e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:06/Issue:11/November-2024 Impact Factor- 8.187 www.irjmets.com

WASTE FOOD MANAGEMENT AND DONATION APP

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DOI: https://www.doi.org/10.56726/IRJMETS63716

ABSTRACT

This paper addresses the problem of rising food waste and its significant environmental, social, and economic effects. The "Waste Food Management and Donation App" provides a centralized digital platform that connects restaurants, NGOs, and individuals to facilitate the efficient redistribution of surplus food. This platform streamlines the process by enabling real-time notifications, donation tracking, and direct communication between food donors and recipients. By addressing logistical and communication challenges, the app aims to reduce food waste while supporting food-insecure communities.

Keywords: NGO, Donation, Food Waste, Resource Management, Digital Platform.

I. INTRODUCTION

1.1 Background

According [1]to a Food waste is a pervasive global issue with wide-ranging environmental, economic, and social impacts. According to the Food and Agriculture Organization (FAO), about one-third of all food produced globally is wasted each year. This amounts to approximately 1.3 billion tons of food being discarded annually. The implications of this waste are profound: the production of wasted food consumes vast amounts of water, energy, and land. For instance, producing food that ultimately goes to waste represents nearly 30% of the world's agricultural land and 25% of its water consumption.

When food waste is disposed of in landfills, it generates methane, a potent greenhouse gas that is significantly more harmful to the atmosphere than carbon dioxide. The environmental impact of food waste thus contributes directly to climate change, and this wastefulness amplifies the demand on natural resources, harming biodiversity and straining ecosystems.

Beyond the environmental cost, food waste also affects economic and social aspects. The production, transport, and disposal of wasted food incur costs that could otherwise be allocated to addressing food insecurity. With millions of people worldwide facing hunger and food insecurity, wasted food represents a missed opportunity to feed vulnerable populations. Therefore, addressing food waste is critical not only for environmental sustainability but also for enhancing food security and reducing poverty.

1.2 Need for a Food Donation Platform

In response to the issue of food waste, various organizations, communities, and individuals have implemented food donation systems. These initiatives aim to redirect surplus food from places like restaurants, grocery stores, and households to people in need. However, many of these efforts remain small-scale or fragmented, often relying on manual communication or lacking a centralized network to connect donors and recipients effectively. The lack of coordination between donors, NGOs, and volunteers poses logistical challenges, leading to inefficiencies and missed opportunities for food rescue.

A centralized platform that brings together food donors, NGOs, and volunteers in real-time could significantly improve food redistribution efforts. Such a platform would streamline the process by automating food listings, updating availability, and enabling swift communication, making it easier for surplus food to reach those in need quickly. This approach would not only address logistical issues, such as coordinating donation pickups and communicating availability but also promote collaboration among stakeholders, fostering a community-driven solution to food waste. According [2]

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1.3 Purpose

This study introduces the "Waste Food Management and Donation App" as a digital platform designed to optimize food donation efforts. The app aims to facilitate real-time listings of surplus food, notify potential recipients, and enhance communication between donors and NGOs. According [3]to a By addressing common logistical and communication challenges, the app seeks to maximize food rescue, minimize food waste, and create a more efficient and accessible food donation process.

II. LITRATURE REVIEW

2.1 Existing Solutions and Technologies

Several platforms have been developed to address food waste by connecting surplus food sources with recipients. Prominent examples include **Too Good to Go** and **OLIO**, which focus on reducing food waste by allowing users to purchase surplus food from restaurants and grocery stores at a discounted rate. These platforms are consumer-focused, encouraging individuals to participate in food rescue by purchasing food that would otherwise be discarded. However, while these apps have been successful in certain areas, they are typically limited to specific geographic regions and often focus on consumer use rather than supporting non-profit organizations like NGOs.

Various research studies have explored blockchain and mobile- based solutions for enhancing food donation. For example, blockchain technology provides benefits such as transparency and traceability, which can be crucial for monitoring food donations and ensuring that they reach their intended recipients. However, while blockchain enhances data security and accountability, its adoption for food donation platforms remains challenging due to issues like scalability, high costs, and the technical skills required for implementation.

Despite the promise of these technologies, existing solutions often face challenges in scaling effectively and maintaining consistent user engagement. Many platforms lack features that allow real-time communication and coordination, which are essential for efficiently redistributing perishable food items. This gap highlights the need for a platform that not only leverages technology to connect stakeholders in real time but is also flexible enough to serve various regions and scaleaccording to demand.

