sales between farmers and consumers and consequently slackening the grip of intermediaries in the agricultural supply chain. Multiple native language support and real-time market price information are features of the portal that highlight the direct market access necessity and what agritech solutions could do to improve farmer income. The research provides conclusions affirming that userfriendly interfacing and continuous updating are essential in sustaining the demand and utility of a given platform, hence having profound implications in altering farmer income and agricultural sustainability in general.

III. METHADOLOGY

Within the farm-art system, agricultural supply chain inefficiencies are solved by bringing the farmer and the consumer together through a mobile application, thus creating a marketplace for the two parties. The system employs Flutter as the cross-platform developer and Firebase as the backend service provider for real-time data synchronization, a safe way of authentication, as well as optimizing low-connectivity conditions for performance. The architecture is modular and scalable so that it could be extended in the future and handle increased loads.
System overview and architecture

3.1 The Farmart architecture is organized under the following three core aspect:

The Farmart system essentially encompasses three major components of the frontend, backend, and security modules, all tied together to provide a seamless experience to both farmers and consumers.

Key System Components:
- Flutter-based frontend for Android and iOS.
- Firebase backend services, including Firestore, Storage, and Authentication.
- Cloud Functions used in the automated business logic.
- Role-based access control for security.
- Offline capabilities for rural areas with poor connectivity.
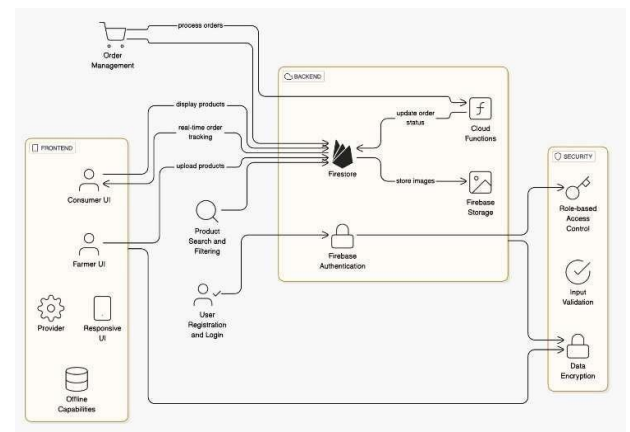

Fig. 1. System Architecture Diagram

It also describes the frontend as a different interface for the consumer and the farmer, with unique functionalities assigned. The backend would take care of data storage, authentication, and business logic through the Firebase services. The system has security measures used to protect user data and carry out secure transactions on it.

3.2 Frontend Development
This will be the approach that Farmart frontend as a resource for cross-platform applications developed using Flutter will
take for ensuring uniformity of performance in both Android and iOS platforms.

The feature menu consists of the following:
UI/UX Design features:
- Simplified payment gateway options including UPI, Paytm, and cash-on-delivery.
- Offline mode where functionalities are active with synchronization to SQLite database.

- Responsive design that can adapt to various screen sizes.

Key Screens

- Home Screen- Grid view for seasonal products with priority to local fruits and vegetables.
- Product Detail Screen- Displays different images, farm location tags, and quality parameters.
- Farmer Dashboard- Shows sales trends, stocks, and orders using easy to interpret charts and graphs.

This is what the consumer interface has been built on: product discovery, shopping cart management, and checkout processes while that which has the farmer interface was directed to product listing, inventory, and sales analytics.

3.3 Backend Implementation

Firebase is used to establish backend services, hence achieving scalability and effective data management.

Firestore Data Modeling:

Products collection with price, stockLevel, farmLocation, organicCertification fields Orders collection with timestamps and order status:

placed → shipped → delivered

User collection having profiles, addresses, and payment methods Cloud Functions Trigger Inventory updates when farmers update their stock or consumers make orders Send order status change notification through SMS via Twilio Auto

order processing with inventory adjustment

Firebase Services:

Firestore - real time database operations, Storage: Storage for product images along with compression APIs Authentication Secure user access keeping in mind this backend architecture, future upgrades would include AI for analytics and implementation of sustainability tracking metrics.

3.4 Security Considerations

Farmart has kept several walls of safety that ensure customer data stay private and that they can go through transactions securely.

