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NO Waste:Donating Surplus Food to Reduce Waste

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ABSTRACT :

Food waste presents significant negative impacts on the environment, society, and economy worldwide, yet instances of hunger and food insecurity persist in certain regions. One potential remedy is the redirection of surplus food from restaurants and stores to charitable organizations and food banks. This research delves into the advantages and hurdles associated with such donations, along with strategies to encourage them. Additionally, it explores how these donations can contribute to community development and social unity. Employing qualitative methodologies such as literature reviews and case studies involving interviews with donors, recipients, and policymakers, the study assesses the effects of these donations. Despite the positive outcomes observed, challenges in logistics, legality, and social acceptance hinder the process. To enhance their impact, coordinated efforts, awareness campaigns, and policy frameworks are imperative. Waste food donations hold promise in mitigating both food waste and hunger while fostering community growth and cohesion. However, the effective navigation of obstacles and the adoption of efficient strategies to advocate and sustain such donations are essential for maximizing their efficacy.

Keywords: Food waste donations, food surplus, hunger alleviation, food insecurity, charitable initiatives, community welfare, policy interventions.

INTRODUCTION :

Background of the topic

The issue of food waste profoundly affects society, the economy, and the environment, with approximately one-third of produced food lost or wasted annually, leading to widespread hunger and malnutrition. Factors such as inadequate storage, distribution systems, and post-harvest management practices contribute significantly to this multifaceted problem within the food supply chain. The consequences of food waste encompass the squandering of valuable resources, heightened greenhouse gas emissions, and the exacerbation of poverty and hunger on a global scale. One potential solution entails the donation of surplus food to those in need; however, further research is imperative to comprehend its efficacy fully. Addressing this challenge demands a concerted effort from all stakeholders involved in the food system to minimize waste and combat hunger effectively. This paper endeavors to scrutinize the impact of surplus food donations in mitigating food waste and alleviating hunger, while also examining the associated challenges and opportunities inherent in employing food donation as a solution. It will posit that while food donation represents a commendable strategy, it must be integrated into a holistic approach aimed at establishing a sustainable and just food system. [1]

Problem statement

To attain global food security for an expanding population, enhancing agricultural productivity and curbing food waste are paramount. Presently, a staggering 40% of the world's food production is squandered, including losses occurring directly on farms, which could have amply nourished the undernourished populace fourfold. Such wastage carries significant environmental ramifications, including a 10% contribution to global greenhouse gas emissions, habitat destruction for wildlife, and depletion of freshwater reservoirs. Addressing food waste emerges as a pivotal component of any effective food strategy.

Significance of the research

The significance of this study lies in its exploration of the determinants shaping the adoption of waste innovations, specifically within the realm of food waste management in the food service sector. Understanding the interplay of social and professional factors is pivotal for the efficacy of waste management initiatives, and this research endeavors to pinpoint innovative practices while assessing the attitudes of managers towards them. By employing qualitative methodologies, this study aims to bridge existing gaps in research pertaining to this domain, thereby contributing valuable insights to enhance the effectiveness of waste management strategies in the food service industry.

Research questions and a preview of the remaining sections of the paper

Research Questions:

