

Warehousing and Distribution of Agricultural products using Blockchain

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Abstract— The Agri- Connect2.0 technology set up a problem with the farming business workshop. This weakness is shown by how hard it's for growers to sell their crops at prices that are allowed to be fair. In order to break this problem, our group came up with the idea for the Agri- Connect PWA app, which is a web operation that makes life easy for growers. Our PWA, which is called Agri- Connect, gives growers the freedom to decide how important they want to charge for their recently gathered goods. growers are more likely to get the plutocrat they earn from the trade of their goods if they do not pay commissions to mediators and rather make direct connections with guests. Also, the original portion shops, which are also used to store the particulars, help with the distribution of ranch goods and with getting those goods to where they need to go. Within each portion shop, there are separate doors for managing orders and storing information about guests and growers. All of these spots are translated with blockchain technology to make sure they work and are open to everyone. Our Progressive Web operation(PWA) works well with WhatsApp, so growers can now partake information about their crops and talk to buyers through an easy- to- use point. This was possible because our PWA was linked to WhatsApp. Because of this, it's easier for growers to vend their goods. Our thing is to close the gap between husbandry and technology so that growers can have further control over their businesses and make further plutocrats. We plan to do this by taking advantage of how numerous people use WhatsApp and how easy it's to use. It's a one- of-a-kind result that was made to change the agrarian business and give growers more fair ways to vend their goods. This exact answer is called Agri- Connect PWA.

Keywords—Progressive web Application, DigitalMarketing, No brokerage amount, Ration shops, User friendly.

I. INTRODUCTION

AGRI CONNECT, positioned at the forefront of agricultural innovation, has not only embraced but redefined the landscape of agricultural marketing with its cutting-edge progressive web application. More than just a platform for transactions, AGRI CONNECT is a transformative force, serving as a dynamic bridge connecting producers and consumers. In doing so, it doesn't merely facilitate

transactions; it revolutionizes the entire experience for both farmers and buyers.

At the core of AGRI CONNECT's mission is a profound commitment to amplify farmers' profits and simplify the purchasing process for buyers, thereby fostering a more equitable and efficient agricultural ecosystem. The platform introduces a paradigm shift by empowering farmers to take control of their pricing strategies, eliminating the need for middlemen and establishing direct access for consumers. This groundbreaking approach ensures that farmers receive the rightful rewards for their labor and produce, marking a departure from traditional models that often left farmers at a disadvantage.

AGRI CONNECT's user-friendly interface is a testament to its commitment to inclusivity. Seamless Login/Signup options cater to Customers, Farmers, and Transport Agents, providing a welcoming and accessible entry point. Users can choose their preferred language, enhancing the platform's accessibility to a diverse user base. Intelligent filters simplify the product search process, allowing users to find items effortlessly based on criteria such as Type, Variety, Availability, and Location. Each product listing is accompanied by comprehensive seller details, contributing to enhanced transparency in the agricultural marketplace.

The purchasing process on AGRI CONNECT is designed to be a hassle-free experience. Customers can proceed to checkout with ease or save items for future consideration, adding a layer of flexibility to the user experience. The platform offers diverse payment options, catering to various preferences including G-pay, PayPal, Paytm, Phone Pe, Amazon Pay, or Cash on Delivery. Beyond facilitating transactions, AGRI CONNECT incorporates curated reviews, ratings, and detailed seller information to build consumer confidence, fostering a sense of trust and reliability in the platform.

In a world increasingly concerned about data security and transaction transparency, AGRI CONNECT stands out by incorporating blockchain technology. This ensures that all transactions conducted on the platform are secure and transparent, instilling trust in both farmers and consumers. The innovative use of blockchain goes beyond mere functionality; it signals AGRI CONNECT's dedication to

setting new standards in agricultural technology, embracing the latest advancements to create a secure and trustworthy marketplace.

AGRI CONNECT adopts a hybrid model that wisely caters to both digital and traditional consumers. By forging strategic partnerships with local shops, the platform streamlines distribution, reducing waste and contributing to a more sustainable agricultural supply chain. This dual approach acknowledges the diverse needs of consumers, recognizing that different markets may require different solutions.

