## A Project Report On

**FOOD WASTE MANAGEMENT**

**Submitted by -**

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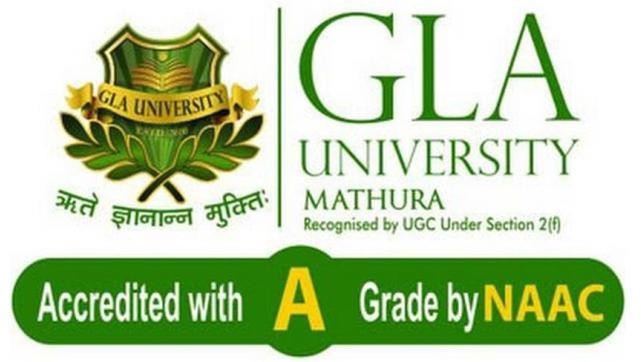
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Submitted for the Project viva-voce held on 02December 2023

## ACKNOWLEDGEMENT

### Presenting the ascribed project paper report in this very simple and official form, we would like to place my deep gratitude to GLA University for providing us with the instructor **Mr. Mohammad Aslam**, our technical trainer and supervisor.

He has been helping us since Day I with this project. He provided us with the roadmap and the basic guidelines explaining how to work on the project. He has been conducting regular meetings to check the progress of the project and provide us with the resources related to the project.

### Without his help, we wouldn't have been able to complete this project

And last but not least we would like to thank our dear parents for helping us to grab this opportunity to get trained and also my colleagues who helped me find resources during the training.

### Thanking You

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## ABSTRACT

Web in simple terms means a network of Internet servers that are ready to support some formatted documents and can be accessed by a web browser. About these formatted documents these are formatted in HTML (Hypertext mark-up language). Not these formatted documents create their links to their type but they also support links to some documents including video, graphics and audio files. Terms Web and Internet are interchangeably used but they are not same. While Internet refers to global network of servers that makes sharing of information, Web is the collection of information being accessed via Internet. Also, we can say that Web is a service and Internet is an infrastructure where web is a service on top of it. Alternatively, we can say Web is just a portion of the Internet.This project deals with use of web technology in the field of e-learning. Nowadays e- learning platform are encouraged as lot of manual work is not done and also it helps in saving time. People anywhere in the world with an internet connection can easily use these platforms. Not only in this field but anyone connected to an internet connection can use internet from any place in the world to shop online, pay bills, read books or newspaper, book movie tickets, reservation of buses or railway and many more.

## Key Feature :

#### User-Friendly Navigation:

Intuitive navigation design for seamless user experience.

Clear and prominent navigation links to sections such as Sign-In, Login, Resources, Success Storie.

#### Sign-In and Login:

Secure user authentication system with a straightforward sign-in and login process.

Encrypted

#### Success Stories:

Inspiring success stories of individuals who have benefited from the Placement Booster platform.

Testimonials and achievements to build trust and credibility.

# Introduction

Welcome to our Food Waste Management Website, where we strive to create a sustainable and responsible approach to addressing one of the most pressing global issues – food waste. In a world where millions suffer from hunger and environmental degradation is a growing concern, it is crucial to implement effective strategies to minimize and manage food waste.

**Our Mission:**

At the heart of our initiative is a commitment to reducing the environmental impact of food waste and contributing to the global effort to achieve food security. We aim to educate individuals, businesses, and communities on the importance of responsible food consumption.

## Problem Statement

In the modern world, the issue of food waste has reached alarming proportions, posing a significant threat to both the global food security. Despite advancements in agriculture and technology, a substantial portion of the food produced worldwide is lost or discarded at various stages of the supply chain. This wastage not only squanders valuable resources but also contributes to environmental degradation and exacerbates issues related to hunger and poverty.