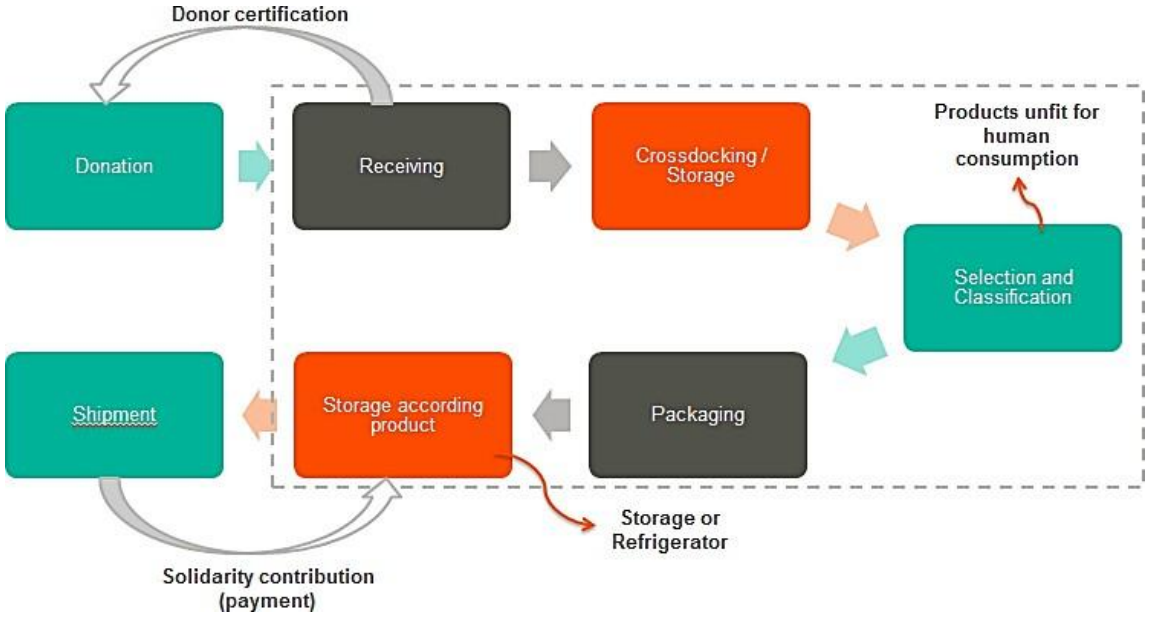
What are the underlying causes and mechanisms contributing to food waste across different stages of the food supply chain?
How do these factors interact to result in food waste, and what are the primary motivations behind wasteful practices?
Why does food waste pose such significant challenges globally, encompassing economic, environmental, and social dimensions?
Preview of Remaining Sections:
After establishing the definition and scope of food waste, the paper will delve into the intricacies of why and how food becomes wasted, examining the multifaceted factors and processes involved at various stages of the food supply chain. It will scrutinize the role of overproduction, storage and handling practices, quality standards, consumer behavior, and supply chain inefficiencies in contributing to food waste, elucidating their economic, environmental, and social ramifications. Subsequently, the paper will analyze the overarching significance of food waste as a global dilemma, exploring its far-reaching implications for environmental sustainability, economic stability, food security, and ethical considerations. By addressing these research questions, the paper aims to shed light on the complexities of food waste and advocate for comprehensive strategies to mitigate its adverse impacts and promote a more sustainable and equitable food system.

History and role of food banks in the world :

The history and role of food banks in the world date back to 1967 when the first Food Bank was established in Phoenix, USA by John Van Engel, in response to the alarming levels of food waste and hunger. Since then, food banks have emerged as vital non-profit organizations dedicated to alleviating hunger and malnutrition, particularly in regions with vulnerable populations. These organizations play a crucial role in rescuing surplus food that would otherwise go to waste and redistributing it to those in need.
Food banks operate as comprehensive networks comprising store connections, transportation systems, distribution centers, and a cadre of dedicated volunteers. They serve as a lifeline for individuals and families facing food insecurity by providing them with access to nutritious food that would otherwise be discarded. Additionally, food banks serve as platforms for community engagement, raising public awareness about hunger and its solutions.
Moreover, food banks advocate for policy changes and political decisions aimed at enhancing food security both at the individual and community levels. They serve as powerful voices in driving initiatives that address the root causes of hunger and promote sustainable solutions.
In essence, food banks represent a collaborative effort involving various sectors of society, including businesses, government agencies, charitable organizations, and volunteers, all working towards the common goal of eradicating hunger and building resilient communities.
In addition to the organizational structure and personnel required, the logistics of a food bank typically follow a straightforward process. It begins with a donor expressing their intention to donate products to the food bank and reaching an agreement with the donor regarding the delivery logistics and any associated benefits, such as tax exemptions.

Upon receipt of the donated products, they are transported to the distribution center of the food bank, where they are stored on pallets. Subsequently, the products undergo a classification stage to identify any items that are unfit for human consumption, which are then discarded. Following this, the products are packaged for distribution.
If necessary, the food bank may also incorporate a storage process to accommodate larger quantities of donated goods.
Once the processing is complete, the administrative department of the food bank notifies partner foundations or organizations of the available products. These entities have the option to purchase the products at a reduced cost, typically around 10% to 15% of the actual market value, allowing them to provide assistance to individuals and communities in need.