Dedicated to farmer empowerment, AGRI CONNECT takes a step further by integrating seamlessly with WhatsApp and a user-friendly online portal. This integration expands the reach of agricultural markets, facilitating easy communication, information sharing about crops, and direct interactions with buyers. This feature not only simplifies the digital experience for farmers but also empowers them to navigate the complexities of the digital marketplace with confidence.

AGRI CONNECT's holistic approach encompasses technological innovation, transparency, sustainability, and farmer empowerment, making it a pioneer in the evolution of agricultural marketing. By combining cutting-edge technology with a deep commitment to the welfare of farmers and the efficiency of the agricultural supply chain, AGRI CONNECT is not just a platform; it's a catalyst for positive change in the agricultural sector.

II. DESIGN METHODOLOGY

A. *Agri Connect: Transforming Agriculture with Seamless Design*

Agri Connect, an avant-garde web development venture, stands at the forefront of a paradigm shift in agriculture, driven by a design methodology that intricately weaves together technological innovation, user empowerment, and sustainability principles. Going beyond the conventional boundaries of functionality, Agri Connect is steadfastly committed to uplifting the welfare of farmers by meticulously crafting an ecosystem that not only maximizes their profits but also ensures fair pricing and minimizes wastage.

The crux of Agri Connect's transformative design philosophy centers around the development of a Progressive Web Application (PWA). This isn't merely a technological choice; it's a strategic decision to enhance the user experience across a spectrum of devices, ensuring the platform is not only accessible but also intuitive for farmers, buyers, and stakeholders. This adaptability underscores a commitment to inclusivity, recognizing the diverse technological landscape that our users navigate.

Efficiency and sustainability are embedded in the very fabric of Agri Connect's design. The platform orchestrates a seamless transportation network, optimizing the delivery of goods to designated ration shop warehouses. This strategic approach not only minimizes post-harvest wastage but also extends the reach of agricultural products, contributing to a more sustainable and efficient supply chain. The integration of secure warehousing within ration shops serves as a

testament to Agri Connect's dedication to safeguarding farmers' earnings.

Blockchain, a cornerstone of Agri Connect's design, fortifies the platform with robust data security and management. Beyond ensuring transactional transparency, blockchain technology establishes a foundation of trust among stakeholders by safeguarding the integrity of critical data. This integration reflects a commitment to creating a trustworthy and tamper-proof agricultural transaction ecosystem, fostering a secure environment for all participants.

In a strategic blend of tradition and innovation, Agri Connect leverages the ubiquitous WhatsApp platform. Farmers can seamlessly share crucial product details with potential buyers, initiating a user-friendly and automated data extraction process. This not only streamlines crop showcasing and selling but also expands the reach of agricultural products through an intuitive online portal. Agri Connect stands as a testament to the harmonious marriage of technology and tradition, recognizing the importance of accessible and familiar tools in fostering widespread adoption.

Agri Connect's commitment to a buyer-oriented platform extends beyond technological facets to facilitating secure transactions and providing a seamless purchasing journey. By harmonizing cutting-edge technology, addressing user needs, and embracing sustainability principles, Agri Connect emerges as a trailblazer in the agricultural sector.

Agri Connect's design methodology transcends mere aesthetics; it represents a strategic, empathetic, and comprehensive approach to agricultural transformation. Through the seamless integration of blockchain, user-friendly interfaces, and a steadfast commitment to sustainability, Agri Connect stands as a pioneer, poised to revolutionize and elevate the agricultural landscape for the betterment of farmers and the industry as a whole.

With an unwavering focus on innovation, user empowerment, and sustainability, Agri Connect sets the stage for a new era in agricultural practices, where technology and compassion intersect to create a thriving and equitable ecosystem for all stakeholders. The platform's multifaceted approach ensures not only the economic upliftment of farmers but also the establishment of ethical and transparent agricultural practices.

The commitment to inclusivity through an adaptable PWA showcases Agri Connect's understanding of the diverse technological landscape in which farmers operate. This adaptability ensures that the platform is accessible to users across different devices, acknowledging the digital diversity prevalent in agricultural communities. By addressing these nuances, Agri Connect is not only modernizing agricultural transactions but also ensuring that the benefits of technology are accessible to all, bridging the digital divide in rural areas.

