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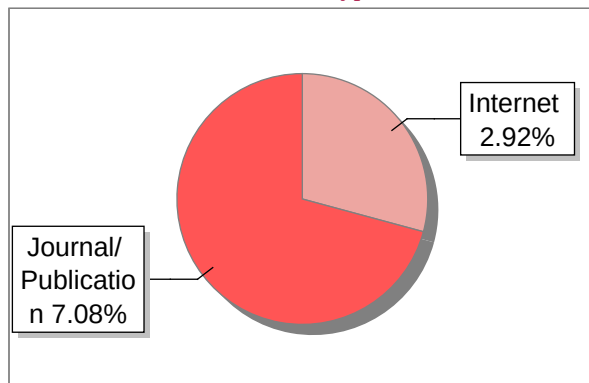
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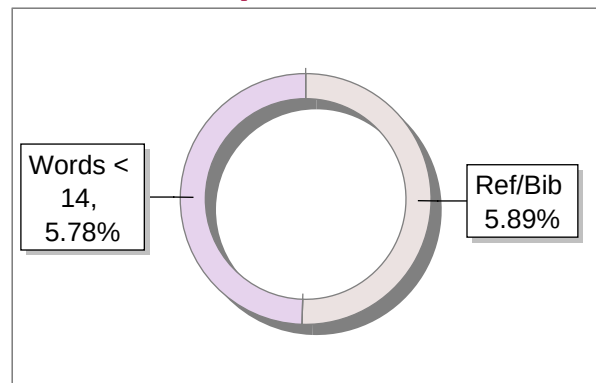
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Performance Evaluation of Agri Supply Chain Management & Stock Prediction

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Abstract

Agricultural producers today confront a number of challenges, including supply chain problems and seasonal variations, making their work exceedingly difficult and imposing. In this case, a distinctive information database with trustworthy data would be very useful. Transferring knowledge—whether it be about business strategies or market trends—is crucial in every area of this profession. Misinformation might proliferate if third parties interfere in this aspect. Blockchain, a trustworthy and uncorruptible data ledger, can be used to stop this. Here, an analysis of the various applications of blockchain technology as a trustworthy and transparent transaction mechanism in the agricultural supply chain is investigated.

Keywords: Blockchain, information database, resource wastes, and the agricultural supply chain.

Introduction

Supply chain management involves the

coordination and optimization of all activities involved in transforming raw materials into finished goods, including sourcing, production, transportation, and distribution. In order for businesses to satisfy customer expectations, save expenses, and acquire a competitive edge in the market, Management of the supply chain effectively is crucial.

Many of the problems that modern supply chains are currently facing may be resolved by blockchain technology. Blockchain is a decentralised, distributed ledger that makes it possible to record and trade information in a way that is secure, transparent, and impenetrable. Blockchain was first created as the foundational technology for the cryptocurrency Bitcoin.

In recent years, blockchain has gained increasing attention as a potential tool for enhancing supply chain efficiency and transparency. By using blockchain, businesses can create a more transparent and traceable supply chain, reducing the risk of fraud, improving food safety, and enhancing the ability to track products from the source to the final consumer. One of the key advantages of

blockchain is its ability to enable dynamic connections between network stakeholders, such as suppliers, manufacturers, and distributors. Blockchain can enhance collaboration and streamline supply chain operations by providing a transparent and safe platform for information sharing.

Moreover, blockchain can also help mitigate risks associated with food safety and fraud by enabling goods to be traced across the supply chain, allowing businesses to quickly identify and address any issues that arise. This can help improve public trust in the safety and quality of products and ultimately increase consumer confidence.

For multiple distributed nodes in blockchain networks to come to an agreement, consensus algorithms are used. A consensus mechanism such as proof of work (PoW) or proof of stake (PoS) is used to ensure that all network participants agree on the current state of the ledger.

Although the use of blockchain in supply chain operations management is still in its infancy, there is great potential for it to revolutionize the sector.