## Objective

1. **Reduce Food Waste:**
   * **Target:** Decrease the overall volume of food waste generated at various stages of the supply chain, from production and distribution to retail and consumer levels.
2. **Minimize Environmental Impact:**
   * **Target:** Mitigate the environmental consequences of food waste by reducing greenhouse gas emissions from decomposing organic matter in landfills and minimizing the use of natural resources in food production.
3. **Promote Sustainable Practices:**
   * **Target:** Encourage and facilitate the adoption of sustainable and resource-efficient practices in agriculture, food processing, transportation, and storage to minimize wastage.
4. **Improve Supply Chain Efficiency:**
   * **Target:** Enhance the efficiency of the food supply chain by addressing inefficiencies, improving storage and transportation practices, and implementing technologies that reduce spoilage and losses.
5. **Enhance Consumer Awareness and Behavior:**
   * **Target:** Educate consumers about the impacts of food waste and empower them to make informed choices that reduce waste, such as proper meal planning, storage, and understanding date labeling.
6. **Achieve Global Food Security:**
   * **Target:** Contribute to global food security by optimizing food distribution systems, redirecting surplus food to those in need, and minimizing losses in areas affected by food scarcity.
7. **Develop and Implement Policies:**
   * **Target:** Advocate for the development and implementation of policies at local, national, and international levels that promote responsible food production, distribution, and waste management.
8. **Foster Innovation and Technology Adoption:**
   * **Target:** Support research, development, and adoption of innovative technologies that improve efficiency in food production, processing, and waste management.
9. **Encourage Corporate Responsibility:**
   * **Target:** Collaborate with businesses to promote responsible production, distribution, and waste reduction practices throughout the entire supply chain.
10. **Facilitate Community Engagement:**
    * **Target:** Foster community involvement through awareness campaigns, educational programs, and local initiatives that encourage responsible food consumption and waste reduction.
11. **Measure and Monitor Progress:**
    * **Target:** Establish clear metrics and monitoring mechanisms to assess the effectiveness of food waste reduction initiatives and adjust strategies as needed.
12. **Promote Circular Economy Principles:**
    * **Target:** Encourage the adoption of circular economy principles, such as recycling and composting, to turn food waste into valuable resources and reduce the overall environmental impact.

By working towards these objectives, the goal is to create a more sustainable and resilient food system that minimizes waste, ensures equitable access to food, and protects the environment for future generations.

## Methodology

1. **Assessment and Analysis:**
   * **Objective:** Understand the current state of food waste in the targeted area, identifying key sources, hotspots, and contributing factors.
   * **Activities:**
     + Conduct a comprehensive assessment of the entire food supply chain, from production to consumption.
     + Analyze data on food waste generation, disposal methods, and environmental impacts.
     + Identify specific sectors (e.g., agriculture, retail, households) contributing significantly to food waste.
2. **Policy and Regulatory Framework:**
   * **Objective:** Establish and enforce policies and regulations that promote responsible food production, distribution, and waste management practices.
   * **Activities:**
     + Research and advocate for the development of relevant policies at local, regional, and national levels.
     + Collaborate with government bodies, NGOs, and industry stakeholders to ensure policy implementation and enforcement.
3. **Education and Awareness:**
   * **Objective:** Increase awareness and educate stakeholders about the impacts of food waste and the importance of adopting responsible practices.
   * **Activities:**
     + Develop and implement educational campaigns targeting different audiences (consumers, businesses, farmers).
     + Conduct workshops, seminars, and training programs to promote sustainable behaviors and practices.
4. **Technology and Innovation:**
   * **Objective:** Integrate innovative technologies to optimize the food supply chain and reduce waste.
   * **Activities:**
     + Research and implement technology solutions for efficient storage, transportation, and processing of food.
     + Explore smart packaging, IoT (Internet of Things), and data analytics to enhance supply chain visibility and decision-making.
5. **Supply Chain Optimization:**
   * **Objective:** Improve the efficiency of the food supply chain to minimize losses and waste.
   * **Activities:**
     + Collaborate with stakeholders to streamline logistics, reduce transportation times, and enhance storage facilities.
     + Implement best practices for inventory management and demand forecasting to avoid overproduction.
6. **Community Engagement:**
   * **Objective:** Foster community involvement in food waste reduction initiatives.
   * **Activities:**
     + Organize community events, workshops, and awareness campaigns.
     + Establish local networks for sharing surplus food and resources within the community.
7. **Corporate Collaboration:**
   * **Objective:** Engage businesses to adopt and promote sustainable practices in their operations.
   * **Activities:**
     + Collaborate with businesses to develop and implement waste reduction strategies.
     + Recognize and showcase companies leading in sustainable practices.
8. **Measurement and Monitoring:**
   * **Objective:** Establish a robust system for measuring and monitoring food waste reduction progress.
   * **Activities:**
     + Set measurable targets for waste reduction.
     + Implement tracking systems and data collection mechanisms.
     + Regularly assess and report progress to stakeholders.
9. **Circular Economy Principles:**
   * **Objective:** Promote the adoption of circular economy principles to turn food waste into valuable resources.
   * **Activities:**
     + Implement composting and recycling programs for organic waste.
     + Explore partnerships with industries that can use food waste as raw materials.
10. **Partnerships and Collaboration:**
    * **Objective:** Build partnerships with diverse stakeholders to create a collective and coordinated approach.
    * **Activities:**
      + Collaborate with NGOs, government agencies, businesses, and community groups.
      + Share best practices and resources to enhance the overall impact.
11. **Continuous Improvement:**
    * **Objective:** Continuously assess and refine strategies based on ongoing evaluations and changing circumstances.
    * **Activities:**
      + Regularly review data and performance against established targets.
      + Solicit feedback from stakeholders and adjust initiatives accordingly.

