

# Food Waste Management System

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## Abstract

Food loss or food waste is the food that is not eaten by the consumer. In addition to that bring down food waste in all role of the food organization is an main part of decreasing the environmental conditions of agriculture, by bring down the whole quantity of water, land and other external resources needed to provide the global group. Decreasing the food waste is the major part of global as it makes the food out of dumping ground. It makes profitable sight at the small scale, by reducing household food bills and at the large scale by decreasing throwing away costs for restaurants. By properly analyzed manage the food waste makes our world to economically and environmentally healthy and make the resources available for the future generations. Everyday many students in the college wasting lots of foods. So we take an initiative to develop a web application for all over world used to keep track and analyze the food waste and to take a better decision by knowing what went wrong and to take the essential steps to avoid the food wastage. We planned our web application to have a login form and registration form. The dashboard has a add food form and remove food form and for wastage entries we have food waste entry form, food waste entry form and food item waste entry form. Our web application provides the user to generate analyzed data in table and chart format. The extra food recipe can be collected by the nearest Orphanages who actually requested for the food and the food waste were given to the agricultural land for fertilization.

**Keywords:** Food waste, Global problem, Food donation, Reuse, Reduce, Healthy environment.

## I. BACKGROUND/ PROBLEM STATEMENT

A drastic increase can be seen in food waste. As per data given by Food and Agriculture Organization (fao/food-loss-and-food-waste/flw- data), 1/3rd of food produced for human consumption is wasted globally, which accounts for almost 1 billion tons per year. On the other hand, also as per WHO 20% of the population face extreme food shortages. Hence there is a need to come up with a solution that can avoid food waste & can help feed the needy.

This android-based Food Waste Management system can assist in collecting the leftover food from hotels & restaurants to distribute among those in need. NGOs that are helping poor communities to battle against starvation & malnutrition can raise a request for food supply from restaurants through this application. Once the request is accepted, the NGOs can collect the food from the restaurants for its distribution. In this way this android-based food waste management system will help restaurants to reduce food waste and will help in feeding the poor and needy people.

## II. INTRODUCTION

Fire, especially fire in buildings, can spread quickly and cause great loss of life and property. Therefore, early fire detection and warning is imperative. Fire detectors, smoke detectors and temperature detectors have been widely used to protect property and give warning of fires. However, smoke and temperature detection is slower than light detection, which is the substantive detection method proposed in this paper. Furthermore, to cover the entire area potentially subject to fire, many smoke or temperature fire detectors are required. Fire, especially fire in buildings, can spread quickly and cause great loss of life and property. Therefore, early fire detection and warning is imperative. Fire detectors, smoke detectors and temperature detectors have been widely used to protect property and give warning of fires. However, smoke and temperature detection is slower than light detection, which is the substantive detection method proposed in this paper. Furthermore, to cover the entire area potentially subject to fire, many smoke or temperature fire detectors are required. Fire, especially fire in buildings, can spread quickly and cause great loss of life and property. Therefore, early fire detection and warning is imperative. Fire detectors, smoke detectors and temperature detectors have been widely used to protect property and give warning of fires. However, smoke and temperature detection is slower than light detection, which is the substantive detection method proposed in this paper. Furthermore, to cover the entire area potentially subject to fire, many smoke or temperature fire detectors are required. Fire, especially fire in buildings, can spread quickly and cause great loss of life and property. Therefore, early fire detection and warning is imperative. Fire detectors, smoke detectors and temperature detectors have been widely used to

