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Share-Bite: An NGO-Mediated Digital Platform for Ethical Food Redistribution at Large and Small Scales Levels

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Abstract - Food waste is a major global issue that has serious environmental, social, and economic impacts. A substantial amount of edible food is wasted every day from households, educational institutions, events, and food service providers, resulting in unnecessary use of natural resources and rising greenhouse gas emissions, especially methane from landfilling. Meanwhile, food insecurity persists as a problem for a substantial number of people. To bridge this gap, there is a need for solutions that focus on preventive measures against waste, rather than managing waste after it occurs.

This paper presents Share-Bite, an eco-innovative, NGO-mediated digital platform that aims to mitigate food waste by effectively redistributing surplus edible food in a timely manner. The proposed system adopts a preventive, community-based strategy by linking food donors with trusted non-governmental organizations (NGOs) in charge of food collection and redistribution. With a simple web-based interface, food donors can post notifications about surplus food availability, and nearby NGOs are instantly alerted through real-time notifications, allowing for rapid and secure redistribution of the food before it turns to waste.

The approach focuses on waste reduction at the point of origin, which aligns with the waste management hierarchy and green/sustainable computing principles. By preventing excess food from becoming part of the waste stream, Share-Bite helps to reduce methane production and the use of water, energy, and other resources in food production and preparation. In addition, the approach encourages ethical food sharing, consumption, and social responsibility.

Share-Bite is scalable, cost-effective, and can be applied in different settings, including campuses, communities, and events. The proposed approach illustrates the effective use of digital technologies to address environmental sustainability issues and create significant social impact. This research showcases the role of technology-driven and prevention-based solutions in promoting sustainable food management practices.

Keywords:

Green and Sustainable Computing, Environmental Sustainability, Food Waste Reduction, Sustainable Food Management, Surplus Food Redistribution, NGO-Mediated Distribution, Ethical Food Sharing, Community-Level Solutions, Methane Emission Reduction

I. INTRODUCTION

Food wastage has become a serious social, economic, and environmental issue worldwide. Large quantities of edible food are discarded daily due to overproduction, improper planning, lack of coordination, and the absence of structured redistribution mechanisms. At the same time, millions of people continue to struggle for access to basic meals, highlighting a critical imbalance between food surplus and food insecurity. This paradox reflects inefficiencies in current food management systems and calls for sustainable, technology-driven solutions that can bridge the gap between excess and requirement.

The environmental impact of food waste is important and many-sided. Food production involves extensive use of natural resources such as water, energy, agricultural land, and

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human labor. When edible food is wasted, all these resources are unnecessarily lost. Furthermore, discarded food decomposes in landfills under anaerobic conditions, releasing methane gas, a greenhouse gas far more potent than carbon dioxide. This contributes directly to climate change and environmental degradation. Therefore, addressing food wastage requires approaches that focus on waste prevention at the source rather than relying solely on disposal or treatment after waste generation.

With the advancement of digital technologies, several food donation and redistribution platforms have emerged to connect surplus food providers with receivers. Many of these systems have been successfully implemented at large scales, involving hotels, restaurants, corporate events, and government-supported food banks. However, such platforms often overlook small-scale food surplus generated by college canteens, hostels, mess facilities, home gatherings, and small events, where a considerable amount of edible food is wasted daily. In addition, open food-sharing platforms that allow individuals to directly receive food face challenges related to misuse, lack of verification, and ethical concerns regarding fair distribution and food safety.

To address these limitations, this research proposes **Share-Bite**, a controlled, NGO-mediated digital platform designed to reduce food wastage through ethical and timely redistribution of surplus edible food. The proposed system restricts food collection responsibilities to verified non-governmental organizations, ensuring accountability, fairness, and responsible handling of food. Share-Bite emphasizes waste reduction at source, environmental sustainability, and social responsibility, aligning with the principles of green and sustainable computing. The framework is presented as a conceptual and prototype-supported model with scope for future implementation, scalability, and integration into community-level and institutional food management systems.

