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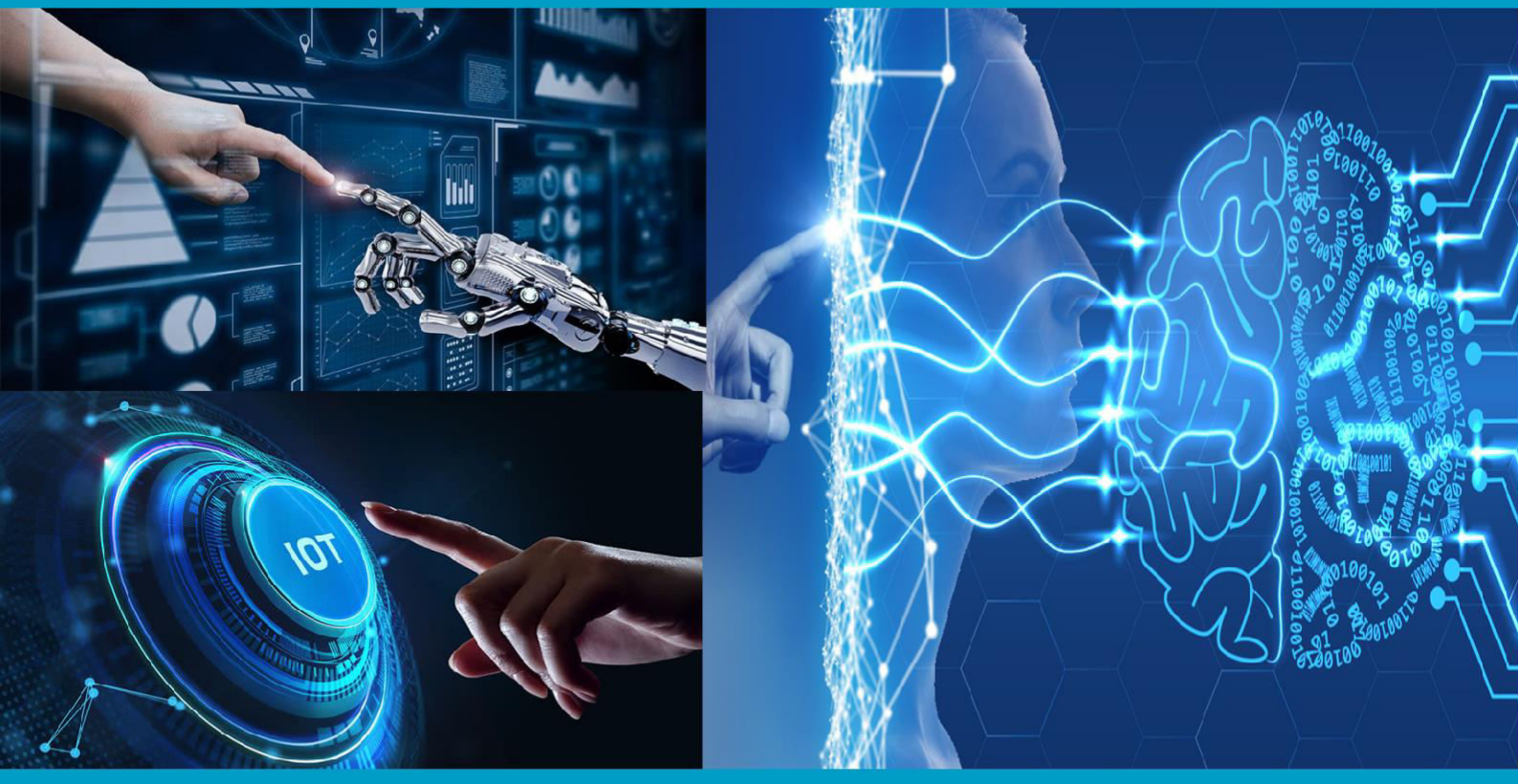

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Bilateral Exchange System for Fresh Produce Selling using Auction Simulator

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ABSTRACT: Fresh products (such as produce, meats and seafood, etc.) are a necessity of life, and, as such, play a pivotal role in human evolution. Traditional selling systems often rely on local markets and direct sales, limiting the reach to a specific geographic area. Producers often rely on middlemen or local distributors in traditional systems, which can lead to reduced profit margins for farmers. Maintaining consistent quality throughout the supply chain can be challenging in traditional systems. Fresh produce has a limited shelf life, and maintaining its freshness throughout the supply chain is crucial. Short shelf life requires quick turnover, and any delays in transportation or storage can lead to spoilage, resulting in losses for producers. Producers may lack access to market intelligence and information on pricing trends, demand forecasts, and emerging consumer preferences. Addressing these problems this project develops a truthful and efficient Double Auction mechanism for produce trading systems.