This streamlined logistics process ensures efficient handling and distribution of donated food items, maximizing their impact in addressing food insecurity and hunger within communities.



LITERATURE REVIEW :

Numerous studies underscore the imperative of transitioning towards sustainable food systems for the well-being of both humanity and the planet. Central to this endeavor is the necessity of halving global food waste, a pivotal step towards achieving sustainability goals. The production of food demands significant resources including water, land, energy, labor, and capital; hence, wasted food signifies squandered inputs. According to WWF-UK, approximately 10% of the world's greenhouse gas emissions can be attributed to food waste. Moreover, around 30% of agricultural land is dedicated to food that ultimately goes to waste, contributing to 38% of the total energy consumption in the global food system. The predominant disposal method, landfilling, further exacerbates greenhouse gas emissions.

The ramifications of food waste extend beyond environmental concerns, significantly impacting food security, availability, and affordability. By impeding the ability to meet the caloric and nutritional needs of the expanding global population, food waste exacerbates food insecurity. This translates into substantial economic costs, with global food waste incurring an annual expense of 2.6 trillion USD.

Despite efforts to redistribute surplus food, there exists the potential for rebound effects, particularly if beneficiaries are able to save money as a result. Reports suggest that rebound effects associated with food donation can offset a significant portion of potential greenhouse gas emission savings. However, despite this caveat, the climate advantage of food donation still surpasses that of anaerobic digestion.

While much of the existing research has focused on greenhouse gas emissions in environmental evaluations, there remains a dearth of studies examining multiple environmental impact categories. It is evident that reducing emissions aligns with the waste hierarchy and results in lower overall emissions. However, further research is needed to comprehensively assess the various environmental impacts of food waste reduction efforts.

Overall, the literature underscores the critical importance of addressing food waste as a multifaceted challenge with far-reaching implications for environmental sustainability, food security, and economic stability. Efforts to mitigate food waste must be informed by a holistic understanding of its environmental, financial, and societal dimensions.

METHODOLOGY :

The development of the food donation system was executed using the MERN Stack, a renowned web application development stack comprising MongoDB, Express.js, React.js, and Node.js. React.js served as the primary front-end web development library, offering efficient tools for constructing the client-side of web applications with speed and ease. Node.js, described by nodejs.org as an "asynchronous event-driven JavaScript runtime," was employed for building scalable network applications. Express.js, a versatile yet robust back-end web application framework tailored for Node.js, streamlined and expedited the creation of backend web applications.

MongoDB, an open-source NoSQL database with a document-oriented structure, was chosen for its proficiency in managing vast amounts of data. Leveraging MongoDB complemented the MERN Stack architecture, enhancing the system's scalability and efficiency.

In addition to the MERN Stack components, the system utilized the Google Maps API to access geolocation information for user communication tasks,

augmenting the functionality of the platform.

Various dependencies, including React-router-dom, Axios, Mongoose, and charts.js, were incorporated to facilitate tasks such as data fetching and visualization. Access to the system was restricted to registered users, who were required to log in using a user registration and login system. JWT authentication was implemented to verify the authenticity of users.

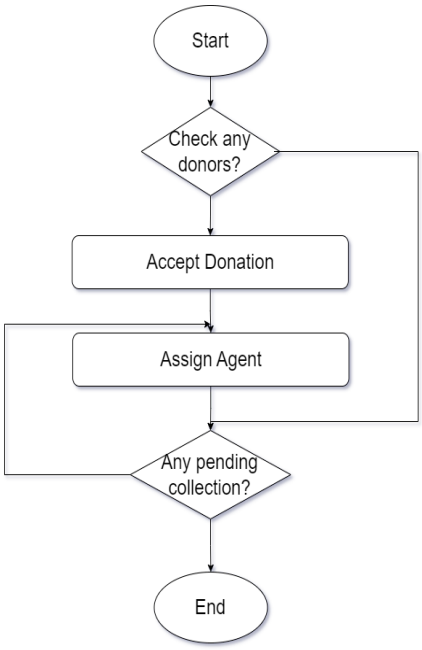
While certain user roles, such as Donors and Agents, were permitted to self-register, others, such as Admins and individuals seeking to utilize the Buying Product at a Discount Function, required registration by database admins or the system itself. This approach ensured controlled access and security within the system, maintaining the integrity of user data and operations.