2.2 Challenges in Food Donation Systems

While technology has enabled various food donation platforms, significant challenges remain in making these systems efficient,scalable, and universally accessible. Some of the key challengesinclude:

- **Limited Communication:** Many current platforms lack a real-time communication system between donors and NGOs. This limitation can result in delayed responses or miscommunications, leading to missed opportunities to redistribute food before it becomes unsalvageable. For example, food providers may list items for donation, but without immediate notifications, NGOs may not become aware of these items in time to collect them, especially for perishable goods.
- **Scalability Issues:** Many food donation solutions are limited to specific locations and do not easily scale across regions. This geographical limitation reduces their impact, as food waste and hunger are global issues requiring widespread solutions. For instance, platforms may work well within certain cities or areas but face logistical difficulties when expanding to new locations, which may have different regulatory requirements, donor networks, and transportation needs.

This study proposes a solution that addresses these communication and scalability gaps. The "Waste Food Management and Donation App" aims to create an efficient, scalable, and real-time food donation platform that connects multiple stakeholders—donors, NGOs, and volunteers—on a single, integrated platform. By leveraging automation, real-time updates, and intuitive communication features, the app provides an effective solution for enhancing food redistribution efforts, reducing waste, and supporting food security across broader regions.

III. PROBLEM STATEMENT

3.1 Food Waste Impact

According [4]to Food waste is not just an issue of excess or discarded food. It carries significant environmental and social repercussions. The disposal of food waste in landfills generates methane, a greenhouse gas that is far

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more potent than carbon dioxide. This contributes to climate change and resource depletion, as the energy, water, and land used to produce the wasted food are lost. Furthermore, food waste represents a missed opportunity to address global hunger and food insecurity. In many parts of the world, millions of people struggle with hunger, and surplus food that ends up in landfills could otherwisehelp feed those in need.

3.2 Challenges in Food Donation

While many food providers are willing to donate surplus food to charitable organizations or NGOs, the donation process is often inefficient, which leads to missed opportunities and logistical hurdles.

- **Uncoordinated Pickups:** One of the main challenges is thelack of coordination in scheduling food pick-ups between food providers, NGOs, and volunteers. The timing of donations is crucial to prevent food spoilage, and without proper scheduling and communication, donated food may not be picked up in time, leading to waste.
- **Real-Time Information Gaps:** Food providers and NGOs often lack real-time information about available surplus food. Without immediate updates about food availability or urgent needs from NGOs, food donations may not be efficiently managed or maximized, causing missed opportunities to redistribute food before it spoils.
- **Complex Logistics:** The manual processes involved in food donations, such as paperwork, inconsistent communication, and unclear logistics, make it difficult for food providers to donate regularly. These obstacles can discourage participation from both small and large-scale food providers, limiting the impact of food donation efforts.

IV. OBJECTIVES

The Waste Food Management and Donation App aims to addressthe challenges associated with food waste and donation logistics by offering a solution that enhances coordination, transparency, and efficiency. The app has been designed with the followingkey objectives:

4.1 To provide a user-friendly and centralized platform thatconnects food providers, NGOs, and volunteers. The primary goal of the app is to create an easy-to-use platform that serves as a hub for food providers (such as restaurants, supermarkets, and individuals), NGOs, and volunteers. By connecting these three key stakeholders, the app facilitates a seamless communication flow. Food providers can easily list available surplus food, NGOs can search for or be notifiedabout donations, and volunteers can manage pick-up logistics. The centralized nature of the platform makes it simpler for all parties to access necessary information and coordinate donations, reducing inefficiencies caused by uncoordinated efforts.

4.2 To implement real-time notifications and alerts for foodavailability, facilitating timely donations.

One of the major challenges in food donation is the lack of real-time communication about food availability. The app addresses this by implementing instant notifications and alerts to keep all parties informed. When a food provider lists available surplus, both NGOs and volunteers receive real-time updates, allowing them to take swift action. This timely communication ensures that donations are made before food spoils, improving the chances of redistributing food effectively and preventing waste.

4.3 To enable detailed tracking and reporting of donations, thereby improving transparency and accountability within the food redistribution network. Transparency and accountability are crucial in any donation process, particularly when dealing with food that could be used to help those in need. The app offers detailed tracking and reporting features, which allow users to track the history of donations, monitor the status of food items, and generate reportson the amounts donated and received. This feature not only helps ensure that food is distributed properly but also provides data for NGOs and food providers to assess the effectiveness of their donations. Improved reporting can also aid in identifying areas for improvement, building trust among stakeholders, and ensuring that food is reaching its intended recipients.

