

A Review of the Current State of Studies and Suggestions for Potential Paths to Sustainable Consumption through Reducing Food Waste

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Abstract - Certain populations face significant challenges in affording food. As a result, efforts are being made to provide sustenance to impoverished and unemployed individuals who lack the means to purchase food items. In order to encourage individuals to offer assistance to those in need, they have the option to donate to us and provide us with their support. The Waste to Wealth web application is a food waste management solution that caters to individuals in any circumstance by providing them with pre-prepared meals. This system provides service facilities for both the back-end operations of restaurants and the front-end experience for customers. We offer an innovative method that enables users to give leftover food to those who can benefit from it or are in need of it. The technology provides users with a convenient method of obtaining edible food. Additionally, the technology facilitates communication between funders and users. After the consolation, the donor can conveniently provide the meal for either personal use or for both parties free of charge.

Keywords: Food, Save Food, Food Doner, Online Food Waste.

I. INTRODUCTION

The project that has been suggested Waste to Wealth-A Novel Approach for Food Waste Management System in PHP is an online platform that efficiently handles the management of food waste. This web application serves as the intermediary between individuals or organizations who donate food and people who are in need of it. Within this application, the food donor inputs both the specific quantity of food and the corresponding addresses. The primary goal of the project is to create a comprehensive and ecologically sustainable system for managing food waste. The project aims to serve the target groups and final beneficiaries by achieving specified objectives related to: Ensures the proper gathering and processing using environmentally-friendly techniques.

Promote the adoption of intelligent practices in purchasing, storing, and preparing food that enable customers

to save money while minimizing food waste at its origin. Individuals have the ability to actively participate and inspire their acquaintances and relatives to minimize food waste inside their households. For practical and effective advice on minimizing food waste at home and while eating out. The guide offers practical recommendations for organizing meals, preserving food, and includes recipes and inventive concepts for repurposing leftovers into delectable meals.

II. OVERVIEW OF KEY ASPECTS RELATED TO REDUCING FOOD WASTE

The present condition of food waste: Research has brought attention to the concerning quantity of food that is discarded on a global scale. Approximately one-third of the food produced for human consumption is lost or wasted annually, according to estimates. This inefficiency happens at different points in the food supply chain, including production, processing, distribution, retail, and consumption.

Factors contributing to food waste are essential to understand in order to comprehend the causes of food waste. The reasons of food waste can vary and encompass factors such as manufacturing and distribution inefficiencies, customer behavior, retail practices, inadequate storage facilities, and aesthetic standards for food presentation. The impact of food waste is characterized by substantial environmental, social, and economic consequences. It has a negative impact on the environment by increasing greenhouse gas emissions, depleting natural resources, wasting energy during manufacturing, and worsening food poverty. Additionally, it imposes economic burdens on farmers, retailers, and consumers. Reduction Strategies: Research is concentrated on developing methods to minimize food waste throughout the whole supply chain. These encompass enhanced ways for gathering crops, more efficient approaches for storing and transporting food, the implementation of uniform date labeling, the redistribution of excess food to individuals who require it, educational initiatives aimed at altering consumer habits, and the utilization of cutting-edge technologies to prolong the lifespan of food products.

Technological advancements are being explored in various areas, including smart packaging, the application of IoT in inventory management, and the use of AI-driven predictive analytics to enhance supply chain efficiency and minimize waste. Policy initiatives are being considered by governments and international organizations as a means to tackle the issue of food waste. These encompass various measures such as incentives, legislation, and collaborations between the public and commercial sectors to foster sustainable behaviors and minimize wastage.

Consumer Behavior and Awareness: Gaining a deep understanding of how consumers behave is essential in effectively decreasing food waste. Research examines the impact of education, awareness campaigns, and nudges on consumer decisions, buying behaviors, portion management, and usage of leftovers.

