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KrishiUdyam : A Direct Market to Farmer

Satyam Dubey
Dept. of CSIT
Acropolis Institute of Technology and Research
Indore, India
satyamdubey210061@acropolis.in

Suyash Bajaj
Dept. of CSIT
Acropolis Institute of Technology and Research
Indore, India
suyashbajaj210820@acropolis.in

Umang Choudhary
Dept. of CSIT
Acropolis Institute of Technology and Research
Indore, India
umangchoudhary210828@acropolis.in

Nisha Rathi
Dept. of CSIT
Acropolis Institute of Technology and Research
Indore, India
nisharathi@acropolis.in

Ashwinee Gadwal
Dept. of CSIT
Acropolis Institute of Technology and Research
Indore, India
ashwineegadwal@acropolis.in

***Abstract*—KrishiUdyam is a digital platform designed to connect farmers directly with government-authorized purchasers, reducing reliance on middlemen and ensuring fair pricing. The system enables secure transactions through features like crop listing, price negotiation based on government-set base rates, agreement generation, and phased digital payments. By integrating verified user roles and administrative oversight, the platform ensures transparency and trust for both parties. This paper outlines the platform's architecture, methodology, and implementation strategy, highlighting its potential to improve farmer income, streamline procurement, and support policy-driven agricultural trade in India.**

***Index Terms*—Agriculture, Transparency, Digitalization, Negotiation, Marketplace, Connectivity, Sustainability.**

I. INTRODUCTION

Agriculture remains the backbone of the Indian economy, with a significant portion of the population relying on it for livelihood. Despite advancements in technology and policy reforms, farmers still face major challenges in accessing fair markets and earning suitable prices for their produce. The involvement of multiple intermediaries, lack of transparent pricing, and limited reach to institutional buyers often result in reduced profits and exploitation at various levels. While digital platforms like Agribazaar have made strides in improving agricultural marketing, many small-scale farmers continue to remain disconnected from reliable, government-verified buyers.

To address these issues, there is a growing need for a solution that enables direct interaction between producers and purchasers under a transparent and secure environment. KrishiUdyam is a digital initiative aimed at empowering farmers by providing them with a platform to directly sell their produce to verified government-linked buyers. It integrates essential features like real-time product listings, price negotiation based on base rates set by the government, agreement generation, and split payment handling. With the involvement of government authorities, administrative monitoring, and a role-based access system, KrishiUdyam proposes a scalable model to streamline agricultural transactions, improve price fairness, and contribute to the digital transformation of India's agri-supply chain.

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II. LITERATURE REVIEW

The integration of digital technologies in agriculture has opened new avenues for improving efficiency, sustainability, and transparency in farming practices. A growing body of research highlights the significance of Internet of Things (IoT), cloud computing, blockchain, and digital platforms in transforming traditional agriculture.

Sundaravadivel et al. [1] proposed a smart agriculture framework using IoT and cloud computing, enabling real-time monitoring and decision-making. Their work demonstrated how sensor data can be effectively collected and analyzed through cloud infrastructure to optimize irrigation and crop health, reducing resource wastage. Complementing this, Verma and Sood [2] designed a cloud-centric IoT-based farm management system that supports real-time monitoring, weather prediction, and soil condition analysis. Their system also ensures scalability and remote access to agricultural data.

Digital platforms have also played a crucial role in enhancing agricultural marketing. Chandrasekaran [3] investigated the influence of digital platforms in agricultural marketing and found that they contribute significantly to reducing the role of intermediaries and ensuring better pricing for farmers. In rural contexts, the adoption of Information and Communication Technology (ICT) tools has shown promising outcomes. Bisht and Roy [7] conducted a case study demonstrating the positive impact of ICT on the marketing practices of farmers in rural India, especially in terms of market access and price awareness.

Transparency in the agricultural supply chain is another area being strengthened through emerging technologies. Ghosh and Dutta [4] performed a systematic literature review on the application of blockchain in agriculture, concluding that blockchain ensures trust and traceability in supply chains, which are often plagued by information asymmetry and fraud.

