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WEB-BASED WASTE FOOD MANAGEMENT: HOUSEHOLD TO NGO

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ABSTRACT

In today's growing food waste crisis, webbased platforms are emerging as powerful tools to connect households with NGOs, streamlining the donation of surplus food to those in need. This review explores the transformative potential of a food waste management system designed to bridge the gap between donors and NGOs. By analyzing the application's functionality, we highlight how it enables households to donate food, and how NGOs can notify registered needy individuals for collection. This system fosters timely food distribution and reduces wastage by providing real-time interactions, notifications, and coordination. However, challenges such as logistics, user engagement, and coordination among multiple stakeholders hinder widespread adoption. This review emphasizes the need for refining digital platforms to ensure efficient and equitable food distribution. Our findings underscore the system's capacity to revolutionize food donation, turning household efforts into a streamlined, impactful process for alleviating hunger.

Keywords: Food Waste Management , donation Platform , NGOs , Food Redistribution , Sustainability , AI Integration , Logistic , Scalability , Community Engagement , Real Time Tracking , real Time Chatting

1. INTRODUCTION

In recent years, food wastage has emerged as a significant issue, especially in densely populated countries like India.The Food and Agriculture Organization (FAO) estimates that every year, almost 1.3 billion tons, or onethird, Of the food produced for human consumption is wasted[7].This waste not only contributes to pollution and hunger but also exacerbates economic challenges faced by many families struggling with food

insecurity. Many families can't afford proper Meals with their limited money. They don't even get ample nutrition due to the shortage of having three meals in A day. Many restaurants, canteens, social and family get-togethers, marriages and functions discharge a large Amount of food at the end of the day even though the food is perfectly fine to be eaten. The excess food wastage Usually ends up in landfills, creating potent greenhouse gases which have rise environmental implications. This Has been a problem for decades[25]. Despite the alarming amounts of food discarded, there are opportunities to redirect this excess to those in need through donations to organizations such as orphanages, old age homes, and NGOs. [24].The purpose of this review is to look how this web based application helps to reduce food waste By creating a platform that connects donors with NGOs, we can tackle food waste while simultaneously addressing hunger, fostering a sustainable solution for the community. The system not only enhances food security but also encourages social responsibility among businesses and individuals alike. [7].

There are challenges that still need to be addressed, such as ensuring data privacy and security for users and establishing effective communication protocols between households and NGOs. Additionally, there is a need for more robust systems to verify the accuracy of food donations and improve the matching process between donors and recipients. By tackling these challenges, we can enhance the effectiveness of food waste management initiatives, making a meaningful impact in the fight against hunger.This review highlights that the integration of such technology-driven solutions is crucial for enhancing food security and fostering a sustainable environment. Through collaboration and innovation, we can transform excess food into nourishment for those who need it most, ultimately creating a more equitable food distribution system [14]

2. PROPOSED METHODS

Food waste is a serious worldwide issue that has an impact on society, the economy, and the environment. The Food and Agriculture Organization (FAO) estimates that every year, almost 1.3 billion tons, or one-third, of the food produced for human consumption is wasted. In addition to adding to poverty and malnutrition, this waste depletes natural resources, increases greenhouse gas emissions, and aggravates issues with food Security.

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[2].There are various papers that provide solution for these problem some of the solution are as follows:

A. StreamLining Food Donation with an Android Application:-

The Android app helps reduce food waste by enabling users to donate surplus food and allowing needy individuals or NGOs to claim it. This study states, "food wastage has been reduced by food redistribution"and the system provides a platform where "the donor can login to the website, update the food details and the location where the food is available." Notifications are sent to NGOs, orphanages, and old age homes, facilitating the redistribution of excess food[25].

B. Web-Based Application for Excess Food Management:-

The web-based application for food waste management connects food donors with NGOs, enabling the efficient redistribution of surplus food to those in need. It facilitates communication between donors and NGOs, manages logistics for food collection and delivery, encourages regular donations, raises awareness about food waste, directly addresses food insecurity, and includes a feedback mechanism for continuous improvement. This innovative approach aims to reduce food waste while alleviating hunger in communities.[12]

C. Leveraging IoT for efficient Food Waste Management:-

The IoT-based Food Wastage Management System offers a smart solution by using IoT sensors to monitor food waste in real-time. It collects data, generates reports, and shares insights with employees and management to promote waste reduction. The system automates food waste tracking, making it scalable for future use in areas like restaurants and events, with potential Integration of technologies like blockchain.[12]

3. RESULTS

The development of a web-based food waste management application draws from a review several existing studies, each contributing insights into effective methods of reducing food waste.The key findings from the selected literature are summarized below:-

A. optimized Waste Food Management System Using Machine Learning for Efficient Donation and Redistribution :-

Due to the lack of public datasets on food donation systems, a custom dataset was developed, containing donation and recipient data collected from volunteers in local communities. Built using Android Studio with Java and XML, the application uses machine learning models like Random Forest and XGBoost for accurate food availability prediction. A 5-fold cross-validation approach ensured optimal accuracy while balancing model complexity, enhancing the app's efficiency in managing food donations and minimizing waste[7].