I.INTRODUCTION

Farmers have a variety of options when it comes to selling their agricultural products. Direct-to-consumer outlets like farmer's markets and community supported agriculture (CSA) subscription programs typically garner the best price point compared to other outlets, but they are also the most labor intensive and require a significant amount of time and money spent on marketing. Self-managed wholesale to restaurants, grocers, and institutions can be profitable but are also logistically complex, in terms of availability lists, order communications, custom packing, and delivery routes. The ever-changing technological requirements to manage these processes and stay competitive can be a barrier for farmers without those technologies (such as members of the Plain communities).

SCOPE OF THE PROJECT

The project scope that aims to revolutionize the conventional methods of fresh produce trading. At its core, the project will introduce a dynamic double auction mechanism, fostering real-time engagement between producers and procurers to efficiently match supply with demand.

The development of an e-commerce platform functioning as an auctioneer is central to the initiative, ensuring the transparent organization and oversight of auctions. Within this scope, the project involves the creation of secure registration processes for producers and procurers, providing them with personalized dashboards for seamless interaction.

II. LITERATURE SURVEY

1.Title: Novel Double Auction Mechanisms for Agricultural Supply Chain Trading
Author: Yang Zhang and Huibing Cheng
Year: 2023
Reference Link: Not provided
Problem:
The agricultural supply chain trading (ASCT) in terms of deteriorated produce quality, increased carbon emissions, high trading costs, long trading times, and complex bidding strategies in bilateral produce markets.
Objective:
The efficient trading time and enhance social welfare in ASCT by proposing two novel Multi-Unit Double Auction (MUDA) mechanisms. The focus is on optimizing resource allocation and pricing of fresh produce.

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Methodology:
The Multi-Unit Non Reduction Mechanism (MNR) and Multi-Unit Trade Reduction Mechanism (MTR) for produce trading in scenarios of supply and demand oversupply, and overdemand. Bid strategies for procurers and growers are provided, and the mechanisms are tested through a numerical study
Algorithm/Techniques:
The MUDA mechanisms aim to address the challenges of carbon emissions and trading inefficiencies in ASCT through the introduction of innovative auction allocation and pricing rules.
Merits:
The introduce two MUDA mechanisms for optimal ASCT, effectively promoting the profit of produce providers and the utility of customers. The study provides valuable insights for researchers in the ASCT domain and demonstrates the effectiveness and applicability of the proposed approach.
Demerits:
The single attribute (price) in bilateral produce markets and an assumption that participants engage in only one auction.

2.Title: Food Safety in Foreign Trade of Agricultural and Food Products: Evaluation of Risk Analysis Stages and Process
Author: Sinan Duru
Year: 2023
Reference Link: https://dergipark.org.tr/en/pub/selcukjafsci/issue/77164/1292323
Problem:
The structural characteristics of foods render them susceptible to physical, chemical, and biological degradation, particularly during the prolonged processes of storage, transportation, and distribution in international agriculture and food trade.
Objective:
This significance of risk analysis in the foreign trade of agricultural and food products, emphasizing its role in identifying and mitigating potential risks to food safety, especially in the context of international trade.
Methodology:
The place and importance of risk analysis in foreign trade, exploring worldwide legislative regulations, practices, and developments related to risk analysis. It emphasizes the interconnected nature of risk assessment, risk management, and risk communication in fostering effective communication between scientific and political authorities.
Algorithm/Techniques:
The primary methodology revolves around risk analysis, involving risk assessment, risk management, and risk communication. The paper underscores the need for a strong infrastructure to support the scientific process of risk assessment, as it forms the basis for subsequent risk management and communication.
Merits:
The sheds light on the increasing importance of risk analysis in international agriculture and food trade, considering factors such as food security, population growth, resource scarcity, and climate change.
Demerits:
The risk analysis applications in international trade entail certain costs. It also notes the necessity of using risk analysis more effectively, particularly in trade involving agricultural and food products from underdeveloped countries lacking sufficient surveillance and control mechanisms. The challenges and potential limitations of such applications are implied but not explicitly discussed.

