

A Project report on

Block Chain Based Portal for Farmers

A Dissertation submitted to JNTU Hyderabad in partial fulfillment of the academic requirements for the award of the degree.

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CERTIFICATE

This is to certify that the Major Project Phase I report entitled " **Block Chain Based Portal for Farmers** " being submitted by V.Datta Sai (20H51A0525), K.Sreehaas (20H51A0567), T.Himesh Baradwaj (20H51A05A7) in partial fulfillment for the award of **Bachelor of Technology in Computer Science and Engineering** is a record of bonafide work carried out his/her under my guidance and supervision.

The results embodies in this project report have not been submitted to any other University or Institute for the award of any Degree.

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ABSTRACT

Farmers, as well as agriculture, are the foundation of life. A lot of work has been done towards the enhancement of agriculture by developing technologies that support directly and indirectly to agriculture. The Government of India has also taken many initiatives for the same. Few examples of such portals are Krishijagran.com, farmer.gov.in, agricrop.nic.in and agriwatch.com etc. A range of research shows that with the various enhancements in the field of ICT, the farmers are unable to take its advantage and fail to get the proper sale value for their crops. So, Considering the features of blockchain such as Immutability, Decentralization and Maintaining the History of transaction details, this project highlights the usage of blockchain technology with farmer's portal that keep the track of selling and buying information of crops. This blockchain system will benefit the farmers or vendors and individuals by preserving the contract of trade. An interface for the farmers is designed using a Python programming language in addition to the Blockchain Technology, which is used to store the information related to seller, buyer, selling and buying an item and total value transacted.

CHAPTER 1

INTRODUCTION

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INTRODUCTION

1.1. Problem Statement

The proposed blockchain-based portal is designed to tackle the challenges related to crop demand and sale prices, with a primary focus on securing the livelihood of farmers and ensuring fair compensation for their agricultural produce. This platform serves as a digital companion for farmers, streamlining the process of selling their crops, obtaining just prices, and maintaining comprehensive records of their transactions. Our study and this project's main objective is to lead the next generation towards a decentralized network, providing them with essential services, thereby fostering agricultural sustainability and empowerment.

1.2. Research Objective

The primary objective of this research is to assess the feasibility and potential impact of integrating blockchain technology with farmer's portals in the Indian agricultural sector. Specifically, our research aims to achieve the following:

Evaluate Technological Viability: Determine the technical feasibility of integrating blockchain technology with existing farmer's portals and assess the compatibility of such a system with the Indian agricultural landscape.

Assess Transparency and Trust: Investigate how the use of blockchain technology enhances transparency, security, and trust within agricultural trade, with a focus on how it can benefit both farmers and other stakeholders.

Examine Efficiency Gains: Analyze the potential efficiency gains in agricultural trade processes, including reduced paperwork, faster transactions, and minimized reliance on intermediaries.

Empower Farmers: Assess the extent to which the proposed blockchain-based system empowers farmers by enabling them to secure fair prices for their crops, access financial services, and take control of their trade transactions.

Analyze Market Impact: Explore the broader economic and market impact of implementing blockchain technology, including its potential to transform the agricultural ecosystem in India.

1.3. Project Scope and Limitations

This project is titled “BLOCKCHAIN BASED PORTAL FOR FARMERS”. It is an online portal for farmers, a single gateway through which the e-commerce activity of crops can be performed. This portal helps farmers to sell their crops and track payments securely. The use of Blockchain technology ensures that the data is tamperproof and whole process of supply chain is transparent and immutable.

CHAPTER 2

BACKGROUND

WORK

CHAPTER 2

BACKGROUND WORK

2.1 BLOCKCHAIN TECHNOLOGY IN FARMER'S PORTAL

2.1.1 Introduction

In the era of information and communication technology, a farmer's portal has consistently proven to be invaluable for farmers, offering user-friendly access to vital agricultural information. The Government of India has also taken significant initiatives in this regard, exemplified by portals like Krishijagran.com, farmer.gov.in, agricoop.nic.in, and agriwatch.com. Additionally, various e-commerce websites such as fert.nic.in and enam.gov.in are available to support farmers. Blockchain technology has gained prominence across several sectors, enabling decentralized computation and information sharing. In the context of agriculture, blockchain offers the potential to establish a secure, collaborative platform for multiple authoritative domains, even when trust among them is limited. This can enhance the decision-making process and establish a reliable information recording system. As blockchain operates as a public ledger, it can address aspects like transaction commitment protocols, consensus, security, privacy, and authenticity. Cryptography plays a fundamental role in blockchain functionality, with public key encryption forming the basis of blockchain wallets and transaction security, while cryptographic hash functions ensure immutability. Numerous efforts have been made to ensure these aspects within blockchain technology, and the presented portal is a valuable contribution in this regard. It aims to create a secure platform for farmers to conduct electronic transactions with customers, ensuring a transparent contract between parties and facilitating fair pricing for agricultural products. Furthermore, it serves as a centralized record-keeping platform for trade transactions.