Backend Functions

In the Food Donation System, four major functions are allocated to four key user roles: Admins, Buying Product at a Discount, Donors, and Agents. Each user role has specific backend functions, as outlined below:

Admin Backend Functions

The process for an admin backend system to manage waste food donation can vary depending on the specific needs of the organization or program. However, here is a general overview of the steps involved in setting up such a system:



Overall, the admin backend system for waste food donation should be easy to use and efficient, allowing for seamless coordination between donors and recipients, while ensuring the safety and quality of the donated food.

Donor Backend Functions

The backend process for a waste food donation donor typically involves the following steps:

The waste food donation platform provides a series of steps for users to follow, which are located in the backend. Firstly, users must register by giving their basic details such as name, email, and password.

These details are then confirmed and saved in a database for future reference. Secondly, users must enter their email and password to access the platform.

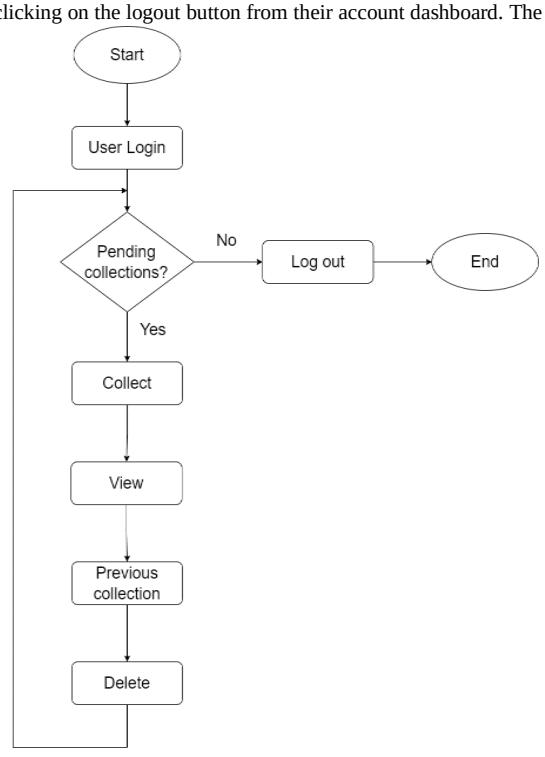
The system checks the entered credentials against the stored user data in the database, and if they match, the user can use the platform.

Next, users can donate food by selecting the "donate food" option on their account dashboard and filling out a form with the relevant details such as the type, quantity, and pickup location of the food they wish to donate. The form data is then saved in the database and marked as a pending donation.

A platform administrator will review the pending donation and either accept or reject it. If approved, the user will be informed of the pickup schedule and location, while if rejected, they will be given the reason for the rejection. Before approval, users can modify the details of their pending donation, and the updated information is saved in the database and marked as pending for review.

Users can view a list of their previous food donations, including details such as date, quantity, and location, from their account dashboard. Users can also modify their personal information, such as name, email, and phone number, from their account dashboard. The updated information is saved in the database and reflected in the user's profile. Furthermore, users can change their account password by providing their current password and a new password, and the new password is validated and saved in the database.

Finally, users can log out of their account by clicking on the logout button from their account dashboard. The session is then terminated, and the user is redirected to the login page.