Efficiency and sustainability are not just buzzwords for Agri Connect; they are integral components woven into the fabric of its design. The seamless transportation network and secure warehousing not only minimize wastage but also contribute to a more sustainable and eco-friendly agricultural supply chain. By optimizing the delivery of goods, Agri Connect reduces the environmental impact of

transportation, aligning its goals with broader sustainability initiatives.

The incorporation of blockchain technology elevates Agri Connect's platform to a new standard of trust and security. Beyond providing transparency in transactions, blockchain ensures the integrity and immutability of data, creating a tamper-proof system that instills confidence among all stakeholders. This commitment to data security not only protects the interests of farmers but also establishes Agri Connect as a reliable and trustworthy platform in the agricultural domain.

In recognizing the importance of traditional communication channels, Agri Connect's use of WhatsApp demonstrates a thoughtful integration of technology with the familiar. By leveraging a widely used messaging platform, the platform facilitates seamless communication between farmers and buyers, transcending language and technological barriers. The automated data extraction process further streamlines operations, showcasing Agri Connect's dedication to user-friendly solutions grounded in real-world usability.

The buyer-oriented focus of Agri Connect ensures that the platform is not just a tool for farmers but also a marketplace that facilitates secure transactions. By providing a seamless purchasing journey, Agri Connect enhances the overall user experience, making agricultural transactions more accessible and transparent. This approach aligns with the platform's overarching goal of maximizing profits for farmers while minimizing wastage.

Agri Connect's design methodology is a masterclass in holistic and thoughtful design. By addressing the unique challenges of the agricultural sector through technology, sustainability, and user empowerment, Agri Connect emerges as a beacon of progress. The platform is not just transforming agricultural transactions; it is redefining the relationship between technology and agriculture, ushering in an era of sustainable, transparent, and equitable practices. As Agri Connect continues to evolve, it not only promises economic benefits for farmers but also embodies a model for responsible and impactful technological interventions in traditional sectors.

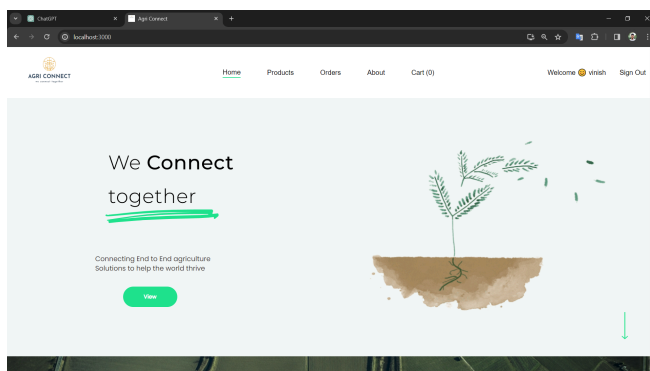


Fig 1. Screenshot of User Portal

III. PROPOSED SYSTEM

AGRICONNECT: Bridging Convenience and Efficiency in Agricultural Transactions, where convenience and efficiency converge. Our meticulously designed website caters to the needs of customers, farmers, and transport agents alike. The journey begins with a seamless Login/Signup experience, tailored to your specific role. Language customization options ensure comfort throughout the Progressive Web Application (PWA) experience.

Navigating AGRICONNECT is made simple with advanced filtering options based on Type, Variety, Availability, and Location. Find high-quality products curated to your needs, accompanied by detailed seller information for informed decision-making. Our platform offers two purchasing options: direct purchase or cart addition. Real-time chat and voice bot assistance enhance your journey.

Payments are personalized too—secure online transactions or Cash on Delivery cater to your preferences. Bridging technology and agriculture, AGRICONNECT provides an intuitive platform for farmers. The user-friendly interface empowers them to access diverse products seamlessly. Seamless product delivery is ensured through our partnership with local ration shops. Sourcing directly from these shops minimizes waste and boosts availability. Fairness and transparency are guaranteed through our pricing model.

Blockchain technology secures and transparently stores customer and farmer data, fostering trust in every transaction. Ration shops also benefit from individual portals, enhancing efficiency in record-keeping and stock management.