III.PROPOSED SYSTEM

The Double Auction Mechanism lies at the core of our proposed system for fresh produce trading, offering a dynamic platform for engagement between procurers and growers. This mechanism facilitates a two-way interaction where producers submit sell offers, indicating the quantity and prices at which they are willing to sell, while procurers simultaneously submit buy offers, specifying their desired quantity and price points. The system's goal is to achieve market clearing, finding the equilibrium where the quantity demanded matches the quantity supplied, ensuring efficient resource allocation.

ADVANTAGES

- Adaptability: Aligns with the perishable and fluctuating nature of fresh produce.
- Reduced Decay: Minimizes refrigeration time, contributing to a low carbon agricultural supply chain.
- Facilitate trade between diverse regions and participants.
- Increase profit potential for producers through direct engagement with procurers.
- Reduce intermediary costs, improving overall profitability.

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IV.MODULE DESCRIPTION

1. Auction Simulator

Designing and developing an Auction Simulator with a Bilateral Exchange System involves creating a modular and scalable system that simulates the dynamics of a real auction, allowing participants to engage in bilateral exchanges. The central module orchestrating the entire simulation process. It manages the flow of data and interactions between different modules.

In the development of an Auction Simulator using Python, Flask, MySQL, and Bootstrap, the project is organized into distinct modules to enhance modularity and maintainability.

2. Double Auction Mechanism

A bilateral trading mechanism, such as a double auction, is a type of market structure that facilitates the exchange of goods or assets between producers and procurers. In a double auction, participants on both sides of the market can submit bids and offers simultaneously, allowing for dynamic price discovery and the matching of compatible bids and offers. This mechanism is commonly used in financial markets, commodity exchanges, and various auction-based systems.

Simultaneous Bidding

Procurers and Producers submit their bids and offers independently and at the same time. This simultaneous process distinguishes the double auction from sequential auction formats.

Bids and Offers

Procurers submit bids indicating the maximum price they are willing to pay for a certain quantity of a good or asset. Producers submit offers indicating the minimum price at which they are willing to sell a certain quantity.

Matching Mechanism

The auction platform matches compatible bids and offers based on price and quantity. The matching process aims to find the optimal price at which Procures and Producers are willing to transact.

Rapid Matching

Double auctions enable swift matching of buyers and sellers. By allowing both parties to submit bids and offers simultaneously, the mechanism facilitates quick identification of compatible trading pairs, leading to faster transaction executions.

Market Clearing

The market-clearing price is determined where the highest bid matches the lowest offer (or vice versa). This establishes the equilibrium price at which supply and demand are balanced.

Continuous Trading

Double auctions often operate continuously, allowing participants to enter or exit the market at any time. This continuous trading feature contributes to market liquidity.

Dynamic Pricing

Prices are not fixed but change dynamically based on the ongoing bid and offer submissions. Participants can adjust their bids and offers in response to changing market conditions.

Competitive Dynamics

The competitive nature of the double auction encourages participants to respond quickly to market changes. This competition contributes to fair pricing and efficient market outcomes.

Flexibility

Participants have the flexibility to revise their bids and offers in real-time. This adaptability is crucial in markets where conditions can change rapidly.

Price Discovery

The double auction mechanism facilitates the continuous process of price discovery, allowing the market price to adjust based on the collective actions