II. LITERATURE REVIEW

Several studies and reports have highlighted the growing concern of food wastage and food insecurity across the world. According to reports published by the **Food and Agriculture Organization (FAO)**, a significant portion of food produced for human consumption is lost or wasted every year, leading to environmental, economic, and social consequences. These studies emphasize that food wastage not only affects food availability but also results in unnecessary use of natural resources such as water, land, and energy.

The **United Nations Environment Programme (UNEP)**, through its Food Waste Index Reports, provides recent data on food waste generated at household, retail, and food service levels. These

reports indicate that food wastage occurs not only at large commercial establishments but also at smaller and decentralized sources. The findings suggest the need for localized and community-level solutions to complement existing large-scale food redistribution systems.

Reports by the **World Food Programme (WFP)** and the **Food Security Information Network (FSIN)** highlight the increasing levels of food insecurity and hunger across various regions. These studies reveal a strong contrast between the availability of surplus food and the growing number of people facing food shortages. The literature emphasizes the importance of timely and efficient redistribution mechanisms to bridge this gap.

In the Indian context, initiatives by the **Food Safety and Standards Authority of India (FSSAI)**, such as *"Save Food, Share Food, Share Joy"* and the **Indian Food Sharing Alliance (IFSA)**, promote safe and ethical food donation practices. These initiatives demonstrate that structured food donation systems are feasible and effective when supported by NGOs and regulatory bodies. However, most existing platforms primarily focus on large donors and centralized operations.

From the review of existing literature, it is observed that while food donation platforms and food banks are operational, there is limited focus on **misuse prevention**, **ethical beneficiary selection**, and **small-scale donor inclusion**. This research builds upon existing studies by proposing an NGO-mediated, misuse-resistant system that supports both large and small-scale food redistribution, addressing the gaps identified in current literature.

III. PROBLEM STATEMENT

Despite the availability of food donation platforms, several challenges continue to persist. A significant amount of surplus food generated from small-scale sources such as college canteens, mess facilities, hostels, home gatherings, and residential areas often goes to waste due to the absence of suitable redistribution mechanisms. Many existing platforms have limited accessibility for individual and community-level donors, as they are primarily designed for large organizations. Additionally, open donor–receiver systems increase the risk of misuse, where food requests may not always reflect genuine need. The lack of ethical control in beneficiary selection further reduces trust and fairness in distribution. Moreover, the absence of localized and community-focused solutions makes it difficult for

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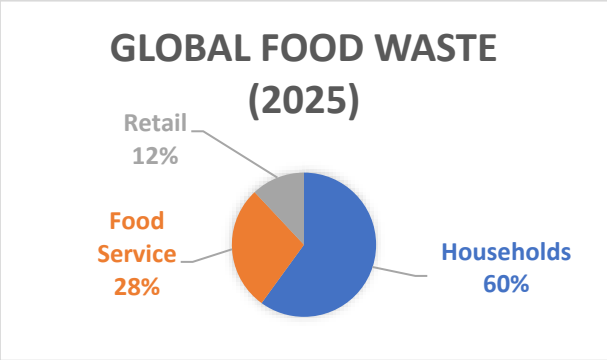
educational institutions and residential areas to actively participate in food redistribution initiatives.

The problem addressed in this research is the lack of a misuse-resistant, ethically controlled, and scalable food redistribution system that can operate effectively at both large and small scales. The proposed system aims to bridge this gap by providing a structured and NGO-mediated approach that ensures fairness, accountability, and practical applicability across diverse environments.



IV. EXISTING SYSTEMS AND GAP ANALYSIS

Food donation systems and food banks currently operate in many regions. These systems are generally characterized by centralized storage, large donor participation, and NGO or government involvement. While effective, they present certain limitations:

- Focus mainly on large donors
- Complex registration and coordination processes
- Limited support for small food generators
- Storage-based models leading to spoilage
- Open access models prone to misuse

The gap identified is the absence of a lightweight, NGO-controlled platform that supports direct redistribution and encourages participation from small donors while maintaining ethical standards.