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- 1) This project is used to reduce food wastage. The main objective of our system is used to analysis and to reduce the food waste for colleges. Creating a web application that allows the user to register and login to their respective dashboard. The dashboard contains add recipe form and remove recipe form. For calculate and analyse the waste, we have three more forms which are food waste entry form, cook waste entry form and cook item entry waste form which are used to entry the total waste weights. Our web application dashboard also provides the track and analysis option which is used to generate the analysed report in table and chart format.
- 2) The application is used by three set of users
  - Admin
  - Donor
  - Requester
- 3) Admin can able to perform all the operations done by both Admin and Manager registration and orphanage registrations. and also, he can able to manage college
- 4) Admin can able to login into their dashboard and he has an ability to activate or block the manager's account. Admin has a power to add or remove food for add the food by donor. Admin has an ability to entry the food, manage food and delete item wastes from food list. Admin can generate the analysis report for donor and requester. Admin can able to see the full history done by donor and accepter.
- 5) Donor can able to login into their respective dashboard if their account is in the active state. donor can add or remove the food for their respective restaurant or respective functions . Donor can able to entry the food, manage food and entry of food on this website for donating. Donor can generate the analysis report only for their respective food list. Client can view their own history and not any other history.
- 6) Forms which are used in this application
  - Add Food
  - Remove Food
- 7) A Survey on Food Waste Management System 2611
  - Report generate form
- 8) Add Food Form is used to add the recipes for the selected dining for any selected session for the selected day.
- 9) Remove Food Form is used to remove the recipe from any selected dining.
- 10) Report Generate Form is used to generate the report for the selected dining for the selected range of dates.

## I. TECHNOLOGY

We are using SQL LITE as our database and for backend scripting we use PYTHON for developing this Application. For generating the Analysis charts, we are using canvas.js and for exporting we use js.pdf libraries.

- 1) SQL LITE is a open source relational database management system (RDBMS). It uses the SQL LITE (Structured Query Language) queries for data accessing. It is the famous language for accessing and managing the data in the relational database. SQL LITE is currently supported by Oracle Company.
- 2) SQL LITE Structured query language (SQL LITE) is a language used to get the data from the database.
- 3) We use canvas.js package to generate the analyze chart.
- 4) Programing language python using web application.
- 5) CSS , JS , HTML ,

## II. LITARATURE REVIEW

Food waste is an important concern because it threatens the environment and sustainability. In fact, it is a serious concern in the hospitality and tourism domain (Okumus et al., 2020). Close to 1.3 billion tonnes of edible food is wasted annually, leading to severe financial, environmental and health outcomes (Gustavsson, 2011). Past research has identified several adverse outcomes of food waste, such as threats to food security (Wang et al., 2018), climate change and greenhouse gas emissions (Kallbekken and Sælen, 2013; Katajajuuri et al., 2014) and monetary loss (Hennchen, 2019). For instance, the annual emissions because of food waste in Finland constitute more than 1% of the country's yearly greenhouse gas emissions (Katajajuuri et al., 2014). Similarly, scientists found the ecological impact of food waste in hotels, cafés and restaurants nearly twice the size of the arable land in Lhasa (Wang et al., 2018). Notably, sustainability has come under intense focus in the hospitality industry in the wake of the COVID-19 pandemic (Jones and Comfort, 2020). In addition, studies have underscored the nutritional loss associated with food waste. For instance, Blondin et al. (2017) revealed that, in the USA, fluid milk waste results in 27% and 41% losses, respectively, of the vitamin D and calcium required under school breakfast programme meals. Consequently, scholars argue that reducing food waste is critical from financial (e.g. food cost) and non-financial (e.g. sustainability) standpoints (Okumus, 2019). In fact, research reports suggest that, by saving one-fourth of the food being wasted, we can feed 870 million hungry people (Khadka, 2017). Similarly, the sustainable development goals of the United Nations (UN) have also emphasized responsible production and consumption, underscoring the importance of mitigating food waste (Gustavsson, 2011).

Regarding food waste generation, prior studies have indicated that a large amount of food waste is generated at the consumption stage, which includes both out-of-home and at-home dining (Martin-Rios et al., 2018). Households represent at-home dining, whereas the food service sector represents out-of-home dining. The food service sector includes both non-commercial and commercial establishments (Betz et al., 2015), such as restaurants, hotels, health-care companies, educational institutions and staff catering. An important subdomain where out-of-home dining takes place is food service establishments at educational institutions. In this context, prior studies have observed that school cafeterias are a major source of unconsumed food (Smith and Cunningham-Sabo, 2014; Adams et al., 2016). For instance, in the National School Lunch Program (NSLP) in the USA, more than 30% of the food served is wasted (Byker Shanks et al., 2017). In fact, food waste in educational settings is a significant issue (Yui and Biltekoff, 2020). What is most worrying in this context is that, in spite of the acknowledgement of such a high quantity of waste generated, the authorities in educational institutions, food service managers in schools and university food service companies' staff are not intent on reducing food waste (Wilkie et al., 2015). Furthermore, the academic research in this area is limited, with most studies in educational settings (particularly in the context of schools) skewed towards using food waste as a measure to estimate the amount of nutrients lost. Food waste does not hold a central place in the existing debate. Other studies have focused on aspects such as the composition of waste generated in the food service operations in schools (Hollingsworth et al., 1995) and the monetary implications of various waste disposal strategies (Wie et al., 2003).