Security Features:

AES encryption both in transit and at rest

OAuth 2.0 integration, which helps in government verification of farmer ID Role basis access: -there is no window towards farmer consumer payment information. Validations of input to reduce attack possibilities Bank

crypt word and safekeeping This increases consumer trust while helping to address the issues of data security in digital agricultural platforms.

3.5 Implementation Phases and Deployment

Farmart follows an orderly defined phased implementation strategy into which the entire development is placed.

Phases of Implementation:

-MVP Development within a period of 6 Months -Basic product listings with proper checkout and integration to Firebase. Scalability and Localization (9 months) of UPI, offline support and translation into regional languages. Advanced Analytics: 12 months: Recommendations powered by AI and tracing of the carbon footprint.

Testing and Quality Assurance:

Unit testing is done for individual components Integration testing for payment gateways Real-world beta testing with 500 farmers and 5,000 consumers from low-connectivity areas Continuous integration pipeline with GitHub Actions.
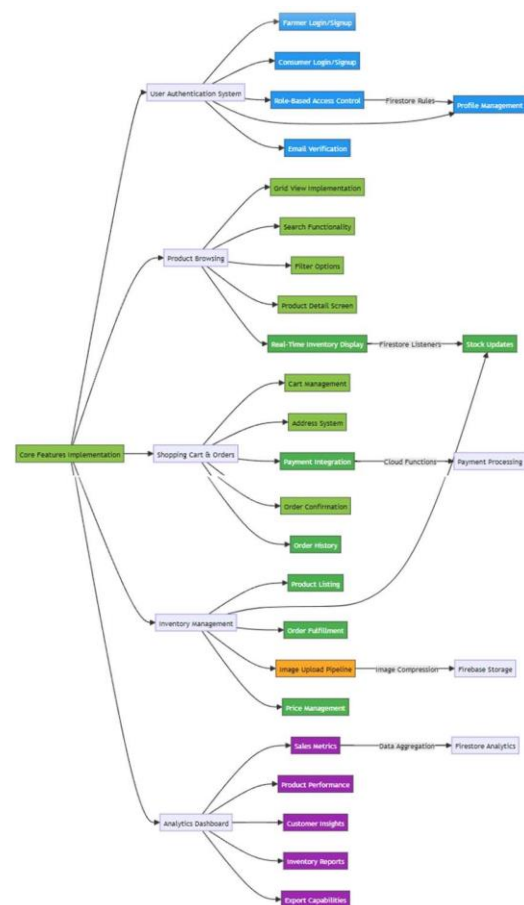

Fig. 2. Data Flow Diagram

IV. RESULTS AND ANALYSIS

4.1 Introduction to Farmart Application Outputs The Farmart application is developed to form a direct link between farmers and consumers while eliminating the intermediaries in the traditional agricultural supply chain and making the inefficient processes more efficient. The easy application user interface is intuitively designed and accommodates users of various levels of digital literacy. The screenshots attached show the key features of both the farmer

and consumer sides of the application in how the right transactions, market access, and product management have been facilitated by the platform.
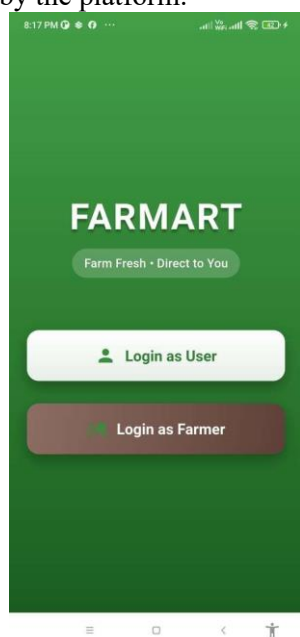