V. PROPOSED SYSTEM: SHARE-BITE

A. System Overview

Share-Bite is a proposed web-based platform designed to facilitate ethical food redistribution through NGO mediation. The system allows users to act only as food donors, while food acceptance and distribution are managed exclusively by verified NGOs.

The platform focuses on:

- Reducing food wastage
- Preventing misuse
- Ensuring fair distribution
- Supporting both large and small-scale donations

B. Actors in the Proposed System

1. Donor
   Donors include individuals, college canteens, mess facilities, hostels, event organizers, and households. Donors can post details of surplus food, including quantity, location, and pickup time.
2. NGO (Receiver)
   Only verified NGOs are allowed to receive and accept food donation requests. NGOs assess the suitability of food and decide its distribution.
3. Volunteer
   Volunteers associated with NGOs handle the pickup and delivery of food from donors to beneficiaries.

VI. SYSTEM ARCHITECTURE AND WORKFLOW

The architecture of Share-Bite follows a controlled and linear distribution model:

Workflow Description

1. Donor uploads food details on the platform
2. Nearby NGOs receive real-time notifications
3. The first NGO to accept the request locks the donation
4. NGO assigns a volunteer for pickup
5. Food is delivered to deserving beneficiaries

This workflow minimizes delay, avoids duplication, and ensures accountability.

VII. METHODOLOGY

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The methodology of the proposed system emphasizes ethical control and misuse prevention:

- NGO Verification: Only registered NGOs can access requests
- Location-Based Notification: Reduces response time
- First-Accept Mechanism: Prevents conflicts
- Volunteer Accountability: Ensures transparency
- Food Safety Consideration: NGOs evaluate suitability

The methodology ensures practical feasibility while maintaining ethical responsibility.

VIII. USE CASE SCENARIOS

A. Large-Scale Use Cases

Share-Bite can be effectively utilized in large-scale environments where surplus food is generated in significant quantities. Wedding functions and large events often produce excess food due to overestimation of guests, making them ideal contributors to the platform. Restaurants and hotels can use the system to redistribute unsold but consumable food in a timely manner. Additionally, community kitchens and large food preparation centers can leverage Share-Bite to ensure that surplus food reaches NGOs instead of being wasted.

B. Small-Scale Use Cases

In addition to large-scale applications, Share-Bite is specifically designed to support small-scale food donors. College canteens, hostels, and mess facilities frequently generate leftover food that can be redistributed efficiently through the platform. Home parties and small social gatherings, which are often overlooked by existing systems, can also contribute surplus food. By enabling participation at the community level, Share-Bite promotes inclusivity and local engagement.

This dual applicability across both large-scale and small-scale scenarios clearly differentiates Share-Bite from many existing food redistribution systems, which typically focus only on large institutional donors.

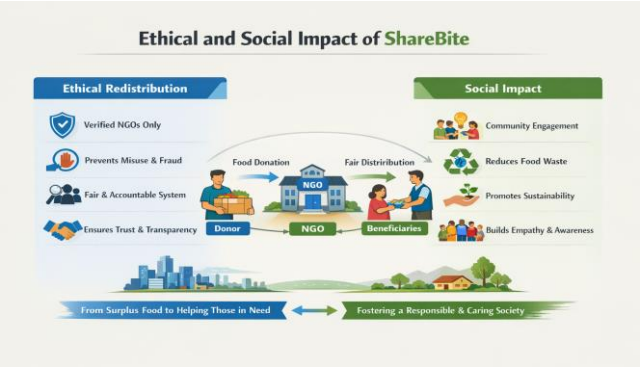
IX. ADVANTAGES OF THE PROPOSED SYSTEM

- Reduces food wastage effectively
- Prevents misuse and fraudulent requests
- Ensures fair and ethical distribution
- Encourages local community participation
- Supports small and large donors
- Improves trust between stakeholders

X. ETHICAL AND SOCIAL IMPACT

Share-Bite emphasizes ethical redistribution by assigning responsibility to NGOs rather than individuals. This approach ensures that food reaches genuinely deserving people and promotes social responsibility. By restricting food acceptance to verified organizations, the platform reduces the risk of misuse, favoritism, and unfair distribution. NGOs possess the required experience and ground-level knowledge to identify real needs, making the redistribution process more transparent, accountable, and trustworthy. This controlled model strengthens public confidence in food donation systems and encourages more donors to participate without fear of misuse.