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V. EXPERIMENT AND RESULTS

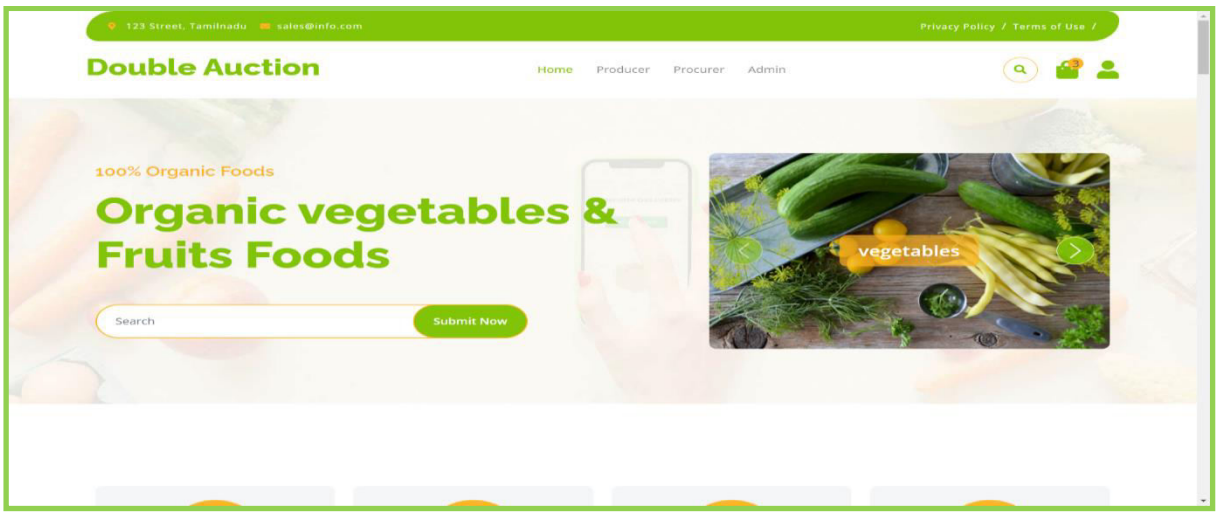

FIGURE 1 DOUBLE AUCTION HOME PAGE

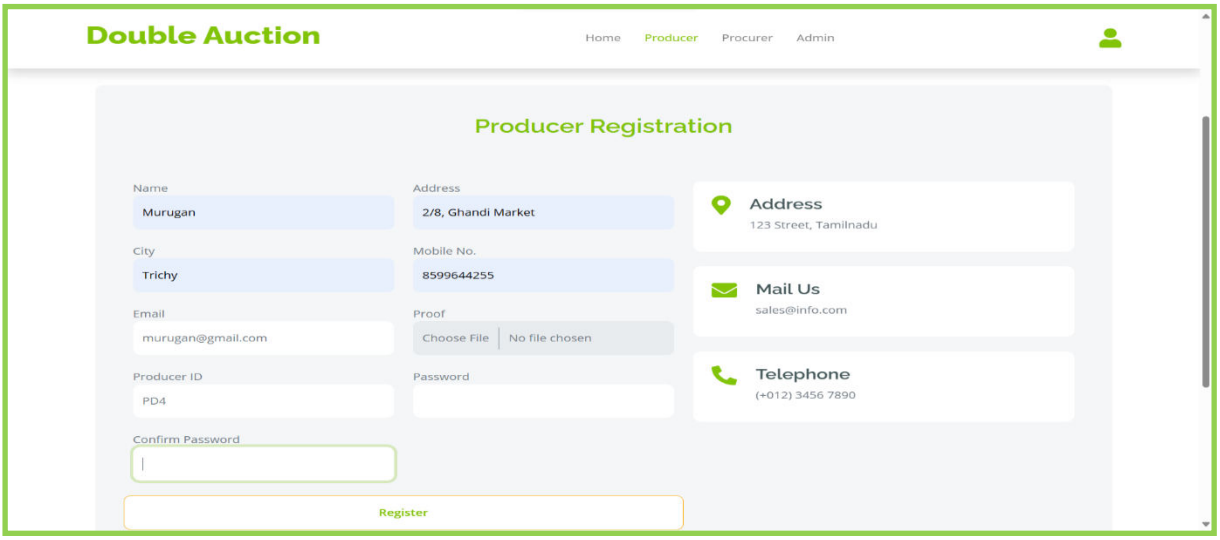