V. METHODOLOGY

The methodology of the Waste Food Management and Donation App is centered around a clear system architecture, choice of technologies, efficient database design, and UML diagrams to model the functionalities. It ensures that all stakeholders—admins, donors, and users/NGOs—can interact seamlessly to manage food

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donations efficiently. Below is an overview of the key components:

5.1 System Architecture

The system is designed around three main user roles, each tailored to the specific needs of the stakeholders involved in the food donation process:

- **Admin**: The admin is responsible for managingthe platform's overall operation. This includes overseeing user management (donors and NGOs),approving food donation listings, and generating reports. The admin ensures the smooth running of the app by maintaining oversight of donations and user activities.
- **Donor**: Donors, which can include restaurants,hotels, and individuals, are the main providers of surplus food. They are able to list their available food donations by entering details such as food type, quantity, expiration dates, and other relevant information. This ensures that food providers can easily contribute to the donation network.
- **User/NGO**: The users (typically NGOs and volunteers) can view the listed food donations and request food for redistribution. They also manage the logistics of food pick-ups, contacting donors to ensure the timely collection of donated food. This role is essential for ensuring that the surplus food is distributed to the communities in need.

5.3 Technologies Used

The app employs a combination of technologies to ensure it is functional, user-friendly, and scalable:

- **HTML, CSS, JavaScript**: These front-end technologies are used to create a responsive and interactive user interface, ensuring that the app is easy to use on various devices.
- **PHP & MySQL**: PHP is used for server-side scripting, enabling the app to handle dynamic content and user interactions. MySQL provides the database support for storing and managing user information, donations, and requests.
- **Apache**: Apache serves as the web server for hostingthe application, providing a reliable environment forrunning the app.

The relationships between different users and the system's features:

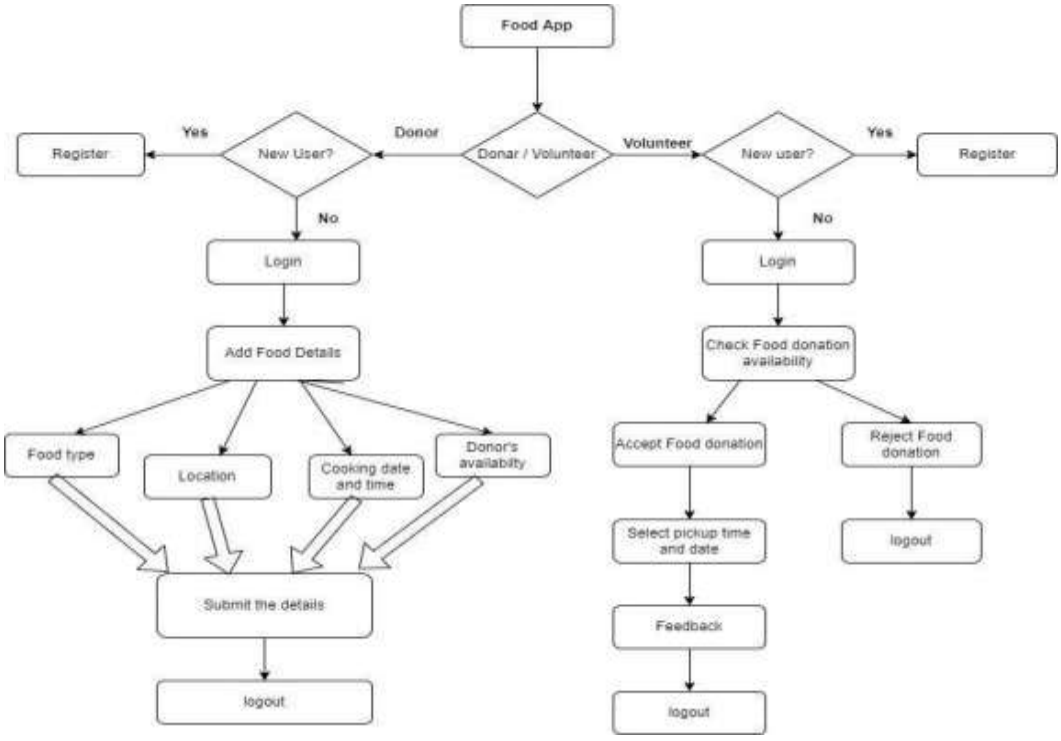

Fig 1: Architecture Diagram

- **Admin Role**: The admin role manages states, cities, donations, and users. UML diagrams for this role show how the admin interacts with various system elements to maintain control and oversight.

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- **Donor Role**: Diagrams for the donor role highlight functionalities such as adding, updating, and tracking food listings. The donor interacts with the system to manage donations and ensure food is distributed on time.
- **User Role**: For the user role, UML diagrams illustrate how NGOs and volunteers can view available food, request donations, and communicate with donors. This ensures that the logistics of food distribution are well-organized.