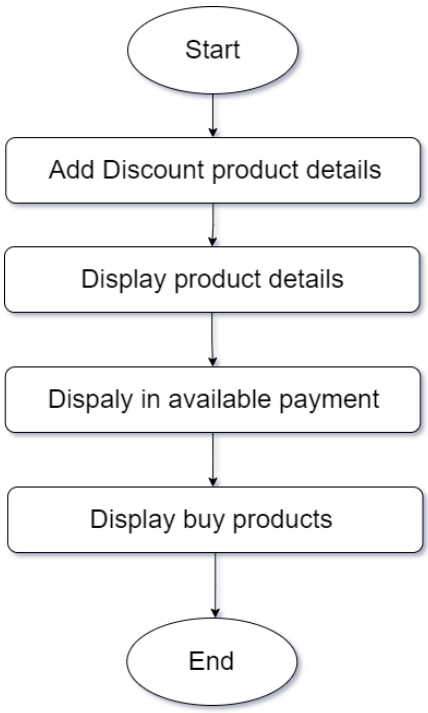
To facilitate the work of waste food donation agents, the system will offer a login functionality where they can access their dashboard by entering their credentials.

Once logged in, agents can view a list of pending collections for the day, which enables them to identify the location of the food donations they need to collect. The system also allows agents to update the status of the donation to "collected" once they reach the location and record the weight and type of the collected food. Agents can view the details of pending collections, such as location, contact information, and scheduled collection time.

The system also tracks all previous collections made by the agent, providing details such as the date, time, weight, and type of food donations collected.

Additionally, agents can delete pending or previous collections if necessary. The waste food donation agent system's backend infrastructure includes a database to store pending and completed collections, user authentication, and several API endpoints to facilitate communication between the front-end and the database.

D. Buying Product at a Discount

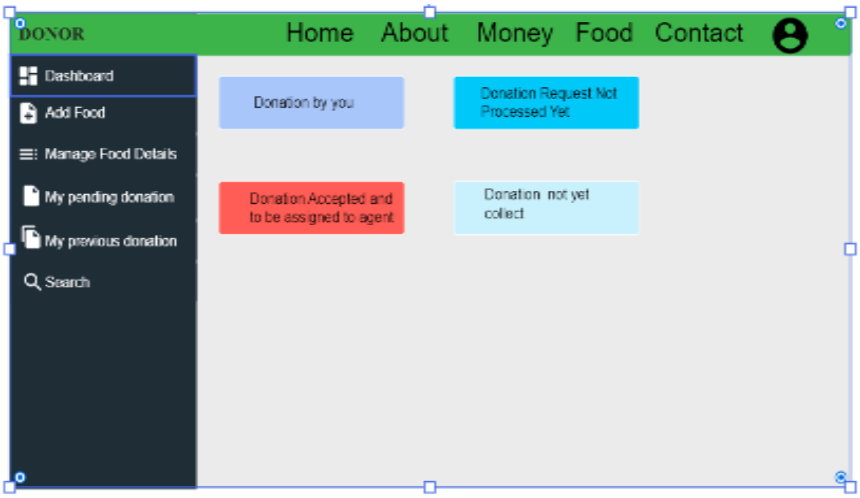


PPROPOSED SYSTEM :

Food Donation Function

The food donation function is the core function of the proposed system. It allows donors to post their surplus food items on the platform, and potential recipients can claim the available food. This figure shows an example of a surplus food donation function interface.