FIGURE 2 DOUBLE AUCTION PRODUCER REGISTRATION

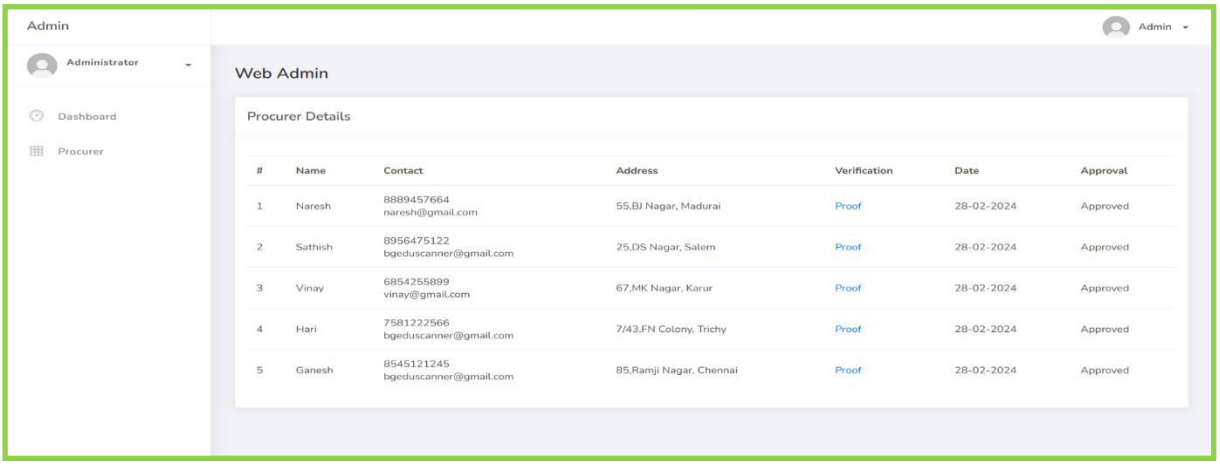

FIGURE 3 PRODUCER DETAIL

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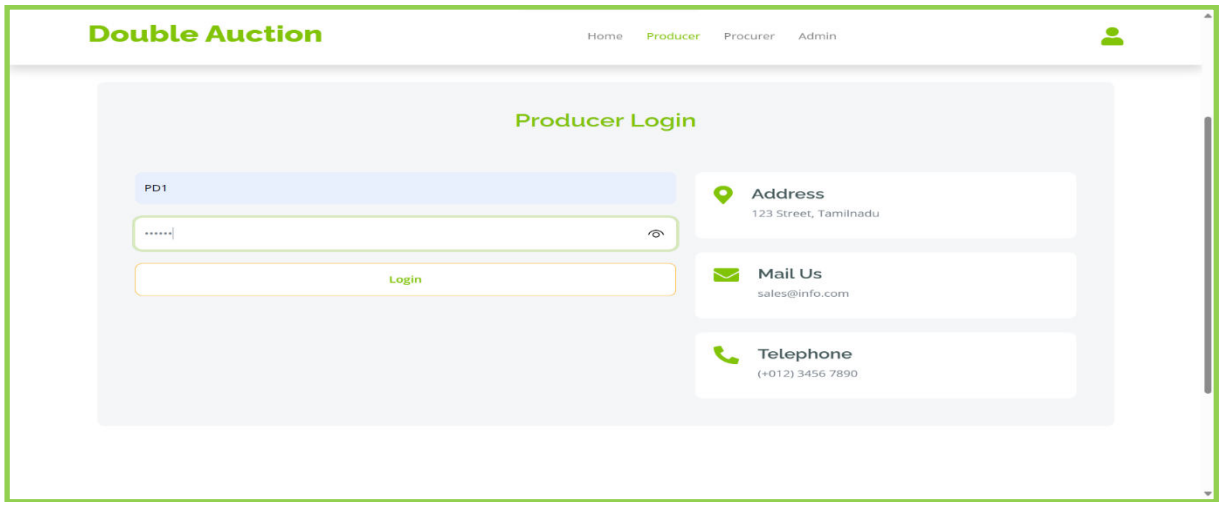