Fig. 3. Login Screen

4.2 Farmer Side of the Application

The farmer interface of Farmart provides comprehensive tools for product management and profile customization: Farmer profile management: Farmers have a unique profile screen to manage their information and contacts: name, email-id, mobile number, address, etc., to communicate transparently with consumers. The profile screen further facilitates product management and statistics visibility control of this function.
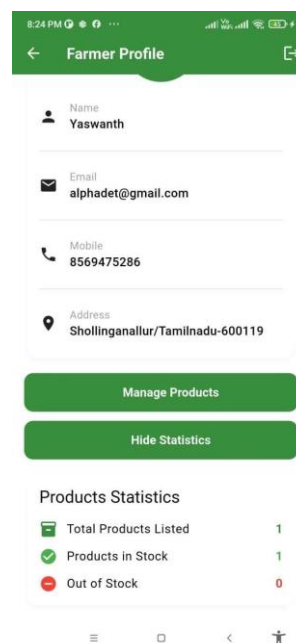

Fig. 4. Farmer Profile Management Interface

Product Management Dashboard: A farmer gets to manage his agricultural products from a centralized dashboard. This includes:

- Listing products with detailed descriptions and pricing information
- Uploading high-quality images to attract consumers
- Tracking stock levels in real-time
- Editing product detail anytime
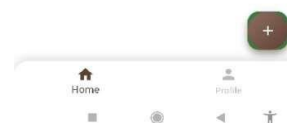- Unlisting or removing the products that are not available

Fig. 5. Farmer Dashboard and Product Management

Statistics and Analytics: The application provides farmers with important statistics and analyses on their sales. Farmers can look up statistics on total products listed, products in stock, and items out of stock. Such statistics assist farmers in making decisions for production planning or inventory management.

4.3 Customer Side of the Application

But on the other side, the Farmart consumer interfaces would be a smooth shopping pathway while remaining open for fresh agricultural products:

Product Browsing Interface: Where the consumer can almost browse through these huge arrays of fresh vegetables and other agricultural products: Each product is displayed with nice pictures, a price tag, and available stock quantity. The browsing interface also helps consumers easily locate particular items while searching and filtering through options.

Order Management: The application facilitates the consumers to order.

- Such Clear Product Listings With Prices And Stock Information
- Shopping Cart Functionality For Selecting Multiple Items
- Summarized Purchase Details On Order Confirmation Screens
- After-Purchase Order History Tracking With Detailed Transaction Information
- Farmart provides Payment Options, including cashon-delivery (COD) besides these. Farmart provides several payment options beyond cash on delivery (COD) to provide for different customer preferences as well as their access level to technology.
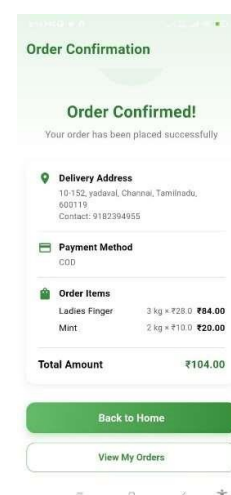

Fig. 6. Consumer Home Screen with Product Listings

Fig. 7. Order Confirmation Screen

4.4 Overall Impact and Discussion

The Farmart application solves perfectly the fundamental problems of an agricultural supply chain as per stereotype view:

- Economic Benefits: This does bring final prices closer to consumers and increase earnings but not hold with policy intermediaries. As a result, consumers get lower prices and fresh products.

- Transparency in Markets: Time-based information updates-feeds on inventories out and the lines linking farmers to consumers injects transparency

thereby bringing out real information on the same table.

- Operational Effectiveness: Features of product management include order tracking and processes of payment-all facilitated by an application that aids agriculture commerce thereby minimizing transaction cost and time.

- Scalability And Accessibility: The structural modularity of Farmart ensures this scaling up toward new areas with even more added agricultural products. It works offline supported in all local languages, and hence it would be easily accessed by farmers from poorly interlinked areas.
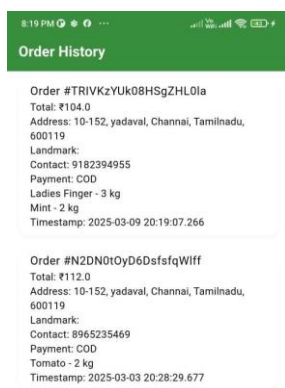