By employing this comprehensive methodology, a food waste management program can address the root causes of waste and create lasting, positive impacts on the environment, society, and the economy.

## 3.Literature Servey

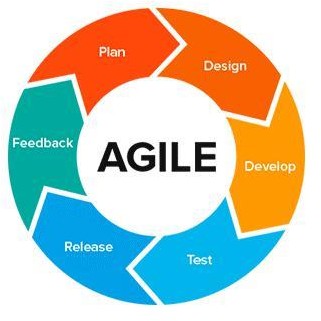
* Many articles acknowledge challenges in obtaining accurate data on food waste, especially in developing regions.
* Calls for more longitudinal studies to track changes in food waste patterns over time.
* Emphasis on the need for standardized measurement methodologies to facilitate cross-study comparisons.
* Continued exploration of behavioral interventions and effective communication strategies to change consumer attitudes and habits.

To access the most recent literature on food waste management, you may want to explore academic databases such as PubMed, IEEE Xplore, ScienceDirect, and others. Additionally, recent reports from organizations like the Food and Agriculture Organization (FAO) and academic journals in fields such as environmental science, agriculture, and sustainability would be valuable sources.

Top of Form

## Performance Analysis

**1. Agile Methodology**



1. **Iterative and Incremental Development:**
   * **Analysis:** Assess the effectiveness of breaking down food waste management projects into smaller, manageable tasks or sprints.
   * **Performance Metrics:** Measure progress over time and evaluate the ability to adapt to changing circumstances or emerging issues.
2. **Customer Collaboration:**
   * **Analysis:** Evaluate the level of collaboration between stakeholders, including government agencies, businesses, communities, and consumers.
   * **Performance Metrics:** Gauge the responsiveness to feedback, the inclusiveness of decision-making processes, and the satisfaction of various stakeholders.
3. **Adaptability to Change:**
   * **Analysis:** Examine how well the food waste management strategy can adapt to changing conditions, regulations, or technological advancements.
   * **Performance Metrics:** Measure the frequency and effectiveness of adjustments made during the course of the project.
4. **Continuous Improvement:**
   * **Analysis:** Assess the incorporation of lessons learned from each iteration into future strategies.
   * **Performance Metrics:** Monitor changes in efficiency, waste reduction, and overall impact over time.
5. **Cross-Functional Teams:**
   * **Analysis:** Evaluate the collaboration and communication among diverse teams involved in different aspects of food waste management.
   * **Performance Metrics:** Assess the effectiveness of cross-functional teams in addressing challenges comprehensively.



**2 Performance Analysis**

While analyzing the performance of any web page speed is a very important criterion. Because if your user find that your web page is taking longer time to load then he or she might not visit your page or will look for an alternative. A recent study by google suggest that 53% of the visit to the web pages are not preferred if the web page takes more than three seconds to get loaded.