FIGURE 4 PRODUCER LOGIN

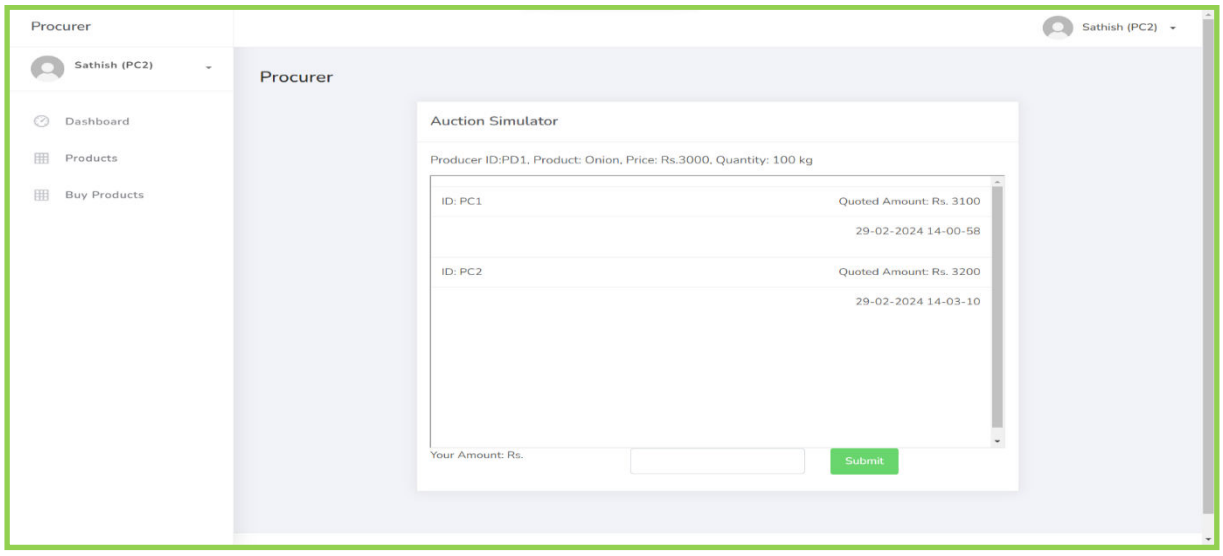

FIGURE 5 AUCTION PAGE

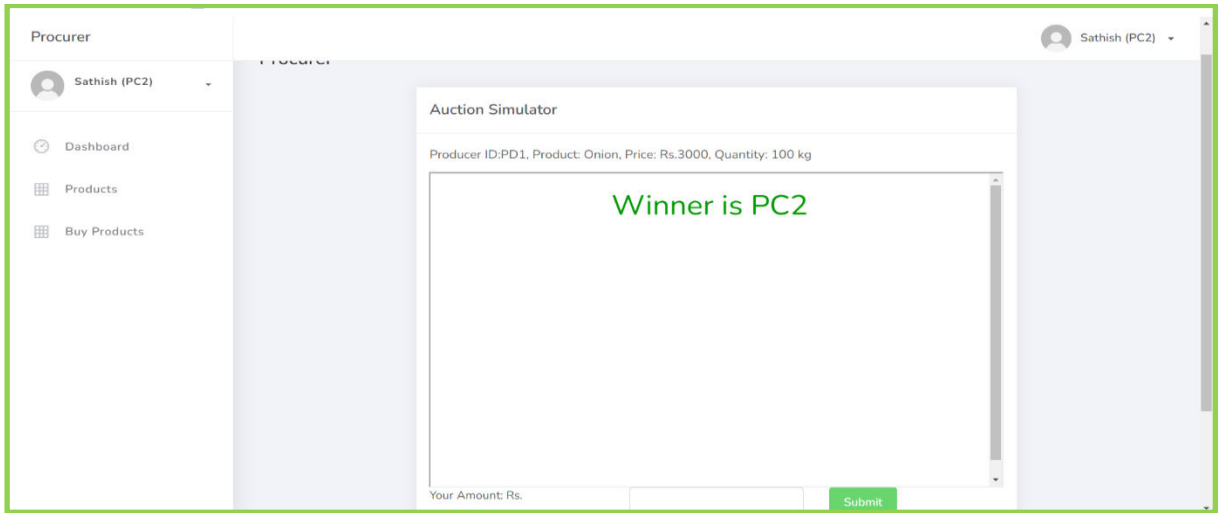

FIGURE 6 WIN ANNOUNCEMENT

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VI.CONCLUSION

In conclusion, the project proposed a transformative approach to the traditional methods of fresh produce trading. This project addresses key challenges faced by producers and procurers in existing systems, introducing a dynamic and efficient Double Auction Mechanism facilitated by an e-commerce platform as the auctioneer. By leveraging this innovative system, the project aims to overcome the limitations of traditional local markets and direct sales, providing a broader market reach beyond geographic boundaries. The introduction of real-time bidding, bid confirmation processes, and dynamic price announcements ensures a transparent and streamlined auction experience for all participants. The integration of market intelligence into the platform empowers stakeholders with essential information on pricing trends, demand forecasts, and emerging consumer preferences. This knowledge facilitates informed decision-making, contributing to a more adaptive and responsive fresh produce market. The project also addresses issues such as middlemen dependency, limited shelf life, and quality consistency throughout the supply chain. Through the efficient allocation of produce and swift payment processes, it aims to improve profit margins for growers while minimizing losses associated with spoilage and delays.