In the modern age, access to information and its availability are crucial for making informed decisions in a timely manner. Information retrieval from the vast global repository on the internet is made possible by the advancement of information and communication technology. However, much of the internet's content is primarily in English, which poses a challenge for those who lack technical skills or proficiency in the English language.

This issue is particularly significant in developing countries like India, where a substantial portion of the population is English illiterate. Even among English-literate individuals, many struggle to find the information they need due to a lack of expertise in the language. Indian farmers often fall into this category, facing challenges in both technical and English language literacy.

2.1.2 Merits , Demerits and Challenges

Merits:

- **Fair Pricing:** The portal ensures fair pricing for agricultural products, benefiting farmers economically and providing them with more stable income sources.
- **Transparency:** Transactions conducted on the platform are recorded in a tamper-proof manner, enhancing transparency and trust in the system.
- **Centralized Record-Keeping:** The portal centralizes record-keeping, making it easier for farmers to efficiently manage their trade transactions.
- **Data Security:** Utilizing blockchain technology enhances data security, safeguarding the integrity of records and protecting sensitive information.
- **Decentralized Computation:** The platform supports decentralized computation and information sharing, fostering collaboration among multiple authoritative domains, even in cases with limited trust. This enhances informed and rational decision-making.

Demerits:

- **Access and Infrastructure:** The portal's success relies on access to necessary technology and infrastructure, which may not be universally available to all farmers, potentially creating a digital divide.
- **Internet Connectivity:** Dependence on reliable internet connectivity could pose challenges, especially in rural areas where such connectivity may be inconsistent.
- **Implementation Costs:** The implementation and maintenance of the platform can be costly, which may deter smaller farmers with limited resources.
- **Data Privacy and Security:** Ensuring data privacy and security can be complex and costly, particularly if not adequately addressed in the system's design and operation.

Challenges:

- **Widespread Adoption:** Ensuring widespread access and adoption of the portal, especially in rural areas, is a primary challenge, necessitating efforts to overcome digital illiteracy and provide essential infrastructure.
- **Multilingual Design:** The portal must be designed to accommodate multiple languages and regional dialects to effectively serve India's diverse farming community.
- **Data Privacy:** Robust measures are essential to protect sensitive information, including personal and financial data.
- **Scalability:** The platform's scalability and performance under heavy loads must be carefully considered to handle a significant volume of transactions effectively.
- **Regulatory Framework:** Establishing regulatory and legal frameworks is crucial to govern the operation of the portal and address potential disputes or issues in electronic transactions.

2.1.3 Implementation of blockchain technology in farmer's portal

Sellers:

Seller users begin by registering, providing a valid email and mobile number for communication purposes. Upon registration, the admin is responsible for activating these seller accounts. Once activated, sellers can log in to the system. Sellers are granted the ability to add new items, update existing listings, and adjust item prices. This empowers them to expand their market reach and reduces the need for intermediaries in the selling process.

Buyers:

Similar to sellers, buyer users also commence their journey with registration, requiring valid email and mobile information for future communications. Admin approval is necessary before these buyer accounts become active, allowing users to access the system. Buyers are then able to browse and purchase products that meet their requirements. They can add products to their shopping cart and remove items as needed. After finalizing their selections and verifying the cart, users can proceed to the checkout process.

Admin:

Administrators have access to the system via their own credentials. They are responsible for activating both seller and buyer accounts. Only activated users can log in to the application. Additionally, the admin user has the capability to oversee all transactions conducted by buyer users. The admin frame provides visibility into all blockchain transactions, complete with details of previous blocks and hash values.

2.2 FARMERS AGRICULTURAL PORTAL IN BLOCKCHAIN TECHNOLOGY

2.2.1 Introduction

Agriculture plays a pivotal role in a country's Gross Domestic Production (GDP). Over time, numerous revolutions have occurred worldwide, including India, to enhance agricultural practices. India, for instance, has witnessed the green revolution, yellow revolution, blue revolution, and more. Agriculture significantly impacts a country's biodiversity, depending on the agricultural activities involved.

The introduction of a farmer's portal aimed at improving the agricultural landscape by enabling farmers to sell their products at better rates. The system's objective is to empower farmers to update farm product information on the website, facilitating better pricing for their agricultural products. This, in turn, enables farmers to enhance their profit margins. They can either directly sell their products to customers or deliver them to buyers. Additionally, the portal provides a platform for farmers to manage their workforce, enhancing efficiency in their operations.

