Smart Urban Food Re-Distribution using Web Application

R. Rama Rajesh[1], A. Mohamed Sirajudeen[2], S. Rishi[3], S. Eswaran[4]

Assistant Professor, Department of Information Technology[1]
Students, Department of Information Technology[2,3,4]
Anjalai Ammal Mahalingam Engineering College, Thiruvarur, Tamil Nadu, India

Abstract: *The rapid rate of urbanization presents significant obstacles to the effective, flexible, and long-term distribution of food in urban settings. This abstract presents Smart Urban Food Distribution (SUFD), a novel approach created to tackle these issues through the incorporation of cutting-edge technologies. The goal of SUFD's multi-domain architecture is to transform urban food distribution networks.To enhance the entire food distribution process, SUFD makes use of cutting-edge technology like AI-driven predictive modeling and real-time data analytics. By means of accurate demand forecasting, inventory control, and route optimization, SUFD lowers food waste, improves the resilience of the supply chain, and lessens its environmental impact.Modern last-mile delivery methods like drones, micro-fulfillment centers, and driverless cars are also included in SUFD. These technologies enable delivery choices that are faster, more economical, and less harmful to the environment, particularly in heavily populated urban areas. The success of SUFD depends critically on stakeholder collaboration. In line with the general objectives of resilience and sustainability, SUFD encourages an integrated approach to urban food delivery through partnering and putting in place interoperable systems.*

Keywords: Food distribution networks, real-time data analytics, resilience of the supply chain, micro-fulfillment centers

I. INTRODUCTION

Introducing the smart urban food redistribution project, an innovative endeavor aimed at revolutionizing the management and distribution of surplus food within urban environments. In a world where food insecurity coexists with alarming levels of food wastage, our project stands as a beacon of hope,leveraging advanced technologies and community collaboration to address these pressing challenges head-on. Our multifaceted platform caters to various stakeholders, including administrators, donors, receivers (orphanages), and volunteers, each playing a crucial role in the efficient and equitable redistribution of surplus food resources.

At the core of our initiative lies the commitment to harnessing technology for social good. Administrators are empowered with a robust login system that enables them to monitor incoming food details, ensuring transparency and accountability in the distribution process. Simultaneously, they maintain comprehensive donor and receiver information, fostering trust and efficiency within the system.

Donors are individuals or organizations that contribute surplus food to the platform. They are required to register and create an account before they can add food details and manage donation requests. Donors have access to a user-friendly interface that allows them to input information about the food they wish to donate, including quantity, type, and expiration date. They can also specify any preferences or requirements regarding the distribution of their donations.

Volunteers play a pivotal role in bridging the gap between surplus food resources and those in need. Through registration and login features, they are matched with locations where surplus food is available and tasked with optimizing delivery routes to ensure timely and efficient distribution. By leveraging advanced algorithms such as NLP (Natural Language Processing), Matching, Route Optimization, Inventory Management, Data Analytics, and Machine Learning, our platform maximizes the impact of every donation, minimizes waste, and enhances the overall effectiveness of the redistribution process.

One of the key components of the smart urban food redistribution project is its sophisticated algorithmic framework, which optimizes various aspects of the redistribution process. These algorithms include Natural Language Processing(NLP), Matching, Route Optimization, Inventory Management, Data Analytics,and Machine Learning, each playing a unique role in enhancing the effectiveness and efficiency of the platform.

II. CENTRALIZED SURPLUS FOOD MANAGEMENT

Donation Intake: Extra food is donated to the central platform by a variety of sources, such as grocery stores, restaurants, food manufacturers, and private citizens. Details about the food, including its type, quantity, expiration date, and pickup place, can be entered by donors.

Inventory management: A central database of available excess food items is kept up to date by the platform. Since every donation is recorded in the system, inventory levels and Expiration dates may be tracked in real-time.

Matching Donations with Recipients: The platform allows recipient organizations, like food banks, shelters, soup kitchens, and community centers, to view the surplus food products that are available. They are able to indicate the quantities required, dietary limitations, and food preferences.

Automated Allocation: Based on variables like proximity, food preferences, and urgency, the platform matches surplus food gifts with suitable beneficiaries using algorithms and data analytics. This guarantees the effective and efficient distribution of donations.

Coordination of logistics: Organizing logistics is made easier by the platform, which helps with scheduling deliveries and pickups, allocating drivers or volunteers, and planning the best routes. This reduces the cost of transportation and guarantees that the recipients receive their food on items

Feedback mechanisms: In order to continuously improve the surplus food management procedure, recipients are able to offer input on the appropriateness and quality of donated food items.

Inventory management: A central database of available excess food items is kept up to date by the platform. Since every donation is recorded in the system, inventory levels and   expiration dates may be tracked in real-time.