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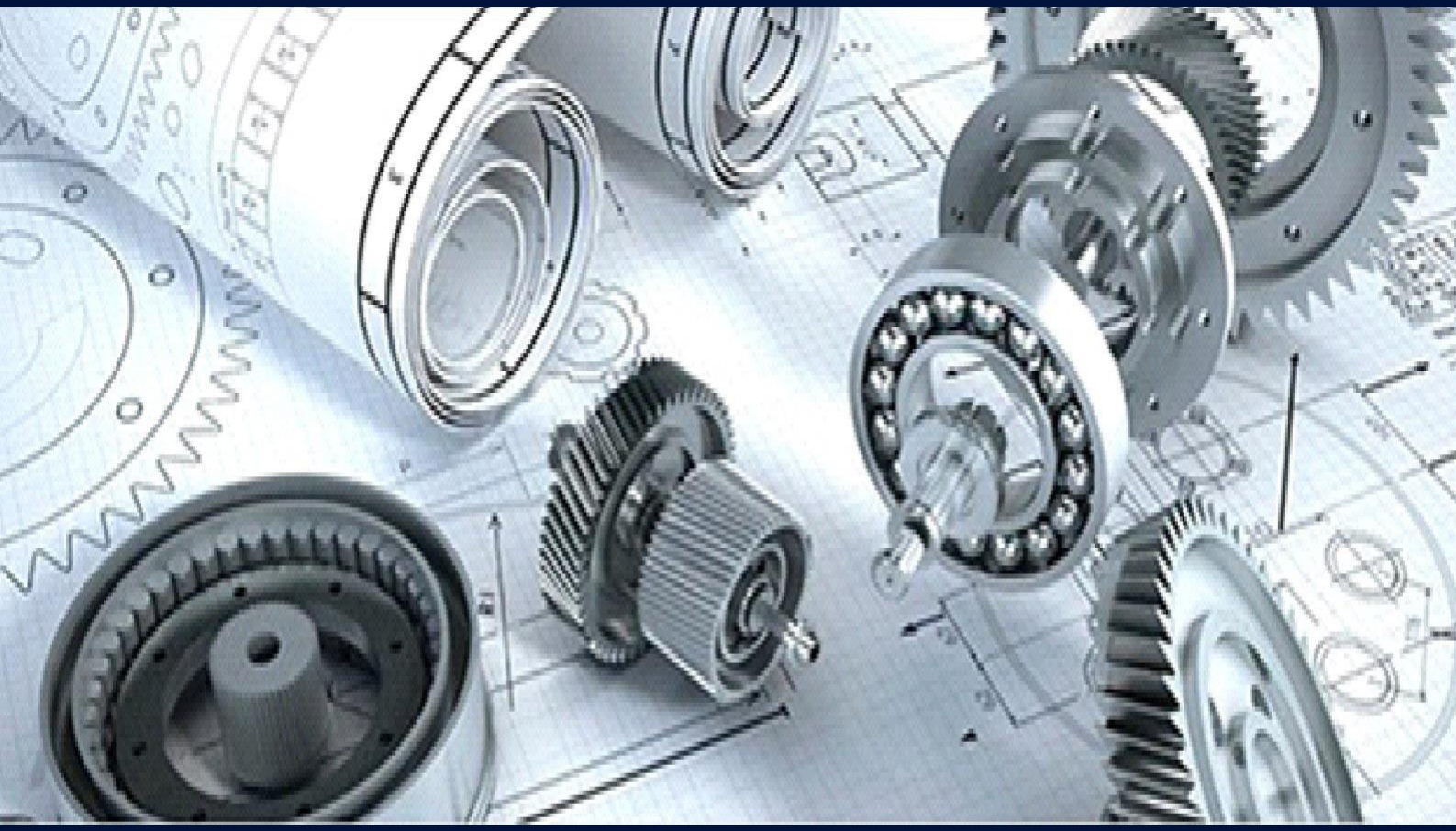

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