The multiple stakeholders and researchers in this area lack direct attention to food waste. This is quite concerning, given the serious implications of food waste. Deeper insights into food waste at a micro level can help reduce it by documenting the quantity of the food wasted and the causes of such waste. In addition, research inputs concerning possible strategies to reduce food waste without compromising consumer satisfaction can be quite useful for various food service establishments. Correspondingly, we feel academic research on food waste in educational settings must progress beyond an overemphasis on nutrition. More importantly, there is an urgent need to focus on hospitality-related concerns, such as meal production, palatability, dining environment and consumer food choices, as they directly affect food waste at the production and consumption stages.

We posit that research investigating various aspects of food waste in educational institutions is important for two main reasons:

- 1) The substantial volume of meals that educational institutions handle at a single location (Wilkie et al., 2015); and
- 2) The opportunity that such research presents for creating a culture of sustainability and for reinforcing the pro-environment habits of future consumers by making them ecologically aware of the food system and its importance (Derqui et al., 2018).

Consequently, to encourage research in this area, we will review the extant literature and present the accumulated learning on the topic so that future researchers can build upon them and further enrich the field. Specifically, we propose that the following research objectives (ROs) be pursued:

- Analyze the research profile of studies on food waste in food service establishments in educational institutions (RO1);
- Identify, comprehend and evaluate the thematic foci of the existing research on food waste in food service establishments in educational institutions (RO2);
- Critically assess emergent themes to highlight gaps in the extant literature and suggest potential research questions (RO3); and
- Develop a framework that multiple stakeholders can use as a reference to understand the contours of food waste in the food service establishments in educational institutions (RO4).

To achieve the ROs of the study, we used the systematic literature review (SLR) approach to identify, analyze and synthesize past studies in the area in consonance with recent studies (Kushwah et al., 2019; Dhir et al., 2020; Ruparel et al., 2020; Seth et al., 2020).

Towards this end, we conducted the following steps. First, we defined the extraction method of congruent studies concerning the conceptual boundary, database identification, keyword choice and actual search and shortlisting of relevant studies. We formulated a robust search protocol based on 18 keywords as well as comprehensive inclusion criteria (IC) and exclusion criteria (EC). We also conducted a peer review of shortlisted studies to finalize the total number of studies to be included in the review (88). Second, we conducted a research profiling of selected studies to present the summary statistics related to publication frequency, publication sources, geographical scope of each study, type of educational institution investigated and theoretical framework. Third, we performed a manual content analysis of the congruent studies to delineate the thematic foci of such studies. This helped us identify seven distinct themes.