Strategies for Implementing a Circular Economy: The research delves into the notion of a circular economy, wherein the reduction of food waste is achieved through various tactics such as composting, anaerobic digestion for energy generation, or transforming waste into new products. **Potential Areas for Future Investigation:** Future study endeavors to enhance comprehension of food waste patterns, provide more efficient intervention tactics, and harness technological improvements to achieve superior waste reduction. Furthermore, it is strongly recommended to foster interdisciplinary relationships in order to completely handle this complex issue. **International cooperation and endeavors:** Global efforts to combat food waste heavily rely on international collaborations, partnerships among various stakeholders, and programs such as the UN Sustainable Development Goals, particularly Goal 12: Responsible Consumption and Production. To achieve significant advancements in decreasing food waste and fostering sustainable consumption patterns, it is crucial to continue doing research and implementing collaborative initiatives across all industries. Provide them both with complimentary access in a straightforward manner.

III. LITERATURE REVIEW

Currently, the globe is grappling with numerous issues, with the most significant being the surge in food waste and its consequential concerns, such as the escalation in greenhouse gas emissions. As per the United Nations, the global food waste accounts for 17% of the entire worldwide food output.

The EU has established a platform called 'Food Losses and Food loss' that offers information on EU initiatives to address the issue of food loss. It also serves as a repository of effective strategies for preventing food waste, provides communication tools to promote awareness, and offers a

library of resources related to food waste [9]. In addition, the European Union provides many mechanisms that might effectively contribute to the prevention of food waste. These mechanisms include labeling, traceability, marketing requirements, measures against unfair trading practices, and financial incentives [4]. Despite the Commission's endeavors, its aspirations regarding food waste and the measures implemented thus far have been disjointed and sporadic. Hence, it is imperative to enhance and synchronize the efforts aimed at mitigating food waste [4]. Furthermore, certain writers suggest implementing obligatory waste reduction objectives, revising European Union regulations on food safety and marketing standards, and legally restricting the liability of food donors [7]. Some propose the necessity of establishing a universal plan on a worldwide scale, incorporating standardized techniques of measurement, specific goals, and prescribed courses of action.

Food loss and waste refer to the edible portions of plants and animals that are grown and collected for human use, but ultimately go uneaten by people (Lipinski et al. 2013; Parfitt et al. 2010). Hence, any food that is originally intended for human consumption but is subsequently diverted for purposes like bioenergy or animal feed is still seen as food loss and waste. Nicole Josiane Janet Kennard.

Another instance of a groundbreaking breakthrough that impacts the prevalent form of waste in the food service business is the ability to convert leftover food and beverage into luminous carbon dots, which can then be used to create light-emitting diodes (Sarswat and Free, 2015). LEDs convert electrical energy into light by utilizing quantum dots that possess luminous characteristics. Quantum dots can be synthesized using a wide range of materials. Researchers have effectively transformed food waste, such as meat or pasta, into quantum dots, which may then be used to create LEDs (Sarswat and Free, 2015). Although the extent to which it may be widely applied is now uncertain, this technique might be considered a paradigmatic example of a revolutionary invention in the food service industry.

According to a study conducted by A. Sarke in 2022, waste management is a significant environmental concern in numerous emerging nations. Consequently, as a result of the unanticipated disposal of food waste. Moreover, these countries exhibit a significant level of food waste, necessitating the implementation of recycling measures.

A study undertaken by S. Bennbaia in 2018 examined the development of a machine designed to handle food infractions in Qatar. Qatar ranks among the top 10 countries globally in terms of food waste, with a per capita annual range of 584 to 657 kg. The substantial quantity of food waste and inadequate

recycling or usage of food results in the accumulation of vast quantities of food in waste areas. This untreated food is subsequently incinerated, contributing to the release of hazardous gasses into the atmosphere. Consequently, a domestic appliance was developed with the purpose of facilitating the recycling of food waste and converting it into fertilizer.

IV. PROJECT METHODOLOGY

The Agile Model is a software development methodology that prioritizes adaptability, client contentment, and the capacity to react to modifications throughout the development process. It was created in reaction to the constraints of conventional software development approaches, such as the Waterfall model, which were perceived as too inflexible and sluggish. Agile methodology emphasizes an iterative approach to development, where requirements and solutions evolve through cooperation among self-organizing, cross-functional teams.