Figure 1- Food donation dashboard

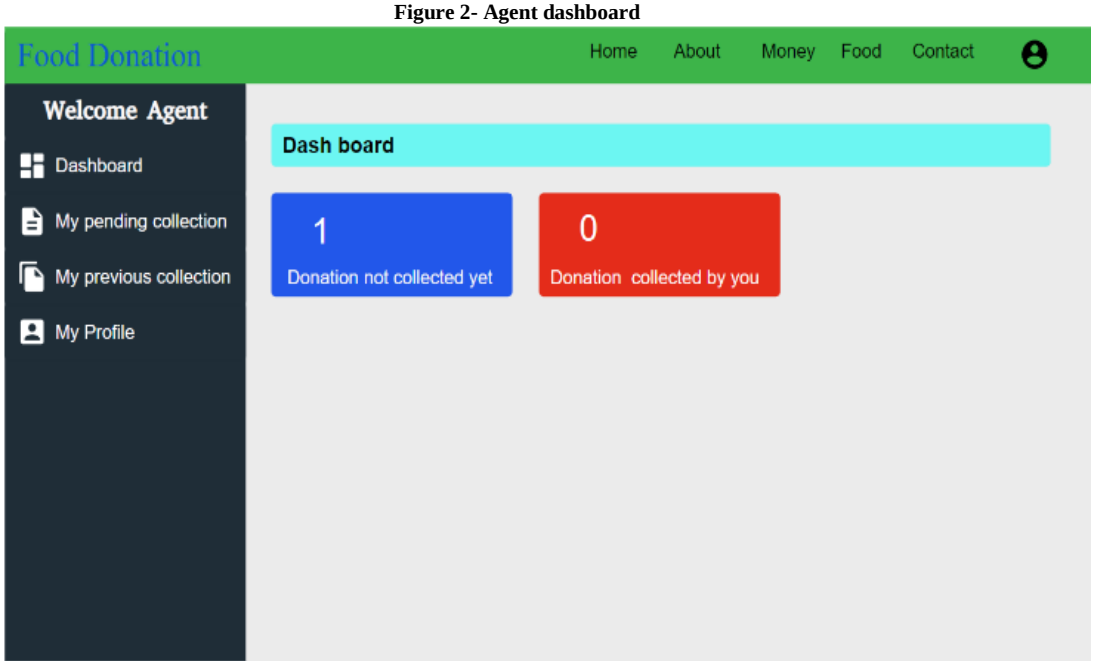


To add a discounted product, the backend process would require creating a new entry in the database with product information such as name, description, image, original price, discount price, and generating a unique product ID.
After adding the product to the database, the backend system can retrieve and display the details on the user interface by querying the database based on the product ID.
To display the available payment options, the backend system needs to integrate with payment gateway APIs such as credit card, debit card, and display the options available based on the payment gateway integration.
When a user selects a product to buy, the backend system would need to verify product availability, payment information, and payment gateway response. If everything is in order, the system can display the option to buy the product and initiate the payment process.
Once the payment is complete, the system can update the inventory in the database and send a confirmation email to
The user. To accomplish this, the backend process would need to integrate various systems such as the database, payment gateway, and email notification system to ensure a smooth user experience.

Agent Function

The agent function can help manage the food donation process by verifying the quality of the donated food, coordinating the transportation and storage of the food, and assisting with the donation process. This figure shows an example of an agent function interface.

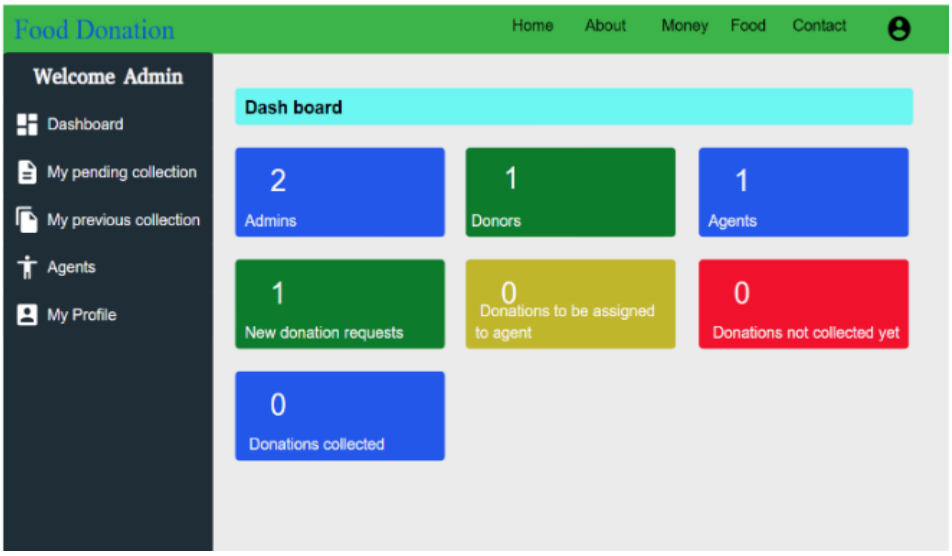
Figure 2- Agent dashboard



Admin Function

The admin function can help manage the overall operation of the proposed system. It can provide real- time updates on the status of the donation process, monitor the performance of agents and donors, and ensure compliance with regulations and policies. This figure shows an example of an admin function interface.