Also, various studies have shown that human patience level is decreasing in this world of technology. So, keeping in mind these facts on should keep in mind the speed analysis while analyzing performance of a web page. Analyzing the speed by which the home page of the web application gets loaded we found that most of the images, CSS and JSP files took less than 900ms which is even less than 1second. One important point to be noted here that before loading the home page cache memory was cleared so that it could

be more specifically analyzed that without the use of cache how much time is being taken by each file to get loaded.

# Software Requirement Analysis

1. **User Requirements:**
   * **User Profiles:**
     + Consumers, businesses, farmers, and government agencies.
   * **User Stories:**
     + Consumers should be able to track and manage their food waste.
     + Businesses need tools for efficient inventory management to reduce waste.
     + Farmers require a platform to connect with potential food donation recipients.
2. **Functional Requirements:**
   * **User Registration and Authentication:**
     + Users should be able to create accounts with different roles.
     + Secure authentication mechanisms for data privacy.
   * **Food Waste Tracking:**
     + Users can input and track their food waste.
     + Reporting tools for individuals and businesses to analyze waste patterns.
   * **Inventory Management:**
     + Businesses should have features for real-time inventory tracking.
     + Alerts for items approaching expiration to minimize waste.
   * **Donation Platform:**
     + Farmers can post surplus produce available for donation.
     + Businesses can identify donation opportunities.
   * **Educational Resources:**
     + Articles, videos, and guides on food waste reduction.
     + Interactive features for quizzes or forums to engage users.
   * **Community Forums:**
     + Discussion boards for users to share experiences and tips.
     + Local community groups for coordinated efforts.
3. **Non-Functional Requirements:**
   * **Performance:**
     + Fast response times for user interactions.
     + Scalability to handle a growing user base.
   * **Security:**
     + Secure data storage and transmission.
     + Regular security audits and updates.
   * **Usability:**
     + Intuitive user interface for varied user profiles.
     + Accessibility features for diverse users.
   * **Reliability:**
     + Minimal downtime for essential functions.
     + Regular backups to prevent data loss.
   * **Compatibility:**
     + Cross-browser and cross-device compatibility.
     + Integration with common operating systems.
4. **Technical Requirements:**
   * **Frontend:**
     + Responsive web design using HTML5, CSS3, and JavaScript.
     + Use of modern frontend frameworks (e.g., React, Angular) for a dynamic user interface.
   * **Backend:**
     + Server-side scripting using a language like Python, Node.js, or Ruby.
     + Database management system (e.g., MySQL, MongoDB) for data storage.
   * **Security Measures:**
     + SSL/TLS for secure data transmission.
     + Encryption of sensitive user data.
     + Regular security patches and updates.
   * **Hosting and Deployment:**
     + Cloud hosting (e.g., AWS, Azure) for scalability.
     + Continuous integration and deployment (CI/CD) for efficient updates.
   * **Third-Party Integrations:**
     + Integration with mapping services for location-based features.
     + Payment gateway for potential premium features or donations.
5. **Regulatory and Compliance Requirements:**
   * **Data Protection:**
     + Compliance with data protection laws (e.g., GDPR, HIPAA).
     + Clear privacy policy and terms of service.
   * **Accessibility:**
     + Compliance with web accessibility standards (e.g., WCAG).
   * **Regulations in Food Industry:**
     + Adherence to regulations related to food safety and donation.
6. **Testing Requirements:**
   * **User Acceptance Testing (UAT):**
     + Engage target users for feedback during development.
     + Ensure the platform meets the needs of different user profiles.
   * **Performance Testing:**
     + Test the website's responsiveness and scalability under various loads.
   * **Security Testing:**
     + Regular security audits and penetration testing.
7. **Maintenance and Support:**
   * **Updates and Upgrades:**
     + Regular updates for feature enhancements and bug fixes.
     + Easy mechanisms for users to update the app.
   * **User Support:**
     + Helpdesk or customer support for user inquiries.
     + Comprehensive documentation for users and administrators.