Fig. 8. Order History Tracking Interface

V. CONCLUSION

The Farmart project has rolled out a mobile platform for creating direct links between farmers and consumers, thus fundamentally changing agricultural marketing in India. High scale features such as real time data sync and secure authentication as well as offline use underlie an app developed in Flutter for cross platform function and Firebase as backend. The dual user interface is designed to build a transparent marketplace for discovering products along with safe payments to the consumer and equipping farmers with product management tools, keeping track of inventory, and performing sale-related analytics. Format has been followed in delivering the MVP and subsequently work progressed to scale issues and advanced analytics integration. Locationbased services, multilingual options, and cash-on-delivery form part of the offering to address

certain unique requirements of the Indian agriculture ecosystem. Going forward, the modular architecture of the application will allow for integrated AI-based recommendations, subscription models, and sustainability tracking engines.

Again, piloting brought significant changes. Direct market entry boosted up farmers' incomes; with fewer middlemen, cheaper prices came to be offered to consumers; and all of them enjoyed lesser cost of transport. It has been technically proven to be scalable: it can now allow increased product ranges and user base. Most importantly, Farmart shows how digital innovation can transform entrenched supply chains, providing channels for broader economic opportunity while mitigating systemic challenges within the agriculture sector.

REFERENCES

[1]   Saniya Patil et al. (2023). Android App to Connect Farmers to Retailers and Food Processing Industry. International Research Journal of Modernization in Engineering Technology and Science. https://www.irjmets.com/uploadedfiles/paper//issue_10_october_2023/45341/final/fin_irjmets1697637486.pdf

[2]   Karan Gurjar et al. (2023). Development of a Mobile Application for Connecting Farmers with Traders and a Price Prediction Model using Machine Learning. International Research Journal of Engineering and Technology. https://www.irjet.net/archives/V10/i10/IRJET-V10I1098.pdf

[3]   Carlos Hinojosa et al. (2023). AgroTIC: Bridging the Gap between Farmers, Agronomists, and Merchants through Smartphones and Machine Learning. Journal of Engineering and Technology. https://doi.org/10.48550/arXiv.2305.12418

[4]   Jeffrey K. O'Hara and Sarah A. Low (2020). Online Sales: A Direct Marketing Opportunity for Rural Farms?. Journal of Agricultural and Applied Economics. https://doi.org/10.1017/aae.2019.44

[5]   Juan D. Borrero and Jesús Mariscal (2022). A Case Study of a Digital Data Platform for the Agricultural Sector: A Valuable Decision Support System for Small Farmers. Agriculture. https://doi.org/10.3390/agriculture12060767

[6]   Namita Singh et al. (2024). Farmer.Chat: Scaling AI-Powered Agricultural Services for Smallholder Farmers. Proceedings of (Conference acronym 'XX'). ACM. https://doi.org/10.48550/arXiv.2409.08916

[7]   K. Sughasini et al. (2024). Mobile App for Direct Market Access for Farmers. Journal of Emerging Technologies and Innovative Research. https://ijcrt.org/papers/IJCRT2412239.pdf

[B. Ashokkumar (2021). Transforming Indian Agriculture through Digital Technologies: Asian Journal of Agricultural Extension,
Economics & Sociology
10.9734/ajaees/2021/v39i630596

[9]   Pratik Supe et al. (2025). A Review on Android Application for Direct Market Access for Farmers. International Research Journal of Modernization in Engineering Technology and Science.
https://www.doi.org/10.56726/IRJMETS68017

[10]   C.V.N. Pradeeth et al. (2024). Mobile App for Direct Market Access for Farmers. International Journal of Engineering Innovations and Management Strategies. https://philarchive.org/archive/PRAMAF-2

[11]   Sunil Mhamane et al. (2020). Android App to Connect Farmers to Retailers and Food Processing Industry. International Research Journal of Modernization in Engineering Technology and Science.
10.1109/ICICT43934.2018.9034434

[12]   Nurfauza Jali et al. (2021). eMarket for Local Farmers. IEEE Student Conference on Research and Development (SCOReD).
10.1109/SCOReD53546.2021.9652777

[13]   Sasha Pesci et al. (2023). A digital divide in direct market farmers' online sales and marketing: Early pandemic evidence from California. Journal of Rural Studies.
https://doi.org/10.1016/j.jrurstud.2023.103038