Cost Reduction: Fuel consumption, vehicle wear and tear, and personnel expenses related to delivery operations are all decreased via optimized routes. Route optimization helps businesses save money and increase their bottom line by optimizing efficiency and reducing resource waste.

Enhanced Service Levels: Effective route planning guarantees on-time and dependable delivery, which boosts client satisfaction and company reputation. It enables improved recipient cooperation and communication, which results in a more efficient and seamless delivery procedure.

Environmental Impact: Route optimization minimizes fuel use and greenhouse gas emissions related to transportation by cutting down on trip time and distance. By encouraging more environmentally friendly and fuel-efficient delivery methods, it supports environmental sustainability

III. SYSTEM ARCHITECTURE

The system architecture of the smart urban food redistribution project is meticulously designed to facilitate the seamless management and redistribution of surplus food resources in urban settings. At the forefront of the architecture is the user interface layer, comprising web and mobile applications that provide intuitive interfaces for donors, receivers, volunteers, and administrators to interact with the system. Beneath the surface lies the application layer, housing the core business logic and functionality responsible for processing user requests, managing data, and orchestrating system operations. Key modules within this layer include donor management, receiver management, volunteer management, donation management, communication, and analytics, each playing a critical role in driving the project's objectives forward. Meanwhile, the integration layer facilitates seamless communication with external systems and services, while the security layer ensures the confidentiality and integrity of sensitive information.
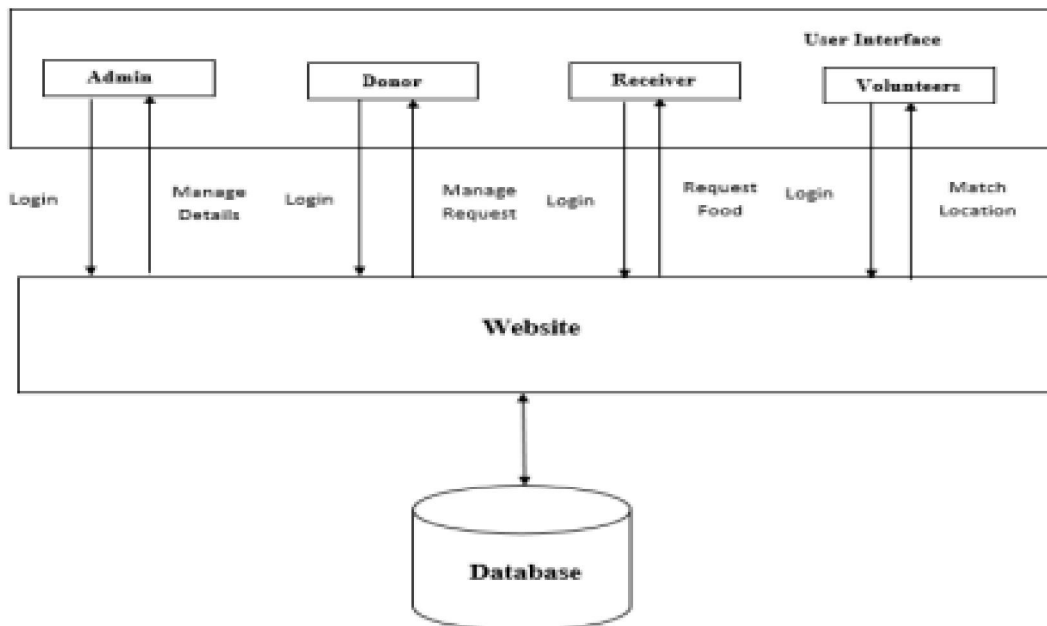
System Architecture

Client-Side Interface:

Users interact with the system through a web-based interface accessible via standard web browsers on desktop and mobile devices.The UI presents a user-friendly interface for donors, recipients, and administrators to perform various actions such as registration, login, donation submission, and request management.

Admin Process:

Admins have the authority to manage user accounts within the system.They can register new users, verify accounts, and manage user permissions. it oversee the process of receiving, reviewing, and approving food donations submitted by donors. They can view donation details, organize donations, and ensure compliance with system guidelines.it access to reporting and analytics tools for monitoring donation trends, analyzing system performance, and generating reports to inform decision-making and optimization efforts.

Donor Process:

Donors begin by registering accounts on the platform, providing necessary information such as username, email address, and password.Once registered,donors can submit details of surplus food donations, including type, quantity, and expiry date, through the system interface.

464

Recipient Process:

Recipients register accounts on the platform, providing necessary details to access donation services.it can browse available food donations listed on the platform, filtering by location, type, and quantity to find suitable options. To request the pickups for desired food donations, specifying preferred delivery times and locations. They can track the status of their donation requests, receiving notifications or updates on pickup schedules and delivery logistics through the system interface.