One of the key principles of this portal is the direct sale of crops to customers without intermediaries. This approach ensures that farmers receive the full profit, while customers benefit from fresh, affordable products. The project's primary objective is to establish a direct line of communication between users and farmers, allowing farmers to sell their products directly to customers and obtain the full profit. Moreover, the portal provides farmers with weather information to aid in crop planning.

Given the limited awareness among farmers regarding current requirements and technologies, middlemen have often taken advantage of the situation, resulting in reduced profits for farmers. To address this issue, the portal aims to provide farmers with information about crops across India, helping them stay updated with current trends and technologies. This initiative promotes awareness and technology adoption among farmers, potentially benefiting future generations and contributing significantly to the nation's economy.

2.2.2 Merits , Demerits and Challenges

Merits:

- **Efficiency:** The use of the max-prior algorithm ensures that customers with the highest demands are prioritized, which can lead to efficient allocation of products to meet the most significant needs first.
- **Reduction in Stock Loss:** By allocating products based on demand, there is a reduced likelihood of stock wastage for farmers, helping them optimize their sales and minimize losses.
- **Improved Customer Satisfaction:** Prioritizing customers with high demand helps ensure that they receive the products they need promptly, enhancing their satisfaction with the service.

Demerits:

- **Limited Product Availability:** The algorithm may lead to situations where some customers receive their products while others may face "out of stock" messages. This could potentially leave some customers unsatisfied.
- **Potential Overstock:** If the algorithm assigns products to high-demand customers and then switches to the next farmer who grows the same crop, it could lead to overstock for some farmers and understock for others, creating imbalances in the supply chain.
- **Complexity:** Implementing a max-prior algorithm can be complex, and it requires a robust and up-to-date system to manage demand, stock, and customer requirements accurately. This complexity may lead to challenges in system maintenance and operation.

2.2.3 Implementation of Farmer's agricultural portal in blockchain technology

Implementation:

The proposed system is a web application developed using CSS, JavaScript, and SQLite3. Its primary purpose is to enable farmers to directly sell their products to customers without any intermediary involvement. The implementation methodology involves breaking down the development and testing of the system into smaller components. This approach allows for incremental progress, addressing one unit at a time. Front-end design, functionality testing, and iterative discussions on improvements are integral aspects of this development process.

User Registration and Interaction:

The website features registration and login options for both farmers and customers or wholesalers. Farmers can add their products and access live weather information on the website. Customers and wholesalers can communicate with farmers to seek information and clarify queries related to farm products available on the platform.

Technology Utilized:

Information technology plays a crucial role in this project, providing an online platform for farmers to sell their products at competitive rates. Farmers can directly sell their products to consumers, bypassing the need for intermediaries, leading to increased profits. They also have the option to handle product deliveries, further enhancing their income. The project incorporates a "CHAT BOT" for user communication and includes a weather map to assist farmers in making informed crop choices based on weather conditions.

Max-Prior Algorithm:

The proposed system employs the max-prior algorithm to optimize resource allocation. This algorithm prioritizes fulfilling the maximum requirements demanded by customers.

It involves sorting the quantity list in descending order to identify the most significant demand. The system then checks the available stock with the farmer and allocates the produce to the customer with the highest requirement if sufficient stock is available. This process continues until all requirements are met. If stock is depleted, it shifts to the next farmer with the same crop. In case all farmers exhaust their stocks, the system displays an "out of stock" message. This algorithm ensures efficient resource utilization and minimal product wastage, benefiting both farmers and customers with access to quality produce at reasonable prices.

2.3 FARMER PORTAL- A MACHINE LEARNING BASED MODEL

2.3.1 Introduction

Agriculture stands as a unique sector within the economy, highly susceptible to the influence of climate. The success of agricultural production and its economic impact are intricately tied to how well climate conditions align with the optimal requirements of crop growth. It's crucial to exploit these conditions to maximize crop yields effectively. Moreover, managing the adverse effects of climate, encompassing factors such as moisture levels, temperature, wind, radiation, and biotic stress, plays a significant role in mitigating their impact on crop growth and development. Additionally, the management of crops to withstand severe weather conditions is a critical aspect of agricultural practice.

Agriculture remains the backbone of the Indian economy. To this day, the country's economic foundation relies heavily on agriculture, particularly in rural areas. Agriculture contributes substantially to the Gross Domestic Product (GDP), accounting for around 16% of the total and employing approximately 52% of the Indian population. The sector's growth is vital not only for national self-sufficiency but also for earning valuable foreign exchange.

In this context, the introduction of a user-friendly portal for farmers is a significant step. Such a portal can provide valuable crop recommendations based on factors like the state's conditions and potential profitability. The Farm Portal aims to offer farmers updates on agriculture-related news and real-time climate information, helping them make informed decisions regarding crop selection. These results are accessible through a compressed web format that doesn't demand excessive storage space. This portal holds the potential to transform the way farmers access vital information and improve agricultural practices in India.