Essential Tenets of Agile:

Agile prioritizes direct contact and collaboration between individuals over strict adherence to processes and reliance on tools. Agile methodology places greater importance on the development of functioning software rather than extensive documentation. Emphasizing Customer Collaboration Instead of Contract Negotiation: Agile methodology encourages ongoing customer engagement and input.

Agile methodology is characterized by its ability to easily accommodate changes in requirements, even during the later stages of development.

Popular Agile Methodologies:

Scrum is a methodology that emphasizes the efficient management of tasks within a team-oriented structure. The process employs predetermined time intervals known as sprints, which are typically of a defined duration ranging from two weeks to a month.

Kanban methodology emphasizes the use of visual boards to effectively visualize the entire project, hence improving workflow efficiency and production. The primary focus is on achieving continuous delivery without imposing excessive workload on the development team.

Extreme Programming (XP) is a software development approach that emphasizes the creation of high-quality software and improving the overall well-being of the development team. The primary focus is on ensuring customer satisfaction and continuous improvement through regular and incremental updates.

Lean Software Development is a methodology that draws inspiration from lean manufacturing methods and ideas. Its main objective is to enhance efficiency and reduce waste in the software development process.

Notable characteristics of Agile Development:

The development process follows an iterative and incremental approach, where work is divided into small, manageable components. Each iteration focuses on building upon and enhancing the previous work. Adaptability: Agile methodology is specifically designed to easily incorporate modifications in project requirements, even during the later stages of development.

Customer Engagement: Consistent input and cooperation from the customer are essential components of the development process. Continuous Testing: Consistent testing guarantees prompt identification and resolution of issues.

Continuous Reflection and Adaptation: Agile teams engage in frequent introspection of their process and make necessary modifications.

Advantages of Agile:

Adaptability: Agile can adjust to changing project needs successfully.

Customer Satisfaction: Ongoing customer engagement guarantees that the product fulfills consumer requirements.

Minimized Risk: Regular iterations result in frequent evaluation and mitigation of risks.

Improved Quality: Regular testing enhances the quality of the final product.

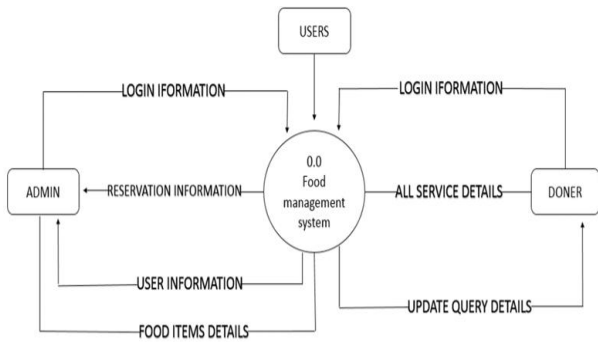
Limitations of Agile:

Demands proficient team members with expertise: Effective application of Agile methodology demands a team with a high level of self-organization and experience.

V. RESULTS AND DISCUSSIONS

Utilized Data Collection Instruments:

Identifying Organizations or Individuals Who Wanted Food. This Leads To Food Waste And Prevents Impoverished Individuals From Benefiting From It. Therefore, We Decided To Develop A Website To Connect The Donor With The People Needing Food Faster, More Effectively And More Organized.