As we delve deeper into the AGRICONNECT ecosystem, the emphasis on user experience becomes increasingly apparent. The Login/Signup process serves as the gateway to a personalized journey, acknowledging the distinct roles of customers, farmers, and transport agents. This tailored approach not only simplifies the onboarding process but also sets the tone for a platform that values the unique needs of each user.

The Progressive Web Application (PWA) architecture ensures a seamless and responsive experience across devices, allowing users to engage with AGRICONNECT at their convenience. The inclusion of language customization options adds an extra layer of accessibility, breaking down linguistic barriers and making the platform more inclusive for users with diverse language preferences.

Navigating the platform is an intuitive experience, thanks to advanced filtering options. Users can effortlessly refine their search based on product Type, Variety, Availability, and Location, streamlining the process of finding the right agricultural products. The curated selection of high-quality products is accompanied by detailed seller information, empowering users to make informed decisions about their purchases.

The purchasing options provided—direct purchase or cart addition—reflect AGRICONNECT's commitment to flexibility. Users can choose the method that aligns with their preferences and needs, enhancing the overall convenience of the transaction process. Real-time chat and voice bot assistance serve as valuable support features,

addressing user queries and providing guidance throughout the journey.

In the realm of payments, AGRICONNECT recognizes the importance of personalization. Whether users prefer secure online transactions or the traditional approach of Cash on Delivery, the platform accommodates diverse payment preferences. This flexibility contributes to a user-centric approach, acknowledging the varied financial preferences of the user base.

The symbiotic relationship between technology and agriculture takes center stage in AGRICONNECT's commitment to farmers. The platform's user-friendly interface is designed to empower farmers, providing them with seamless access to a diverse range of agricultural products. This not only simplifies the procurement process for farmers but also contributes to the overall modernization of the agricultural sector.

Seamless product delivery is a key focus area, and AGRICONNECT has strategically partnered with local ration shops to achieve this goal. By sourcing directly from these shops, the platform minimizes waste and enhances product availability, creating a supply chain that is both efficient and sustainable. The emphasis on fairness and transparency is evident in the pricing model, ensuring that every transaction is conducted with integrity.

Blockchain technology, a cornerstone of AGRICONNECT, plays a pivotal role in securing and transparently storing customer and farmer data. This not only safeguards the sensitive information involved in transactions but also instills trust among all stakeholders. The decentralized nature of blockchain ensures that data remains tamper-proof, contributing to a robust and secure platform.

Ration shops, integral partners in the AGRICONNECT ecosystem, benefit from individual portals that enhance efficiency in record-keeping and stock management. This digitization of processes not only streamlines operations for ration shops but also contributes to the overall efficiency of the agricultural supply chain.

AGRICONNECT emerges as a comprehensive solution that seamlessly integrates technology into the agricultural sector. With a keen focus on user experience, flexibility, transparency, and efficiency, the platform represents a significant step forward in modernizing agricultural transactions. By bridging the gap between convenience and efficiency, AGRICONNECT envisions a future where agricultural transactions are not only streamlined but also contribute to the sustainable growth of the sector.