2.3.2 Merits , Demerits and Challenges

Merits:

- **Agricultural Empowerment:** The proposed portal aims to empower Indian farmers with valuable insights regarding crop selection, market prices, and weather conditions, allowing them to make informed decisions and potentially increase productivity and profits.
- **Machine Learning Integration:** The use of machine learning algorithms for crop yield and price prediction can provide farmers with accurate and data-driven recommendations, enhancing their decision-making processes.
- **Comprehensive Solution:** By providing a single platform that caters to farmers' diverse needs, such as crop selection, market prices, soil type, government schemes, and weather information, the portal simplifies and streamlines access to crucial agricultural information.
- **User-Friendly:** The portal is designed to be user-friendly, ensuring that farmers can easily access and understand the information provided. The inclusion of weather information and crop recommendations based on location.

Demerits:

- **Data Accuracy:** The effectiveness of the machine learning algorithms heavily depends on the quality and accuracy of the data used for training. Inaccurate or incomplete data can result in unreliable recommendations.
- **Digital Literacy:** Some farmers may have limited digital literacy, making it challenging for them to use the portal effectively. Training and support may be required to ensure that all farmers can benefit from the platform.
- **Storage and Bandwidth:** While the results are mentioned to be in a compressed web format, the portal's potential success will depend on its ability to manage and serve data efficiently to a potentially large user base, which may pose storage and bandwidth challenges.

2.3.3 Implementation of Farmer portal a machine learning based model

Implementation:

For the front-end of the platform, the development is centered around creating a responsive and user-friendly web interface. Two popular frameworks, React or Angular, are considered for building this interface. The user experience and design are vital components, and tools like Adobe XD or Figma are used to craft an intuitive and aesthetically pleasing design. Geolocation services are integrated into the front-end using JavaScript libraries like Leaflet to provide mapping and location-based features.

On the server side, either Python or Node.js is selected as the programming language for back-end development. To enhance the platform's functionality, machine learning is employed, utilizing Python libraries such as scikit-learn or TensorFlow to develop crop recommendation algorithms. User data, including profiles, preferences, and feedback, is stored in a MongoDB database. Real-time weather updates are made possible through integration with a weather data provider, such as OpenWeatherMap. Additionally, a content management system (CMS) like WordPress is used to manage and update agricultural news and information, ensuring that users have access to current and relevant content.

The platform incorporates push notification services to keep users informed and engaged. These notifications are implemented using Firebase Cloud Messaging for Android devices and the Apple Push Notification Service (APNs) for iOS devices.

Security is a paramount concern, and the platform ensures robust measures. User authentication is implemented using JSON Web Tokens (JWT), offering secure access to the system. Additionally, data encryption and secure data transmission are enforced by incorporating HTTPS for user data protection and privacy.

CHAPTER 3

RESULTS AND DISCUSSION

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The integration of blockchain technology into the farmer's portal has the potential to significantly benefit the agricultural sector in India. By leveraging the immutable, decentralized, and transaction history features of blockchain, this system aims to enhance transparency and fairness in agricultural transactions. With a user-friendly interface developed in Python, farmers and stakeholders will be able to securely record and access critical information about crop sales, ultimately leading to more equitable and efficient trade practices. This initiative has the potential to empower farmers, vendors, and individuals, improving their access to fair prices and enhancing their overall livelihoods in the agriculture industry.

Through the implementation of blockchain technology, this project has the capacity to transform the way agricultural transactions are conducted. By securely recording information about sellers, buyers, and transaction details, the system ensures transparency and trust in the agricultural ecosystem. Farmers, vendors, and individuals will have an efficient means to document and access critical trade data, ultimately helping them secure fair market prices for their crops.

The use of Python programming for the user interface simplifies the process of data entry and retrieval, making it accessible to a wider audience, including those with limited technological experience. This integration of technology into agriculture aligns with the Government of India's efforts to support the sector and bridge the digital divide.

CHAPTER 4

CONCLUSION

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CONCLUSION

Blockchain Technology in the field of agriculture can bring revolutionary enhancement in the area of maintaining farmers data securely, ensuring the security of transactions, and sale price of crops. In this project the block chain-based portal is involved in dealing with the issue of demand and sale price of crops which in result ensure crop security to farmers as well as to get fair price of the crop. A farmer can register and sell his crops, recording a transaction on a block chain at a point when buyers commit to buy a farmer's crop. This transaction is capable of recording crop details, the price at which it is committed to buying and quantity of crop purchased. This immutable nature of block chain technology will enable the farmers to get a legitimate price of crop and reduce the cost of operation for selling and buying crops when compared to traditional methods.

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