Doner_email	Varchar(30)
Doner_number	Int (20)
Doner_address	Varchar (50)

Users Table

Users_ID	int (20) (primary key)
Users_name	varchar (150)
Users_number	int (8)
Users_email	varchar (25)
Users_address	varchar (20)

Data Flow Diagram:

Table Design: Login table

User_id	int (20)(primary key)
Password	Varchar (20)

Doner table

Doner_Id	int(20) (primary key)
Doner_name	Varchar(50)

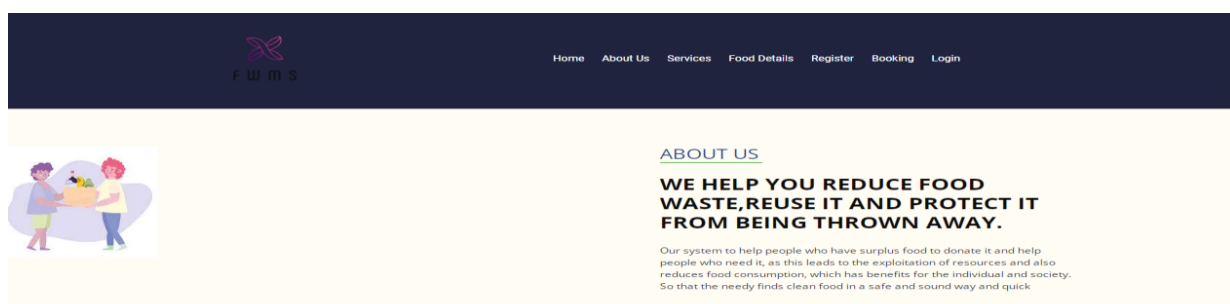
Admin table

Admin_id	int (20) (primary key)
Admin_name	Varchar (50)
Admin_number	int (20)
Email	Varchar (25)

System Design 1



System Design 2



Sample Code

User.html:

```
<html>
<style type="text/CSS">
body{background-image:url(bb.jpg);background-position:left          bottom;background-size:1500px;text-align:center;border-
style:solid;font-size:22px;margin: 70px auto;
border: 7px ridge white;width: 700px;}
h2{font-family:courier;font-size:70px;}
</style>
<body >
<font color="white">
<h2 ><b>User</b></h2>
<form action="user.php" method="POST">
User id:<input type="text" name="pid" />
<br><br>
User Name :<input type="text" name="un" />
<br><br>
User number:<input type="text" name="aage" />
<br><br>
User Email:<input type="text" name="email" />
<br><br>
User address:<input type="text" name="age" />
<br><br><br>
<input type="submit" name="INSERT" value="Submit"/>
<input type="Reset" name="Reset" value="Reset"/>
</form>
</body>
</html>
```

Admin.html:

```
<html>
<style type="text/CSS">
body{background-image:url(bb.jpg);background-position:left          bottom;background-size:1500px;text-align:center;border-
style:solid;font-size:22px;margin: 70px auto;
border: 7px ridge white;width: 700px;}
h2{font-family:courier;font-size:70px;}
</style>
<body >
<font color="white">
<h2 ><b>Admin</b></h2>
```

```
<form action="admin.php" method="POST">
Admin Id:<input type="text" name="pid" />
<br><br>
Admin Name :<input type="text" name="an" />
<br><br>
Admin Number:<input type="text" name="aa" />
<br><br>
Email:<input type="text" name="em" />
<br><br><br>
<input type="Submit" name="INSERT" value="Submit"/>
<input type="Reset" name="Reset" value="Reset"/>
</form>
</body>
</html>
```

The results and commentary can be consolidated into a single section or presented separately. Additionally, they can be divided into smaller groups accompanied by concise and informative descriptions.

VI. CONCLUSION

Upon conducting extensive investigation and analysis of numerous research studies. After careful analysis, I have determined that food waste is a significant issue that necessitates action through the reduction of food waste and the implementation of food recycling and reuse practices. And utilizing consumable sustenance by distributing it to individuals in need. Our application is based on this concept. This initiative aims to utilize consumable food and provide it to individuals who are in need. This presents a chance to utilize food resources while also minimizing food waste. Upon completion of our project, it will serve as a practical and unbiased resource for anyone seeking to provide food donations in a convenient and secure manner. During the course of the project, we faced numerous challenges which we successfully resolved, and now we are actively seeking solutions to the remaining issues. The project report outlines the procedural processes involved in constructing the system. Our system is user-friendly, convenient, and straightforward to setup and use.

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