5.3 Database Design

The database is structured to efficiently handle multiple types ofdata related to users, donations, and requests. Key tables in the database include:

- **tbladmin**: Stores admin user details and permissions.
- **tblfood**: Contains information about food donations,including type, quantity, and expiration dates.
- **tbldonor**: Holds donor information, such as contactdetails and food donation history.
- **tblfoodrequests**: Tracks requests made by NGOs orvolunteers for food donations.

This structure ensures that data is well-organized and can be retrieved quickly to provide a smooth user experience.

5.4 UML Diagrams

UML (Unified Modeling Language) diagrams help illustrate the structure and functionality of the app. These diagrams represent

VI. FEATURES

The app offers several key features for each of its modules (Admin, Donor, and User/NGO), which help streamline food donation management: The app is designed to be compatible with most modern browsers, making it accessible to a wide audience across various devices.

6.1 Admin Module

The admin module is central to the app's operation, focusing on donation management, user oversight, and reporting:

- **Dashboard**: Provides essential statistics, including total states, cities, donors, and requests. This helps admins track the overall activity and health of the system.
- **Donor and NGO Management**: Admins can monitor and manage registered donors and NGOs, ensuring that the food donation process is running smoothly.
- **Reporting Tools**: Admins can generate detailed reports on donations and requests, ensuring transparency and operational efficiency.

6.2 Donor Module

The donor module allows food providers to easily contributesurplus food to the donation network:

- **List Food for Donation**: Donors can input details about the food they wish to donate, including type, quantity, and expiration date, which helps NGOs identify what is available for redistribution.
- **Manage Requests**: Donors can view requests from NGOs and track the status of their donations, ensuring timely and efficient food distribution.
- **Update Profile**: Donors can keep their contact information up-to-date, facilitating smooth communication with admins and users.

6.3 User Module

The user module is designed for NGOs and volunteers,providing features to facilitate food distribution:

- **View Available Food**: Users can browse food listings to identify available donations.
- **Request Food**: NGOs and volunteers can request specific items, which streamlines the donation process and ensures that the food is distributed according to need.
- **Contact Donors**: The app enables direct communication between users and donors to coordinate the logistics of food pick-ups.

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VII. SYSTEM MODULE

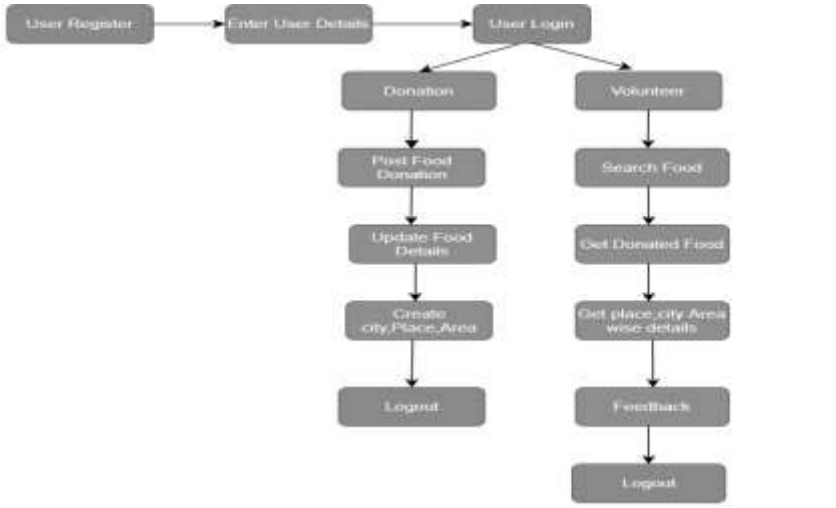

Fig 2: System module Diagram

VIII. CONCLUSION

Our study has look into the problem of food waste that has many serious side effects economically and socially. However, the waste of the food can be prevented or at lowest decreased using political rules and technology. Mobile application technology is helpful for food waste management. The app objective to encourage better food management. Our proposed solution should reduce food waste by facilitating food sharing in group using mobile technology. This work is an first step towards design a better system to reduce daily food waste

ACKNOWLEDGEMENT

We owe sincere thanks to our college Atharva College Of Engineering for giving us a platform to prepared a project on the topic "Waste Food Management and Donation App" and would like to thank our Dean Dr. V.C Pandey for giving us the opportunities and time to conduct and research on the topic. we are sincerely graceful for Prof. Sachin Chauhan as our guide and Ms. Renu Chaudhary, Head of Information Technology Engineering Department, and our which would have seemed difficult without their motivation, constant support and valuable suggestion. Moreover, the complication of this research paper would have been impossible without the co- operation, suggestion and help of our friends and family.

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