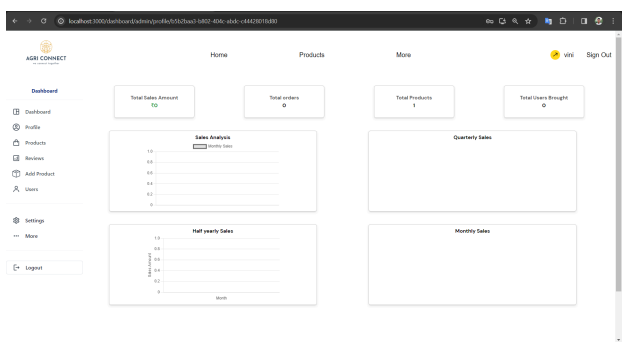


Fig 2. Screenshot of Farmer’s Portal

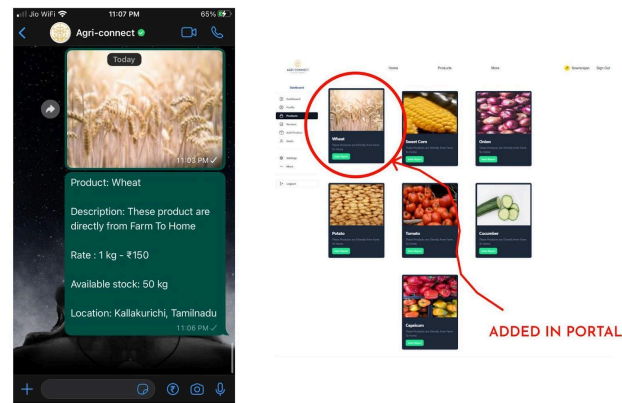


Fig 3. Whatsapp Integration

AgriConnect: Revolutionizing Agricultural Transactions through WhatsApp-Integrated Farming

In the dynamic landscape where agriculture meets technology, AgriConnect stands as a trailblazer, seamlessly merging a Progressive Web Application (PWA) with WhatsApp integration. This symbiotic relationship propels the agricultural sector into a new era, empowering farmers and stakeholders with unprecedented connectivity and efficiency.

A. AgriConnect: Pioneering WhatsApp-Integrated Farming

At the heart of AgriConnect's innovation lies the integration of a Progressive Web Application with WhatsApp, creating a unique and user-friendly portal. This integration is not merely a technical enhancement but a strategic move to empower farmers. Through this dynamic synergy, farmers can effortlessly showcase detailed crop information and establish direct connections with potential buyers.

By harnessing the widespread use of WhatsApp, farmers can transcend geographical barriers, presenting vital details about their crops in real-time. Product images, pricing information, and venue details are seamlessly shared, providing a comprehensive view accessible on mobile devices. This instant and direct communication channel transforms the way farmers engage with buyers, fostering a more personalized and efficient interaction.

B. Simplifying Crop Marketing and Sales

AgriConnect redefines the landscape of crop marketing and sales by offering farmers a platform to present their crop details to a broader audience. Leveraging the omnipresence of WhatsApp, farmers can share crucial information directly with potential buyers. From product images that showcase the quality of their produce to transparent pricing and location details, every aspect of the crop becomes easily accessible to interested parties.

The innovative aspect of AgriConnect lies in its ability to extract data seamlessly from WhatsApp conversations, automating the process of uploading this information to the online portal. This not only expands the reach of agricultural products but also significantly enhances the efficiency of the marketing and sales cycle. AgriConnect's commitment to

innovation is evident in its approach to simplify and amplify the impact of agricultural transactions.

C. Streamlined Purchasing Process

AgriConnect introduces a secure online portal that serves as the gateway to a streamlined purchasing process. Buyers are presented with a user-friendly interface where they can explore a diverse range of agricultural products, view high-quality images, and compare prices. The integration of WhatsApp adds a transformative layer to this process, breaking down digital barriers and making the purchasing journey more accessible to a wider audience.

In the digital age, where online transactions are becoming the norm, AgriConnect recognizes the need for security and convenience. The platform ensures that the purchasing process is not only efficient but also secure, providing buyers with a seamless experience. The integration of WhatsApp into the purchasing journey serves as a testament to AgriConnect's commitment to embracing technology in a way that enhances user experience.

D. Innovation, User-Centricity, and Integration: AgriConnect's Holistic Vision

AgriConnect's mission goes beyond being a mere platform; it is a visionary approach that leverages technology to empower farmers, enhance visibility, and streamline transactions in the agricultural sector. The amalgamation of a user-friendly portal with WhatsApp integration underscores AgriConnect's commitment to innovation and efficiency.