B. Using AI and Machine Learning technologies For web based food waste management system:-

The AI and machine learning-based food waste management application optimizes food donation processes by accurately predicting food availability and demand. Through data analysis, the system enhances decision-making for NGOs and households, ensuring timely and efficient food redistribution. By leveraging real-time data, the application minimizes food waste, improves resource allocation, and effectively connects donors with recipients, ultimately fostering a sustainable approach to food management and reducing food insecurity in local communities.

C. Using AI and Machine Learning technologies For Android based food waste management app:-

The mobile application effectively reduces food wastage by utilizing AI and machine learning technologies. It identifies food items through image recognition, estimates their weight, and generates recipes using leftover ingredients. An intelligent chatbot engages users, offering personalized meal plans and nutritional advice based on previous meals. The implementation achieved a recipe generation accuracy of 76% and introduced a unique weight estimation method. By encouraging better food management and promoting healthy eating habits, the application fosters sustainability and addresses the global issue of food waste.[22]

4. RESEARCH GAP

A. Scalability Issues :-

The system does not cover scalability for handling large-scale operations or the integration of food safety measures during transportation.[14][2][3] .

B. Lack of Real-Time Tracking:-

There's no mention of real-time tracking for food distribution logistics. Due to which users are unaware about exact location where their donated food has reached.[14][2][3].

C. Improving Infrastructure for Safe Transportation of Food:-

There is potential to improve cold storage facilities and logistics infrastructure to ensure that perishable items are safely transported and stored. Additionally, increasing public awareness could further enhance participation in food donation programs[10]

5. FUTURE DIRECTIONS

A.Boosting User Engagement through Gamification and Social Network Integration :-

Future development could include gamification to boost user engagement and integrating social networks for broader reach and user involvement. Integrate food safety checks, collaborate with more NGOs and local governments, and add gamification features to enhance user engagement.[10][2].

B. Innovative Solutions: Cold Storage and Smart Technologies:-

Efforts should improve cold storage, use nanotechnology for food preservation, and raise public awareness about food waste. Future enhancements may include better logistics, like refrigerated transport, rural expansion, and integrating renewable energy, such as solar power, for sustainability[6]. Smart technologies, like smart fridges and improved packaging, can also help reduce food waste. [21]

C.Smarter Logistics, Expanded Donations, and AI Integration:-

Future enhancements may focus on improving logistics with better transportation solutions and expanding the platform to include donations beyond food, such as clothing and books [7]. AI can be integrated for smarter logistics, optimizing donor-NGO matching based on food availability and providing realtime logistics tracking. Additional features could include GPS-based food location tracking, time/date stamps, crossplatform functionality, and support for various types of donors [14].

Further studies may examine food waste patterns across different geographic regions and social classes in India, employing mixedmethod or quantitative approaches to broaden the findings [16].

D. Research, Policy Integration, and Consumer Awareness:-

Future research could focus on refining the decision-making framework for waste management and expanding the categorization process to other industries and regions[19]. A Future efforts should focus on integrating waste reduction into food policies, improving infrastructure for postharvest handling, and increasing public awareness about food waste. Consumer education and better food packaging technology can also play a crucial role .

6. CONCLUSION

In conclusion, the review of these studies shows that food waste management, whether through mobile applications, AI-driven solutions,or community-based interventions, holds the potential to significantly reduce global food waste. Technologies like real-time tracking, inventory optimization, and redistribution platforms play a key role in ensuring excess food reaches those in need. Implementing such systems can help minimize environmental impacts, reduce hunger, and improve sustainability. However, the challenges of user engagement, data privacy, and logistical barriers must be addressed to fully optimize these solutions. Moving forward, continuous research and development in this space are essential to refining the technological tools, making them more accessible, user-friendly, and impactful. By focusing on scalability, inclusivity, and ethical practices, these innovations can not only minimize food waste but also contribute significantly to global efforts toward sustainability, hunger reduction, and environmental conservation. The future of food waste management lies in harnessing the power of technology while keeping human centric solutions at the core of these efforts.These systems show that reducing food waste can contribute significantly to alleviating hunger, minimizing environmental degradation, and promoting sustainability by optimizing food resources. They emphasize the critical need for implementing real-time data tracking, geolocation,and automation to connect donors with non-profit organizations more eeffectively.

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