Literature Review

Blockchain technology has emerged as a promising solution for improving supply chain management across a range of industries. In the agricultural sector, where supply chain efficiency and transparency are critical to

ensuring food safety and reducing waste, blockchain has shown particular potential.

[1]Studies have explored the use of blockchain in agricultural supply chain management, with a focus on leveraging the technology to improve traceability and accountability throughout the supply chain. By creating a tamper-proof record of all transactions and movements, blockchain can improve transparency, reduce risk, and ensure the authenticity of products.

[2]Researchers have also explored the use of smart contracts, which are self-executing agreements that are recorded on the blockchain, to automate and streamline processes within the supply chain. This can reduce the need for intermediaries, increase efficiency, and reduce costs.

[3]Additionally, studies have investigated the role of IoT sensors and other data-gathering technologies in conjunction with blockchain to provide real-time data on key supply chain variables such as temperature, humidity, and location. This can improve supply chain decision-making and enable more effective risk management.

Overall, the literature suggests that blockchain technology holds significant promise for improving agricultural supply chain management, and further research and experimentation is needed to fully realize its potential.

Methodology

We suggest an ASC system structure built on the blockchain. Each transaction's tracing information from ASCs will be included in a block. Each block will be uploaded to the blockchain that the ASCs participants manage and turn into a safe permanent record once it has been verified by them and reached an agreement.

A distributed ledger that is digitally unchangeable and chronologically records transactions almost instantly is known as a blockchain. The technology may also tell you when and where the authorities dumped the garbage.

The respective consensus of the network participants (referred to as nodes) is a need for each future transaction to be added to the ledger, enabling a continual process of control regarding manipulation, errors, and data quality.

A peer-to-peer distributed network called a distributed ledger keeps track of a public history of transactions. The blockchain is widely available and distributed.

To preserve data integrity, availability, and resilience across all sites, the data is precisely copied and synchronised.

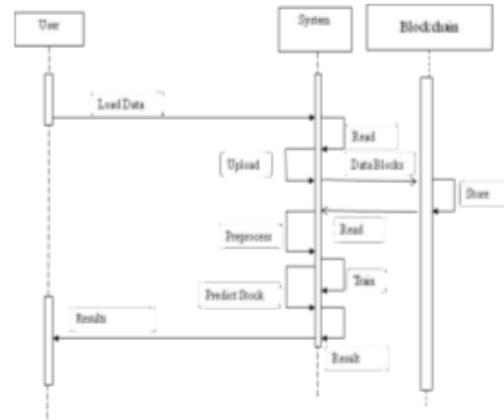


Fig. 1 .System Design

Algorithms

The production and storage of maize can be efficiently decided upon using the **Reinforcement Learning-** Supply Chain Management to maximise product revenues. For the proposed DR-SCM technique, we define the state space, action space, and reward function as follows.

State void. $st = [s_0, s_1, s_2, \dots, s_n, dt]$ is the definition of the state at time t , where s_0 and $(s_1, s_2, \dots, s_n)$ are the factory and retailer stock levels, respectively, that are within the maximum stock capacity s_capi . The needs of several retailers at time t are represented by the expression $dt = [d_{1,t}, d_{2,t}, \dots, d_{n,t}]$. Action space. The DRL agent's action is to decide how much merchandise should be transported to stores and how much the plant should produce.

Reward system. To teach the DRL agent the

optimal ASC management policy with larger incentives and increase product profitability, the reward function is applied.

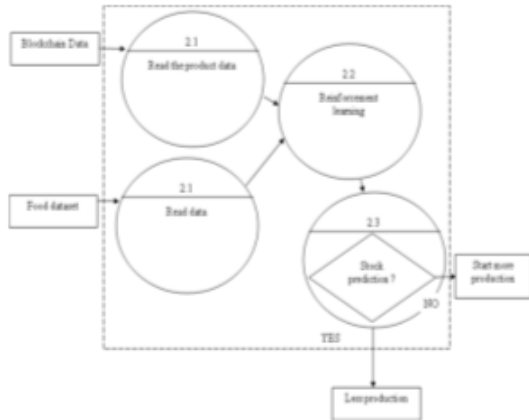


Fig. 2. Flow Diagram of RL –SCM

Consensus methodologies A crucial quality for any kind of decentralised system, not just those using blockchain technology.