In addition to ethical distribution, Share-Bite creates a positive social impact by fostering community involvement and awareness about food wastage. The platform encourages individuals, educational institutions, and small event organizers to view surplus food as a valuable resource rather than waste. By enabling redistribution at both small and large scales, Share-Bite promotes sustainable consumption practices and collective responsibility. Over time, this approach can contribute to reduced environmental impact, stronger community support networks, and a culture of empathy and sustainability within society.



XI. ENVIRONMENTAL IMPACT OF THE PROPOSED SYSTEM

Food waste has a significant environmental footprint due to the unnecessary consumption of natural resources and the

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emission of greenhouse gases. When edible food is discarded and sent to landfills, it decomposes anaerobically and releases methane gas, which is substantially more harmful to the environment than carbon dioxide. In addition to greenhouse gas emissions, food wastage results in the loss of water, energy, agricultural land, and labor used during food production, processing, transportation, and cooking.

The proposed Share-Bite system contributes to environmental sustainability by focusing on food waste reduction at the source rather than waste disposal after generation. By enabling the timely redistribution of surplus edible food, the platform prevents food from entering the waste stream, thereby reducing methane emissions associated with landfill decomposition. This preventive approach aligns with the waste management hierarchy, where waste reduction is considered more environmentally beneficial than recycling or disposal.

Furthermore, Share-Bite indirectly supports the conservation of critical natural resources. Each instance of food redistribution represents saved water, energy, and raw materials that would otherwise be wasted. By promoting local and community-level redistribution, the system minimizes additional transportation requirements, further reducing carbon emissions associated with food logistics.

From an Environmental Studies (EVS) perspective, the proposed model supports sustainable consumption patterns and responsible resource utilization. By treating surplus food as a valuable resource rather than waste, Share-Bite encourages environmentally conscious behavior among individuals, institutions, and event organizers. Over time, widespread adoption of such redistribution systems can contribute to reduced environmental degradation, lower greenhouse gas emissions, and improved sustainability outcomes at both local and regional levels.

XII. LIMITATIONS

- Possible pickup delays during peak times
- Requirement of continuous NGO onboarding

Acknowledging these limitations enhances research transparency.

XIII. FUTURE SCOPE

- Mobile application development
- AI-based NGO prioritization
- Integration with government food programs
- Expansion to rural and semi-urban areas
- Real-time donation and pickup tracking for better transparency
- Analytics dashboard for NGOs to monitor donations and impact
- Multi-language support to increase accessibility across regions
- Awareness modules to educate users about food wastage reduction

XIV. CONCLUSION

This research proposes Share-Bite, an NGO-mediated digital platform designed to reduce food wastage through ethical, controlled, and responsible redistribution. While similar food donation systems already exist and operate effectively at a large scale, Share-Bite extends accessibility to small-scale donors such as educational institutions, residential communities, and small social events, which are often overlooked by existing solutions. The incorporation of a misuse-resistant architecture, where only verified NGOs are authorized to accept and distribute food, strengthens trust and ensures fair beneficiary selection.

By prioritizing fairness, accountability, and sustainability, the proposed system offers a practical and scalable approach to addressing food wastage across diverse environments. Share-Bite not only aims to minimize the disposal of edible food but also encourages community participation and social responsibility. With further development and implementation, the proposed model has the potential to contribute significantly to sustainable food management practices and long-term social impact.

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