This software requirement analysis provides a comprehensive outline for developing a Food Waste Management Website. Adjustments may be necessary based on specific organizational or project requirements. Engaging stakeholders throughout the development process is crucial for success.

**Implementation Plan and User Interface Design**

#### Week 1: Project Setup and User Authentication

**Project Kickoff:**

* Define project scope, objectives, and stakeholders.
* Formulate a project team with roles and responsibilities.
* Conduct a kickoff meeting to align the team on goals and expectations.

#### Week 2: User Profiles and Resume Builder

1. **Requirement Gathering:**
   * Collect detailed requirements through meetings, surveys, and user interviews.
   * Prioritize requirements based on business value and criticality.
2. **Technology Stack Selection:**
   * Choose the appropriate technology stack for frontend, backend, and database.
   * Consider scalability, security, and ease of maintenance.

#### Week 3: Communication Module and Mobile Application

1. **Prototyping:**
   * Develop wireframes and prototypes for key features.
   * Gather feedback from stakeholders for refinements.
2. **Development:**
   * Implement core functionalities in iterative sprints.
   * Regularly conduct sprint reviews and retrospectives.
   * Address any emerging issues promptly.
3. **Testing:**
   * Conduct unit testing, integration testing, and system testing.
   * Perform user acceptance testing (UAT) with target users.
   * Address and resolve any identified bugs or issues.
4. **Deployment:**
   * Deploy the application to a staging environment for final testing.
   * Conduct a soft launch with a limited user base for additional validation.
   * Deploy the finalized application to the production environment.
5. **Monitoring and Optimization:**
   * Implement monitoring tools to track performance and user interactions.
   * Continuously optimize the application based on user feedback and usage patterns.
6. **Training and Documentation:**
   * Provide training sessions for administrators, support staff, and end-users.
   * Create comprehensive documentation for ongoing reference.
7. **Maintenance and Support:**
   * Establish a system for handling user support and issue resolution.
   * Schedule regular maintenance updates and feature enhancements based on user feedback.
8. **Scaling and Expansion:**
   * Evaluate opportunities for scaling the application based on user growth.
   * Consider expansion to additional regions or user groups.
9. **Feedback Loop:**
   * Establish a continuous feedback loop with users and stakeholders.
   * Use feedback to inform future iterations and updates.

**User Interface (UI) Design:**

1. **User Personas:**
   * Create user personas based on different stakeholders (consumers, businesses, farmers).
   * Understand the specific needs and goals of each persona.
2. **Information Architecture:**
   * Design a clear and intuitive information architecture for the website.
   * Define navigation pathways for different user journeys.
3. **Wireframing:**
   * Develop wireframes for key pages and features.
   * Focus on layout, content placement, and user interactions.
4. **Visual Design:**
   * Create a visually appealing and cohesive design language.
   * Use a consistent color palette, typography, and imagery.
5. **Responsive Design:**
   * Ensure the website is responsive and accessible across various devices.
   * Prioritize mobile-friendly design for on-the-go users.
6. **Interactive Elements:**
   * Implement interactive elements for enhanced user engagement.
   * Use subtle animations and transitions to improve the user experience.
7. **Accessibility:**
   * Design with accessibility standards in mind (e.g., WCAG).
   * Provide alternative text for images and ensure keyboard navigation.
8. **Feedback Mechanisms:**
   * Include feedback mechanisms such as form validations and success messages.
   * Design user-friendly error messages for a positive user experience.
9. **Call-to-Action (CTA):**
   * Clearly define and highlight CTAs for key actions.
   * Use contrasting colors and placement for effective CTAs.
10. **Typography and Readability:**
    * Choose readable fonts and font sizes.
    * Ensure sufficient contrast between text and background.
11. **Consistency:**
    * Maintain design consistency across all pages.
    * Ensure a consistent layout and design language for a seamless user experience.
12. **User Testing:**
    * Conduct usability testing with representative users.
    * Gather feedback on the UI and make refinements based on user preferences.
13. **Prototyping:**
    * Develop interactive prototypes for key user flows.
    * Validate user interactions and iterate based on feedback.
14. **Final Design Review:**
    * Conduct a final design review with stakeholders.
    * Ensure alignment with brand guidelines and project objectives.