Figure 3- Admin dashboard



Buying Product at a Discount

The buying product at a discount function can help organizations and individuals purchase surplus food items at a discounted price. This can help reduce food waste and provide affordable food options to those in need. This figure shows an example of a buying product at a discount function interface

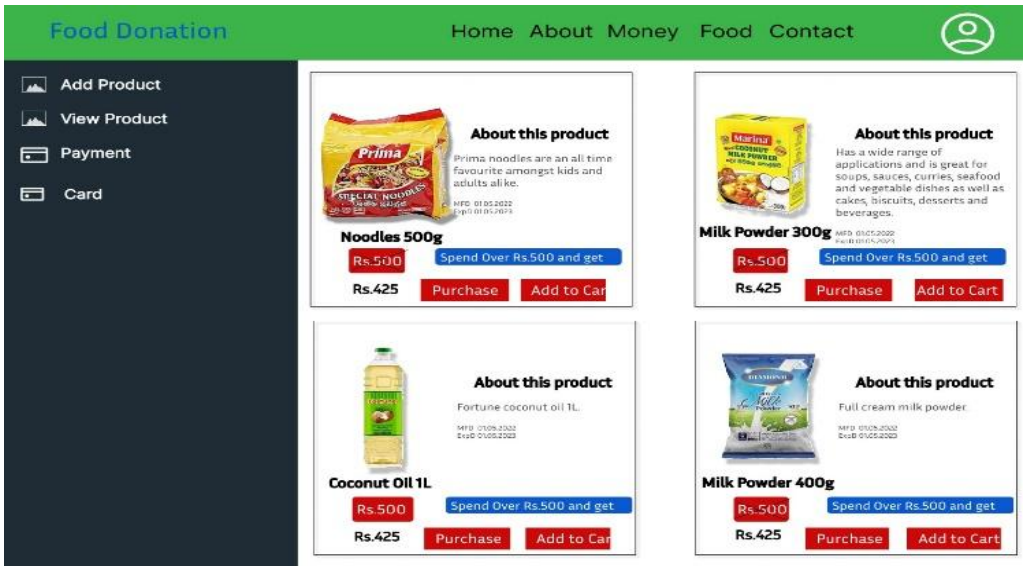


Figure 4 – Discount dashboard

Overall, the proposed system can leverage various functions and features to facilitate the donation process, from surplus food donation and agent coordination to admin management and buying products at a discount. By incorporating these features, the proposed system can provide an efficient and effective platform for reducing food waste and fighting hunger.

In general, the discussion section aims to offer a comprehensive interpretation and context of the study's results by drawing on existing knowledge and research questions to improve our understanding of the impact of donating surplus food in reducing food waste and combating hunger.

DISCUSSION :

The discussion section of a research paper titled "Reducing Food Waste and Fighting Hunger: The Impact of Donating Surplus Food to Those in Need" would likely explain and give meaning to the study's findings with respect to the research questions and previous knowledge. This section would analyse the implications of the results and offer a more thorough understanding of the study's importance.

Initially, the discussion would reiterate the research questions and summarize the significant results of the study. It would then provide an interpretation of these findings based on existing literature on food waste, hunger, and food donation. For instance, the discussion could investigate how the results enhance our understanding of the effectiveness of food donation programs, or whether they support or contradict current theories or hypotheses.

Furthermore, the discussion would probably acknowledge the limitations of the study, such as the sample size or extent of the research, and consider how these restrictions could impact the interpretation of the findings. The authors may also recommend areas for future research that can expand on the current study's results or address any remaining questions or gaps in existing knowledge.

Apart from explaining the results, the discussion might also give suggestions for policy and practice based on the study's findings. For instance, the authors could propose specific measures or strategies to improve the effectiveness of food donation programs or provide direction for businesses or organizations interested in donating surplus food.

Overall, the proposed system can leverage various functions and features to facilitate the donation process, from surplus food donation and agent coordination to admin management and buying products at a discount. By incorporating these features, the proposed system can provide an efficient and effective platform for reducing food waste and fighting hunger.