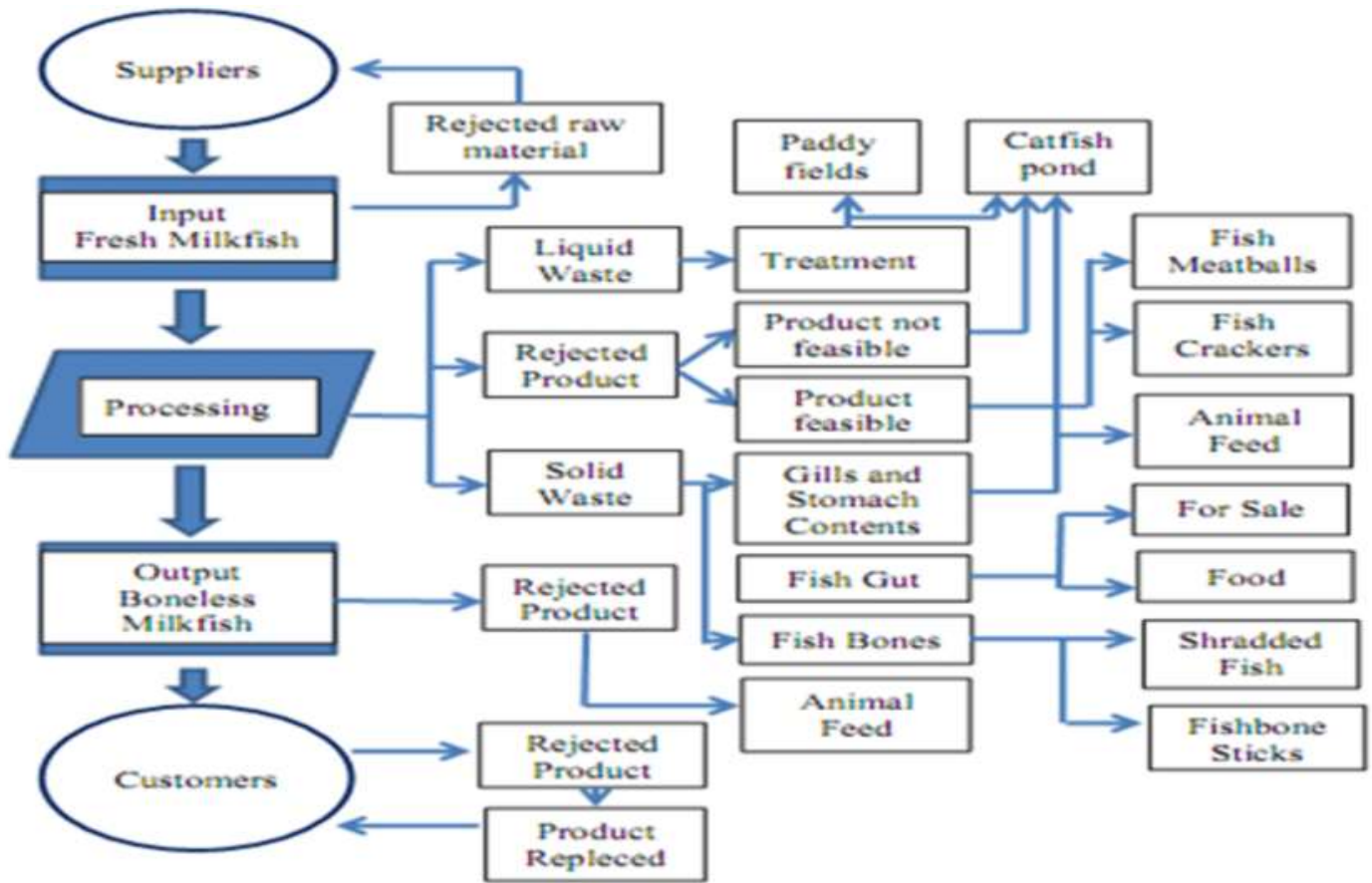
The emergent themes were critically analyzed to identify the gaps in the extant research and to suggest theme-based potential research questions and future research avenues. Fourth, we developed a framework (the food waste ecosystem) for presenting a systems view of food waste in the food service establishments in educational institutions by building on the key findings of the review that we conducted (i.e. research themes, research gaps and avenues of future research). Fifth, we discuss herein the theoretical and practical implications of the study, followed by the study limitations, which should be kept in mind while implementing the results of this study.

#### *A. Working of the Project*

In this system, we have tried to reduce restaurant food wastage by giving waste food to NGOs. NGOs will raise a request, in case of any leftover food restaurants have. This request is sent to the restaurant manager of that particular restaurant. The NGO Manager then approves the request and assigns it to one of the NGO employees for takeaway and forwards the request to the restaurant. The leftover food at the restaurant can be given to NGOs at the end of the day. The admin can track the history of restaurants and NGOs for the leftover foods.