In the broader context of sustainable agricultural development, Kumar and Jain [5] emphasized the transformative potential of digital technologies in rural areas. Their study highlighted how digital initiatives contribute to environmental sustainability, economic growth, and the empowerment of rural farmers.

Furthermore, Sethi and Sharma [6] focused on the secure transfer of payments through digital platforms, which is essential for building trust in digital agricultural marketplaces. They designed a secure payment gateway using the Spring Boot framework, ensuring data security in online transactions.

In summary, these studies collectively indicate a strong shift towards digitalization in agriculture, addressing critical issues such as inefficiencies, lack of transparency, poor market access, and insecure payment systems. The synergy of technologies like IoT, cloud computing, blockchain, and secure gateways is paving the way for a more sustainable and inclusive agricultural ecosystem

III. METHODOLOGY

The development of KrishiUdyam follows the Rapid Application Development (RAD) model, which emphasizes iterative design, fast prototyping, and user feedback at every stage. This approach was chosen to ensure timely development while staying aligned with real-world agricultural needs and user expectations.

The process began with a detailed requirement analysis involving stakeholder consultations, including farmers and potential government purchasers. The project team defined four primary user roles—Farmer, Government Authorized Purchaser, Admin, and Government—each with specific access controls and functional responsibilities.

Following the planning phase, modular prototypes were developed for key features such as user registration, product listing, crop price negotiation, agreement generation, and dual-phase payment handling (advance and remaining). These modules were continuously tested and improved through feedback from test users and supervisors.

System architecture was designed using UML diagrams such as Class Diagrams, Activity Diagrams, and Deployment Diagrams to map out system flow and relationships. The backend was built using FastAPI, with a MySQL database for persistent data storage. The frontend was developed using React, and third-party services such as Razorpay and

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Twilio/Gmail SMTP were integrated for payment processing and notifications.

This phased, iterative methodology enabled the development of a scalable and user-friendly platform tailored to streamline agricultural trade between farmers and government-authorized purchasers.

IV. PLATFORM OVERVIEW

KrishiUdyam is a web-based platform designed to digitally connect farmers with government-authorized purchasers, providing a transparent, secure, and role-based agricultural trading environment. The platform is built with usability and scalability in mind, ensuring smooth interaction for all four key roles: Farmer, Purchaser, Admin, and Government Authority.

On the farmer side, users can register, log in, list their agricultural produce, set quantity, and view real-time requests from verified purchasers. Farmers can negotiate prices based on government-suggested base rates and enter into digital agreements. The platform supports a two-phase payment system: advance payment before dispatch and remaining payment after delivery.