A system's ability to withstand all potential failure costs resulting from the byzantine generals' problem is known as byzantine fault tolerance.

A byzantine fault tolerant blockchain system can be created in a variety of ways that are connected to the various consensus algorithms and protocols.

The protection of the network from attackers and dealing with competing chains are the two main problems that the consensus mechanism for a blockchain must address.

1. Proof of work (PoW);

2. Proof of-stake (PoS);

Results and Discussion

Transparency of the supply chain is increased with the involvement of blockchain technology. Blockchain creates a decentralized and distributed ledger that records all transactions in the supply chain network. This means that all participants in the network can see and track every transaction, from the source of raw materials to the end product. This transparency helps to improve the overall visibility and traceability of the supply chain, making it easier to identify and resolve issues such as product recalls, fraud, and counterfeit products.

Efficiency of the supply chain will increase with the use of blockchain technology. Blockchain provides a secure, transparent, and tamper-resistant platform for recording and sharing information. This means that information can be shared quickly and efficiently between all participants in the network, reducing the time and costs associated with traditional paper-based processes. For example, blockchain can automate many of the manual processes involved in supply chain management, such as tracking inventory, verifying transactions, and managing logistics.

The security of the supply chain is enhanced with the involvement of blockchain cryptography. Blockchain technology uses complex cryptographic algorithms to secure and protect data in the network. This means that transactions and data are encrypted and stored in a secure and tamper-resistant manner, reducing the risk of data breaches and cyber attacks. Additionally, blockchain technology provides a decentralized and distributed network, reducing the risk of a single point of failure and making it more resilient to attacks.

Blockchain technology can reduce the random cost spikes in the supply chain. The transparency and efficiency provided by blockchain can help to identify inefficiencies and bottlenecks in the supply chain, allowing for more effective planning and optimization. Additionally, the secure and tamper-resistant nature of blockchain can help to reduce the risk of fraud and counterfeiting, which can contribute to cost spikes in the supply chain.

Trust factor increases between the members of the network with the use of blockchain technology. Blockchain provides a secure, transparent, and tamper-resistant platform for recording and sharing information. This means that all participants in the network can trust the information being shared, reducing the risk of disputes and increasing collaboration. Additionally, the use of

blockchain can help to establish a shared system of record and trust, reducing the need for intermediaries and increasing the efficiency of the supply chain network.

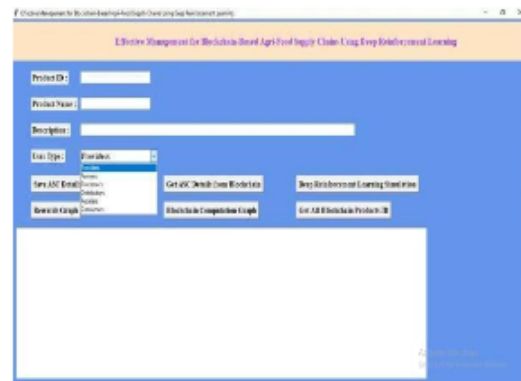


Fig.3. Home page of the application



Fig.4.Adding to the Blockchain

Conclusion

The use of blockchain technology in the Indian agricultural supply chain can help address many of the problems that currently exist. With blockchain, data collection, verification, storage, and transfer can be done in a transparent and

reliable manner. This can lead to increased efficiency and decreased wastage, which can ultimately result in overall improvements for the industry.

One potential application of blockchain in the Indian agricultural supply chain is the use of smart contracts to automate and streamline key processes, such as payments and quality checks. By automating these processes, intermediaries can be eliminated, resulting in cost savings and increased efficiency. Another potential use of blockchain is the creation of a tamper-proof ledger to track the movement of goods throughout the supply chain. This can improve transparency and accountability, reducing the risk of fraud and ensuring the authenticity of products.

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