#### *B. Project Life Cycle*

The waterfall model is a classical model used in system development life cycle to create a system with a linear and sequential approach. It is termed as waterfall because the model develops systematically from one phase to another in downward fashion. The waterfall approach does not define the process to go back to the previous phase to handle changes in requirement. The waterfall approach is the earliest approach that was used for software development



Food Waste Food is the using up for resource for both animals and humans, but if we did not eat which is said to be food waste. The main cause of food waste is overproduction, over purchasing and rotten of foods. Some food waste occurs due to lack of transparency and inadequate supply facilities. Food waste rate in India More than 40% of food is manufactured which is expended carelessly with no purpose said by “The United Nations Food and Agriculture Organization (FAO)”. 18.7 Kilograms of food is wasted daily in India. Year Food Waste 2018 52 Million tons Vikram Ra , Anirudh Rb , Bhuvaneshwaran Mc , Praveen kumar Sd , Suganthkumar Ke 2612 2019 59 Million tons 2020 67 Million tons .

Food waste rate in India By implementing this project, we can reduce the poverty rate in India. By reducing the poverty, we can increase the economic growth of our nation. The main cause of poverty is people who are not able to eat food due to financial status. In this Project waste food can send to orphanages and people who are not having funds to eat.

C. System Architecture

- 1) In Existing system, they only analyzed the food waste.
- 2) They did not categorized the food waste.
- 3) They did not make use of the food item waste.

4) In that application, they cannot provide a facility to make use of this application to every organization.