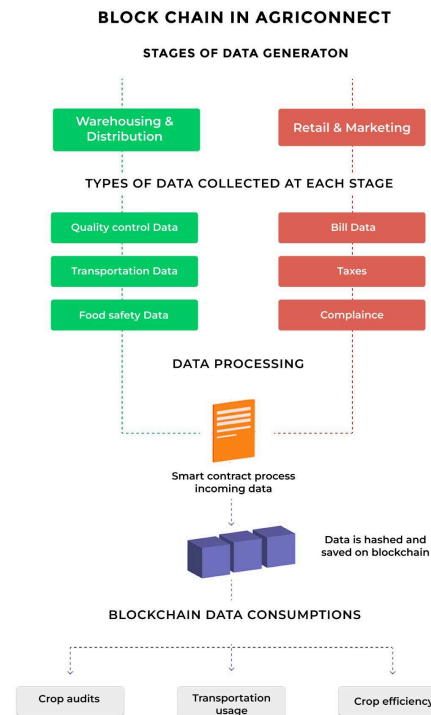
At its core, AgriConnect stands as a symbol of technological evolution meeting the traditional realms of agriculture. The platform's commitment to user-centricity ensures that every feature is designed with the end-users—farmers and buyers—in mind. The integration of WhatsApp serves as a bridge, connecting the two ends of the agricultural transaction spectrum seamlessly.

E. The Holistic Impact: A Connected and Sustainable Agricultural Ecosystem

AgriConnect is not just a platform; it is a transformative force driving the agricultural sector towards a connected and sustainable future. The innovative marriage of a secure online portal and WhatsApp integration creates a holistic approach to agricultural transactions. By simplifying processes, enhancing visibility, and fostering direct connections, AgriConnect envisions a future where agriculture and technology converge for the greater good.

As AgriConnect pioneers the WhatsApp-integrated farming approach, it sets the stage for a more connected, efficient, and transparent agricultural ecosystem. This is not just a technological upgrade; it is a shift in the paradigm of how agricultural transactions are conducted and experienced. With a vision grounded in innovation and a commitment to empowering farmers, AgriConnect stands as a testament to the possibilities that emerge when technology and agriculture converge with purpose and foresight.

IV. FLOW CHART



Flow chart here described explains the blockchain in Agriconnect

V. PWA FEATURES

A. WhatsApp Integration: The incorporation of WhatsApp into AgriConnect introduces a revolutionary channel for farmers, simplifying the sharing of crucial crop details without the need for advanced technical expertise. By leveraging the user-friendly interface of WhatsApp, farmers can seamlessly communicate product images, pricing information, and venue details to potential buyers. This intuitive integration eliminates communication barriers, empowering farmers to showcase their crops effectively and engage with buyers in a more accessible and immediate manner.

B. Wider Market Reach: Connecting Farmers with a Global Customer Base

AgriConnect transcends geographical constraints, offering farmers an unprecedented opportunity to extend their customer base beyond local boundaries. Through the platform's innovative features, farmers can now connect with buyers from diverse locations, unlocking new markets and paving the way for a more extensive network of potential customers. This expanded reach not only benefits individual farmers but also contributes to the diversification and globalization of agricultural trade.

C. Improved Visibility: Elevating Product Showcase for Enhanced Marketing

The user-friendly portal provided by AgriConnect becomes a powerful tool for farmers to enhance the visibility of their products. With a well-designed interface that prioritizes ease of navigation, farmers can effectively showcase their crops, attracting more customers and creating a visually appealing representation of their agricultural offerings. This

heightened visibility goes beyond traditional marketing approaches, making AgriConnect a catalyst for transforming how agricultural products are presented and perceived in the market.

D. Convenient Purchasing: Streamlining Transactions for Seamless Buyer Experience

AgriConnect doesn't just cater to farmers; it provides a convenient and secure platform for buyers as well. Through the online portal, buyers can easily compare prices, access product information, and make secure purchases. This streamlined purchasing process not only simplifies transactions for buyers but also ensures a seamless and trustworthy experience for both parties involved. AgriConnect's commitment to convenience extends to every aspect of the transaction, creating a user-centric environment that fosters trust and satisfaction.

E. Time and Cost Savings: Enhancing Efficiency through Automated Processes

One of the notable advantages of AgriConnect is its ability to automate the transfer of data from WhatsApp to the online portal. This automation not only saves valuable time for farmers but also reduces operational costs associated with manual data entry. By freeing farmers from the burden of administrative tasks, AgriConnect allows them to focus on core agricultural activities, fostering increased productivity and efficiency. This innovative approach to data transfer reflects AgriConnect's dedication to leveraging technology for the betterment of farmers, ensuring that they reap the benefits of both time and cost savings.