CONCLUSION :

The conclusion section of a research paper titled "Reducing Food Waste and Fighting Hunger: The Impact of Donating Surplus Food to Those in Need" would provide a summary of the study's key findings and their implications for future research and practice. This section would typically offer practical recommendations on how to apply the study's results to real-world settings to improve food waste reduction and hunger alleviation efforts.

To begin with, the conclusion would summarize the study's key findings, emphasizing the most significant results and their relationship to the research questions. It would then interpret the implications of these findings, discussing how they add to our knowledge of the impact of donating surplus food on reducing food waste and fighting hunger.

Based on these interpretations, the conclusion would provide practical recommendations for future research or practice. For instance, the authors may

suggest specific policy interventions to encourage food donation programs or provide guidance on how to improve the efficiency of current food recovery efforts. They may also provide advice for businesses or organizations interested in donating surplus food, such as the best practices for food safety or logistics.

The conclusion would also likely acknowledge the study's limitations and propose areas for future research that can build on the current study's findings. This could involve exploring the impact of food donation programs in different geographical regions or contexts or examining the effectiveness of various strategies for reducing food waste and hunger.

Overall, the conclusion section aims to offer a concise and clear summary of the study's key findings and their practical implications for future research and practice. It would provide recommendations and guidance for stakeholders looking to take action to reduce food waste and fight hunger based on the study's insights and contributions to the existing knowledge in this field

REFERENCES :

1. FAO, “Voluntary code of conduct for food loss and waste reduction,” [Online]. Available: https://www.fao.org/documents/card/en/c/cb9433en.
2. “FOOD WASTE,” [Online]. Available: https://www.worldwildlife.org/initiatives/food-waste.
3. O. Lai, “EARTH.ORG,” [Online]. Available: https://earth.org/what-is-food-waste/.
4. “How Food Waste Affects World Hunger,” [Online]. Available: https://www.wfpusa.org/articles/how-food-waste-affects-world-hunger/.
5. “Food Waste, Climate Change and Hunger: A Vicious Cycle We Have the Power to Break,” [Online]. Available: https://www.wfpusa.org/articles/food-waste-climate-change-hunger-vicious-cycle/.
6. “nature,” [Online]. Available: https://www.nature.com/articles/s41586-018-0594-0.
7. “Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems,” [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/S0140673618317884.
8. “Greenhouse Gas Emission,” [Online]. Available: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/greenhouse-gas-emission.
9. “The Sustainable Development Goals Report”.
10. J. B. A. A. T. A. J. G. A. K. J. Kufuor, “Preventing nutrient loss and waste across the food system: policy actions for high-quality diets”.
11. FAO, “Sustainability Pathways,” [Online]. Available: https://www.fao.org/nr/sustainability/food-loss-and-waste.
12. C. P. O. I. S. M. E. N. Sundin, “Surplus food donation: Effectiveness, carbon footprint, and rebound effect”.
13. T. P. A. C. S. T. E. S. M. Damiani, “Quantifying environmental implications of surplus food redistribution to reduce food waste,” *Journal of Cleaner Production,* vol. Volume 289, 20 March 2021.
14. “https://nodejs.org/en/about,” [Online]. Available: https://nodejs.org/en/about.
15. “EXPRESS,” [Online]. Available: https://expressjs.com/.
16. “Express JS vs Node JS: Why it’s Time to Migrate?,” [Online]. Available: https://procoders.tech/blog/express-js-vs-node-js/.
17. Alexander, C., & Smaje, C. (2008). Surplus retail food redistribution: An analysis of a third sector model. Resources, Conservation and Recycling, 52(11), 1290–1298.
18. BAMEX. (2013). How we work? Retrieved from http://bancosdealimentos.org.mx/#tres
19. Center for Research and Development of Domestic Trade (CID - CI) and Cuban Society of Logistics and Marketing (SCLM) of the National Association of Economists and Accountants of Cuba (ANEC). (October 28, 2006). Bibliociencias. Retrieved on June 2014, in http://www.bibliociencias.cu/gsdl/collect/libros/index/assoc/HASH3a17.dir/doc.pdf.
20. Easley, D., & Kleinberg, J. (2010). Networks, Crowds and Markets: Reasoning about a highly Connected World. Cambridge, Cambridge University Press.