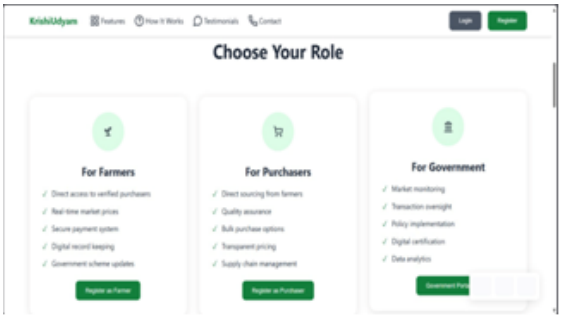

Fig. 1: User Registration Page

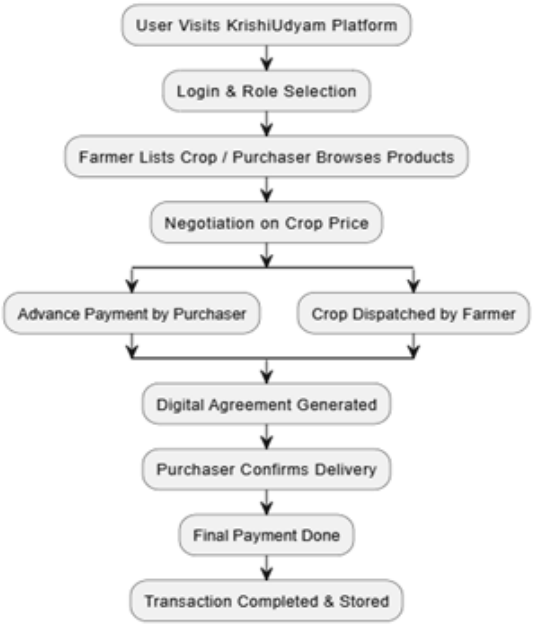

Fig. 2: Flowchart of KrishiUdyam

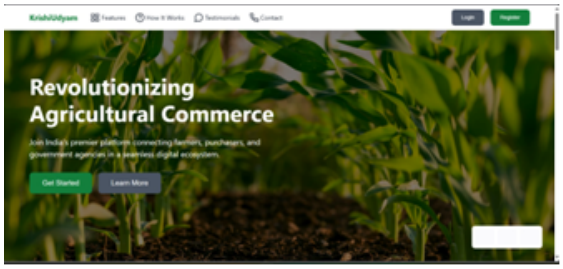

Fig. 3: Farmer Page

Government-authorized purchasers can search for listed produce, view farmer profiles, initiate negotiations, and place orders. Once the farmer agrees to the terms, an agreement is digitally generated and signed by both parties.

The admin dashboard allows system administrators to manage user verification, approve product listings, monitor transactions, and handle complaints. Meanwhile, government officials have access to tools for setting base prices, verifying stakeholders, integrating schemes, and analyzing market trends via a dedicated dashboard.

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The platform is built using ReactJS for the frontend, FastAPI for the backend, and MySQL for data storage. System security is maintained through authentication, authorization, and secure APIs.

V. IMPACT

The implementation of KrishiUdyam has the potential to significantly transform the agricultural marketing landscape by addressing long-standing inefficiencies and creating a direct communication bridge between farmers and government-verified purchasers. By eliminating the role of intermediaries, the platform ensures that farmers receive fair compensation for their produce, thereby improving income stability and financial independence. One of the key impacts is increased price transparency, as negotiations occur based on base prices set by the government, and all transactions are digitally documented. This reduces the possibility of price manipulation and builds trust between stakeholders. Additionally, the two-phase payment system—advance and post-delivery—ensures financial security for farmers and accountability from buyers. For government authorities, KrishiUdyam provides an efficient mechanism for monitoring trade activity, implementing subsidy schemes, and collecting real-time data for policy decisions. It also simplifies the process of verifying participants, enforcing quality standards, and ensuring compliance with agricultural norms. The platform promotes digital literacy and inclusion in rural areas, empowering users to interact with structured marketplaces using familiar, user-friendly interfaces. With its modular and scalable design, KrishiUdyam also lays the foundation for integrating future innovations like AI-driven crop predictions and multilingual support, enhancing its impact further across diverse agricultural communities.

VI. RESULTS AND DISCUSSIONS

To evaluate the effectiveness of the KrishiUdyam platform, multiple test cases were simulated using dummy data for farmers, purchasers, and admin users. The system was tested for functionality, performance, and user experience across its major modules, including product listing, order placement, agreement generation, negotiation handling, and payment processing.

The results indicated that the platform successfully enabled farmers to list produce and receive direct purchase requests from verified government buyers. A price negotiation module was tested with predefined base prices, where both parties could agree on fair rates. Once finalized, the system generated digital agreements that were securely stored and linked to the transaction record.

A notable observation was the efficiency of the dual-payment system, where farmers first received an advance and later the remaining amount after dispatch confirmation. This not only ensured financial trust but also increased user confidence in adopting digital trade.

User feedback from simulated interactions suggested that the platform UI is intuitive, and role-based access made it easier for each user type to operate independently. Admin functionalities like user verification, product approval, and complaint tracking were tested successfully.