Volunteer Process:

Volunteers begin by registering accounts on the platform, providing necessary information such as personal details, contact information, and areas of interest or expertise related to volunteering. Upon registration, volunteers create profiles detailing their skills, availability, and preferences for volunteer opportunities. They may also upload relevant documents or certifications if required.

Manage Detail:

Admins handle user accounts, registrations, and permissions within the platform. They review, approve, and manage incoming food donations, ensuring adherence to system guidelines. To coordinate the matching of donations with recipients, managing pickup logistics and tracking donation status. They have access to tools for monitoring donation trends, analyzing system performance, and generating reports.

Manage Request

Donors submit surplus food details, including type, quantity, and expiry date, for review and approval. They track the status of their donation submissions, receiving updates on approval and distribution.They may communicate with administrators or recipients regarding donation details or pickup arrangements. Donors update their personal information, contact details, and preferences as needed.

Request Food:

Recipients search and browse available food donations listed on the platform, filtering by location, type, and quantity. They submit requests for desired food donations, specifying preferred pickup times and locations for delivery. They may communicate with administrators or donors regarding donation availability or pickup arrangements. Recipients update their personal information, contact details, and preferences as needed.

Match Location:

Volunteers search for opportunities within their vicinity, ensuring alignment with their geographic location and availability. They explore available volunteer opportunities listed on the platform, considering factors such as type of work and time commitments.To submit applications for roles of interest, expressing their suitability and availability for the tasks.Organizations or coordinators review volunteer applications and approve suitable candidates based on their skills and availability

IV. CONCLUSION

Surplus food distribution is a vital strategy in the fight against both hunger and food waste. By redirecting excess food from farms, businesses, and other sources to those in need, surplus food distribution initiatives play a crucial role in promoting food security and sustainability. Through the collaboration of food donors, transportation providers, and recipient organizations, surplus food is efficiently collected, stored, and distributed to communities facing food insecurity.

Not only does surplus food distribution help alleviate hunger by providing nutritious meals to individuals and families in need, but it also contributes to reducing food waste, which has significant environmental, economic, and social implications. By preventing edible food from ending up in landfills, surplus food distribution efforts conserve resources, reduce greenhouse gas emissions, and support a more equitable distribution of food.

As we continue to address the complex challenges of hunger and food waste, prioritizing and expanding surplus food distribution initiatives will be essential. By fostering partnerships, leveraging technology, and promoting awareness, we can enhance the effectiveness and reach of surplus food distribution efforts, creating a more sustainable and compassionate food system for all.

Distribution of surplus food encourages cooperation between various stakeholders, such as food donors, transportation companies, and beneficiary groups, in addition to its positive effects on the environment. This cooperative strategy

fosters social bonding and equity in addition to bolstering community resilience. Surplus food distribution projects give financial relief to both individuals and organizations serving vulnerable populations by offering surplus food at a reduced cost or for free.

Surplus food distribution is essentially a multimodal approach that has significant effects on hunger alleviation, food waste reduction, environmental sustainability, and social justice. Societies can advance toward attaining goals related to food security and sustainability while fostering more resilient and inclusive communities by giving priority to and growing existing efforts for the distribution of surplus food.

V. ACKNOWLEDGMENT

REFERENCES

[1]. S. Wang and J. Xu, "Design of Intelligent Household Food Waste Product Based on AHP-TRIZ Method," 2022 International Conference on Culture-Oriented Science and Technology (CoST),Lanzhou, China, 2022, pp. 95-98, doi:10.1109/CoST57098.2022.00029.

[2]. Bhardwaj, Sonali and Kumar, Utkarsh and Kumar, Dr. Yogesh,Food Waste Management Android App (July 14, 2022).Proceedings of the Advancement in Electronics & CommunicationEngineering 2022, Available at SSRN:https://ssrn.com/abstract=4157538 or http://dx.doi.org/10.2139/ssrn.4157538

[3]. Sakthi P, Jagannath S, Suman N, Sakthivel A and Nandhini A,"Survey on Waste Food Management and Donating Web Application", International Journal of Research Publication and Reviews, Vol. 3, No. 5, pp 2416-2417, May 2022.

[4]. R. R. Prova, A. Rayhan, R. S. Shilon and M. M. Khan, "A Web and Mobile Based Approach to Redistribute Consumable Food Waste," 2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT),Kharagpur, India, 2021,pp.1-6,doi:10.1109/ICCCNT51525.2021.9579645.

[5]. N. K. G N, J. R, S. S. Nukala, M. K. V, S. P. Shankar and S.Kandarp, "Development of Leftover food management system using efficient hunger search techniques," 2021 IEEE Mysore Sub Section International Conference (MysuruCon), Hassan, India,2021, pp. 312-321.

Copyright to IJARSCT

www.ijarsct.co.in

DOI: 10.48175/IJARSCT-18076

ISSN
2581-9429
IJARSCT

466