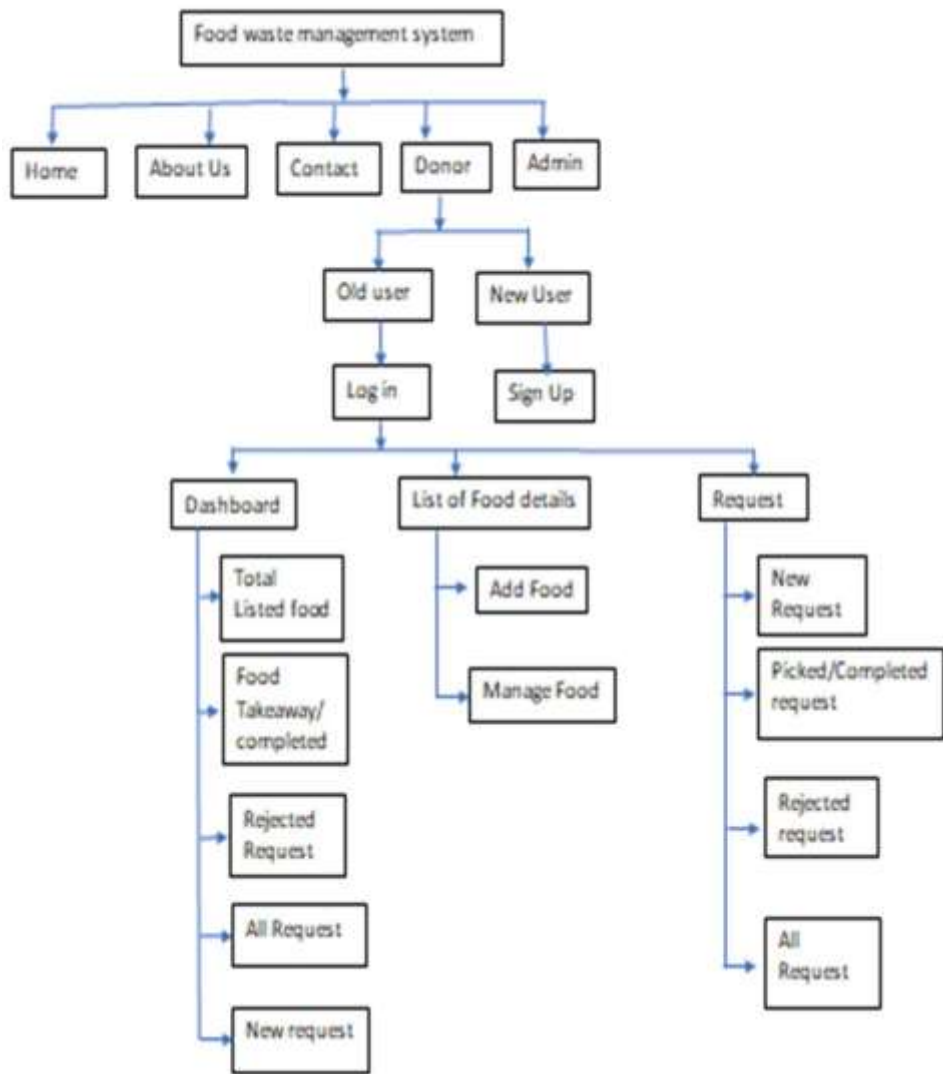


Fig. Flow chart of System Architecture Donor Side

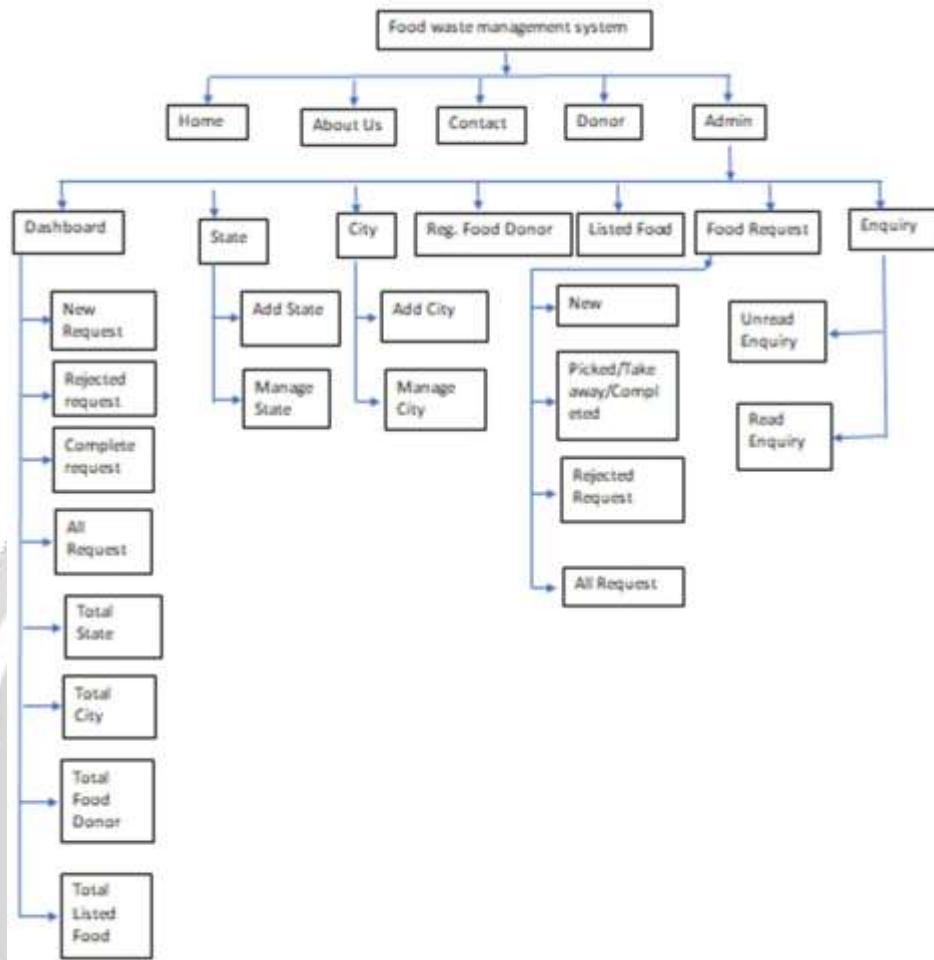


Fig. Flow chart of System Architecture Admin Side

### III. ADVANTAGES

- 1) Food can be reused; it will reduce the Food resources and it will be saved for future generations.
- 2) The wasted food also used for Bio-degradable fertilization in Agriculture.
- 3) By this process, we will help for Nation's growth.
- 4) Also, it will avoid poverty in Orphanage.
- 5) Food waste can be reduced.

### IV. CONCLUSION

Our important finding is that to reduce the food waste done by every college and schools Restorants and family functions and get togethers every day and we achieved this through this Application and also we avoid poverty in Orphanage.

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