In discussions with academic reviewers and test users, it was highlighted that KrishiUdyam promotes transparency, accessibility, and real-time traceability, which are key elements missing in traditional agricultural marketing channels. The platform's architecture also demonstrated scalability, making it adaptable to more regions and potential government scheme integrations.

VII. TECHNOLOGY STACK AND ARCHITECTURE OF KRISHIUDYAM

The development of *KrishiUdyam* is based on a robust Java-based architecture designed to deliver high performance, modularity, and scalability. The selected technologies ensure smooth integration of multiple system components and provide a secure environment for agricultural transactions.

A. Frontend

- **HTML5, CSS3 & JavaScript:** Used for building a responsive and user-friendly interface.
- **Bootstrap:** For UI styling and layout responsiveness.

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- **jQuery:** For handling dynamic interactions and DOM manipulation.

B. Backend

- **Java (Spring Boot):** The core backend framework used to build RESTful APIs and manage business logic. Spring Boot offers rapid development with embedded server support and robust dependency management.
- **Spring Security:** For implementing secure authentication, authorization, and role-based access control.
- **Hibernate (JPA):** ORM framework for mapping Java objects to database tables and handling CRUD operations efficiently.

C. Database

- **MySQL:** A widely-used relational database for storing user data, crop listings, orders, agreements, and transactions.
- **JDBC:** For connecting Java applications with the MySQL database when Hibernate is not used.

D. Authentication & Security

- **JWT (JSON Web Tokens):** Used for secure login and access management.

E. Payment Gateway

- **Razorpay API:** Can be integrated for secure online payment processing (advance and remaining payments).

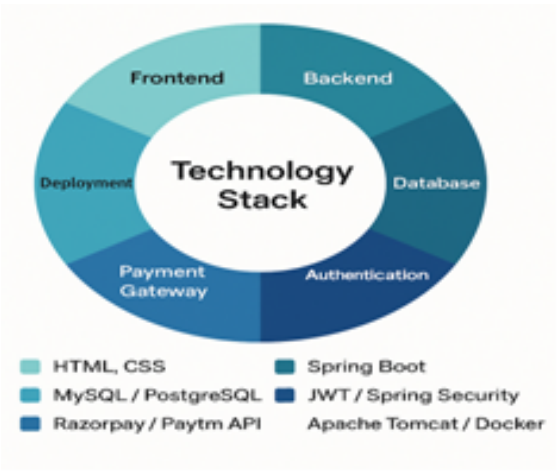

Fig. 4: Technology stack of KrishiUdyam

F. Deployment

- **Apache Tomcat:** As the embedded web server in Spring Boot applications.
- **Maven:** For project build and dependency management.
- **GitHub:** For version control and collaborative development.

VIII. CONCLUSION

This Java-based technology stack allows *KrishiUdyam* to function as a secure, scalable, and maintainable platform, offering smooth interactions between farmers, government buyers, and administrators.

KrishiUdyam is a digitally driven solution aimed at transforming the traditional agricultural marketing system by directly linking farmers with government-authorized purchasers. Through this platform, the need for intermediaries is eliminated, enabling farmers to access fair prices, secure payments, and transparent trade mechanisms. The system's design supports real-time product listings, structured negotiations based on base prices, and digital agreements, all of which contribute to building a more reliable and efficient marketplace.

By implementing features like phased payment processing, administrative monitoring, and government integration, KrishiUdyam promotes trust, transparency, and accountability across all user

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roles. The use of modern technologies such as Java Spring Boot, MySQL, and Razorpay ensures that the platform is secure, scalable, and adaptable for future enhancements.

Overall, KrishiUdyam offers a practical approach to improving the agricultural ecosystem in India, empowering farmers, simplifying procurement for verified buyers, and supporting government initiatives for sustainable and inclusive agricultural growth. ACKNOWLEDGMENT I would like to express my sincere gratitude to Prof. Nisha Rathi, assistant professor Acropolis Institute of Technology and Research, Indore, for her invaluable guidance and support throughout the duration of this research project. Her expertise and insights have been instrumental in shaping the direction of this study.

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