The features offered by AgriConnect extend far beyond the conventional realms of agricultural transactions. By seamlessly integrating WhatsApp, broadening market reach, enhancing product visibility, streamlining purchasing processes, and promoting time and cost savings, AgriConnect emerges as a comprehensive solution that addresses the diverse needs of both farmers and buyers. This platform represents a paradigm shift in the agricultural landscape, where technology is harnessed to create a more connected, efficient, and sustainable ecosystem for all stakeholders involved.

VI. RESULT AND CONCLUSION

AGRICONNECT, at its core, is a groundbreaking manifestation of technology's profound impact on agriculture, coupled with a dedicated mission for the holistic upliftment of farmers. Our flagship Progressive Web App (PWA) serves as a dynamic catalyst, propelling digital marketing strategies that, in turn, significantly enhance farmer profits. By seamlessly connecting farmers with end-users and ration shops, AGRICONNECT plays a pivotal role in fostering efficient communication channels within the agricultural ecosystem.

As we navigate the digital landscape, AGRICONNECT not only leverages technological advancements but also serves as a comprehensive resource hub for farmers. Beyond the realm of profit-centric interactions, our platform offers invaluable farming guidelines and practices, effectively empowering farmers with the knowledge and tools needed to enhance productivity. In doing so, we contribute directly

to the larger narrative of Digital Agriculture, playing a key role in propelling India's growth in the agricultural sector.

What sets AGRICONNECT apart is its commitment to transcending the conventional limits of e-commerce in agriculture. While e-commerce platforms often focus solely on transactional aspects, our user-friendly app optimizes farming practices, acknowledging the intricate nuances that govern the agricultural domain. This comprehensive approach ensures that AGRICONNECT is not just a transactional platform but a transformative force that enhances the overall agricultural landscape.

AGRICONNECT envisions a future where technology and tradition seamlessly coexist, creating a harmonious farming ecosystem. It is not merely about embracing technology but about striking a balance between innovation and age-old agricultural practices. This approach not only ensures the sustainability of farming practices but also aligns with broader global goals.

In alignment with the United Nations Sustainable Development Goals (SDGs), AGRICONNECT actively contributes to the targets of Decent Work and Economic Growth (SDG 8), Sustainable Cities and Communities (SDG 11), and Responsible Consumption and Production (SDG 12). Through our commitment to these goals, we aim to create a positive ripple effect, influencing not only individual farmers but also fostering sustainable development within communities and regions.

At its core, AGRICONNECT is more than just a technological solution; it is a commitment to empowerment, transformation, and sustainability. By actively addressing the challenges faced by farmers and aligning with global development goals, we are not just offering a digital tool; we are shaping a brighter, more sustainable future for farmers and agriculture as a whole. AGRICONNECT stands as a testament to the potential of technology to drive positive change, ensuring prosperity and growth in the agricultural sector.

REFERENCES

- [1] Digital Market: E-Commerce Application for Farmers: <https://ieeexplore.ieee.org/document/8697615>
- [2] Customer demanding products in online shopping — A novel framework <https://ieeexplore.ieee.org/document/8186720>
- [3] Developing an E-commerce website <https://ieeexplore.ieee.org/document/7522526>
- [4] E-COMMERCE <https://en.wikipedia.org/wiki/E-commerce>
- [5] Agro App: An application for healthy living <https://ieeexplore.ieee.org/document/6965213>
- [6] "Digital Agriculture: feeding the future". Project Breakthrough. Retrieved 10 December 2019.
- [7] Blahe, Wahyu (10 November 2019). "Digital Farmers". petanidigital.id. Retrieved 12 December 2020.
- [8] Schieffer, J.; Dillon, C. (1 February 2015). "The economic and environmental impacts of precision agriculture and interactions with agro-environmental policy". *Precision Agriculture*. 16 (1): 46–61. doi:10.1007/s11119-014-9382-5. ISSN 1573-1618. S2CID 9071060.
- [9] "Agriculture and food: the rise of digital platforms - Paris Innovation Review". parisinnovationreview.com. Retrieved 26 July 2019.
- [10] Lonie (2010). "Innovations in Rural and Agricultural Finance: M-PESA: Finding New Ways to Serve the Unbanked in Kenya". IFPRI: 2020 Vision for Food, Agriculture and the Environment.