By following this implementation plan and paying attention to user interface design principles, the food waste management website can be developed with a focus on usability, accessibility, and user satisfaction. Regular feedback loops and iterative improvements will contribute to the success of the project.

## FUTURE SCOPE

The future scope of a food waste management project holds immense potential for continued innovation and impact. Here are several areas with significant future potential:

1. **Advanced Technologies:**
   * **IoT (Internet of Things):** Integration of IoT devices for real-time monitoring of food storage conditions, allowing for better inventory management and reducing spoilage.
   * **Blockchain:** Implementing blockchain technology for transparency and traceability in the supply chain, ensuring accurate recording of food transactions from production to consumption.
2. **Data Analytics and AI:**
   * **Predictive Analytics:** Utilizing data analytics to predict patterns of food waste, enabling businesses to proactively manage inventory and production.
   * **Machine Learning:** Implementing machine learning algorithms to optimize supply chain logistics, improve demand forecasting, and reduce waste at various stages.
3. **Consumer Engagement:**
   * **Mobile Apps and Gamification:** Developing mobile applications that engage consumers in reducing food waste through gamification, challenges, and rewards.
   * **Augmented Reality (AR):** Creating AR applications that educate consumers about sustainable food practices, including smart shopping and meal planning.
4. **Collaborative Platforms:**
   * **Global Collaboration:** Expanding platforms to facilitate global collaboration, connecting surplus food producers with organizations that can distribute it to areas in need.
   * **B2B Collaborations:** Strengthening partnerships between businesses and food suppliers to share data and insights, fostering a more collaborative and efficient food supply chain.
5. **Policy and Regulatory Initiatives:**
   * **Global Standards:** Advocating for and contributing to the development of international standards and policies related to food waste reduction, encouraging global cooperation.
   * **Incentive Programs:** Collaborating with governments to implement incentive programs for businesses adopting sustainable food waste management practices.
6. **Circular Economy Practices:**
   * **Waste-to-Energy Solutions:** Exploring and promoting innovative waste-to-energy solutions to convert organic waste into bioenergy, contributing to a circular economy.
   * **Closed-Loop Systems:** Establishing closed-loop systems where food waste byproducts are repurposed as inputs for other processes, minimizing overall waste.
7. **Education and Awareness:**
   * **Virtual Learning:** Leveraging virtual and augmented reality technologies for immersive educational experiences on food waste reduction, targeting schools, businesses, and communities.
   * **Partnerships with Influencers:** Collaborating with social media influencers and celebrities to raise awareness about sustainable food practices and waste reduction.
8. **Community Initiatives:**
   * **Localized Solutions:** Encouraging and supporting localized community initiatives for composting, community gardens, and sharing surplus food.
   * **Crowdsourcing Solutions:** Implementing crowdsourcing platforms to gather ideas and solutions from communities to tackle food waste at the grassroots level.
9. **Integration with Smart Cities:**
   * **Smart City Initiatives:** Integrating food waste management solutions into broader smart city initiatives, optimizing waste collection routes, and promoting sustainable urban living.
   * **Data Sharing:** Collaborating with municipal authorities to share data on food waste, enabling more effective city-wide waste management strategies.
10. **Continuous Research and Development:**
    * **Innovation Hubs:** Establishing innovation hubs or partnerships with research institutions to continuously explore and develop new technologies, methodologies, and best practices in food waste reduction.
    * **Research Grants:** Pursuing research grants to fund studies on emerging trends and technologies related to food waste management.

The future scope of food waste management projects is dynamic and expansive, driven by technological advancements, changing consumer behaviors, and a growing global awareness of the need for sustainable practices. Continuous adaptation and collaboration will be key to addressing the evolving challenges and opportunities in this crucial domain.

# CONCLUSION

After completion of this project we have concluded that this web application works as per the need and requirement of the client and is user friendly. Also this mini project helped me to understand the design, code and implementation processes which are performed while making any project. Many concepts were revised and many of them were very new which ere learnt in making of this web application.

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