A Project Report

on

A Web-Based Food Based Connecting System: Waste to Wealth

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

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May, 2024

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that Project Report entitled “A Web Food based connecting system: Waste to Wealth” which is submitted by Himanshu ,Vinay kumar Yadav , Vishesh Agrawal in partial fulfillment of the requirement for the award of degree B. Tech. in Department of Computer Science & Engineering of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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ABSTRACT

The Web-Based Food Waste Connecting System is a comprehensive solution designed to address the critical issue of food waste by connecting surplus food providers with those in need. In today's world, where food security and environmental sustainability are paramount concerns, this project aims to bridge the gap between surplus food producers, such as restaurants, event organizers, and caterers, and individuals or organizations seeking food donations. The system leverages the power of the internet to create a dynamic platform that facilitates the efficient and transparent redistribution of excess food. Users can easily register and participate in the system, either as food donors or recipients. Donors can upload details about surplus food items, including type, quantity, and expiration date, while recipients can search and claim available food based on their specific needs.

Key features of the Web-Based Food Waste Connecting System include real-time notifications, geolocation services, and a user-friendly interface to enhance accessibility. The platform incorporates smart algorithms to match food donors with recipients efficiently, considering factors such as proximity, food type, and urgency. Additionally, the system prioritizes food safety by providing guidelines for proper handling, packaging, and transportation.

By promoting a circular economy for surplus food, this project not only reduces food waste but also contributes to alleviating hunger in communities. The potential societal and environmental impacts of the Web-Based Food Waste Connecting System make it a valuable initiative in the pursuit of sustainable development goals. This project embodies the principles of technology-driven social innovation, fostering a sense of community and shared responsibility in the fight against food waste.

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FAO: Food and Agriculture Organization of the United Nations

UNEP: United Nations Environment Programme

SHP: Sustainable Hospitality Coalition

WEF: World Economic Forum

EC: European Commission

CHAPTER 1

INTRODUCTION

In today's world, the hospitality industry stands at a critical juncture where the imperative of sustainability intersects with the pressing need to address food insecurity. With the stag gering amount of food wasted annually, hotels and messes find themselves in a unique position to make a substantial impact on both fronts. Surplus food, a common byproduct of their operations, represents not only a missed opportunity but also a glaring ethical and environmental concern. This project delves into a novel approach to managing surplus food in hotels and messes, proposing a dual strategy that aims to maximize social, environmental, and economic benefits. By categorizing surplus food into two distinct types– eatable and non-eatable– this approach offers a pragmatic solution that addresses both immediate hunger relief and long term energy sustainability.

The first category, eatable food, encompasses items that remain safe for consumption but are no longer needed within the establishment. Rather than allowing these edible resources to go to waste, they can be swiftly distributed to nearby slums and vulnerable commu nities, serving as a lifeline for those facing food insecurity. This real-time distribution model not only provides immediate relief but also fosters community engagement and goodwill. Conversely, non-eatable food, including scraps, trimmings, and other inedible components, presents a unique opportunity for resource recovery. Instead of disposing of this organic waste in landfills, where it contributes to methane emissions and environmental degradation, it can be transported to bio gas plants for conversion into renewable energy. Through anaerobic digestion, these bio gas facilities transform food waste into a valuable resource, yielding bio gas for electricity generation and nutrient-rich dig-estate for agricultural use. By adopting this dual approach, hotels and messes can mitigate their environmental footprint, contribute to local communities, and demonstrate a commitment to sustainability and social responsibility. However, the implementation of such initiatives is not without its challenges, ranging from logistical complex ities to regulatory hurdles. Nonetheless, with proper planning, stakeholder collaboration, and innovation, these challenges can be overcome, paving the way for a more resilient and inclusive food system. In the following sections, this paper will explore the

feasibility, benefits, challenges, and best practices associated with the proposed approach, drawing on existing literature, case studies, and real-world examples. By shedding light on this innovative strategy, it is hoped that this research will inspire and inform efforts to transform surplus food management in the hospitality industry, ushering in a more sustainable and equitable future.

1.1 Reducing wasted food does great things for the environment:

Following are the benefits to which helps to deal with the surplus foods.

- **Saves Resources** – When food is wasted, it also wastes the resources – such as the land, water, energy, and labor – that go into growing, storing, processing, distributing, and preparing that food. Each year, food loss and waste take up an area of agricultural land the size of California and New York combined. This is enough energy to power 50 million U.S. homes for a year, and emissions (excluding landfill emissions) equal to the annual carbon dioxide (CO_2) emissions of 42 coal-fired power plants.
- **Reduces Greenhouse Gas Emissions** – More than 85 percent of greenhouse gas emissions from land filled food waste results from activities prior to disposal, including production, transport, processing, and distribution. To reduce these emissions, we need to prevent food from being wasted in the first place.
- **Reduces Methane from Landfills** – When food goes to the landfill, the nutrients in the food never return to the soil. The wasted food rots and produces methane, a greenhouse gas 25 times as potent as CO_2 at trapping heat in the atmosphere.
- **Returns Nutrients to the Soil** – Even when all actions have been taken to use your wasted food, certain inedible parts will still remain and can be turned into compost to feed and nourish the soil. Composting these wastes creates a product that can be used to help improve soils, grow the next generation of crops, and improve water quality.

- **Feed People, Not Landfills** – Instead of feeding landfills, we should be feeding people in our communities. You can donate a variety of foods to many different types of organizations. Contact Feeding America or your local food rescue organizations for

information about where you can donate and what types of food your local organization is able to accept.

- **Feed Children** – The U.S. Department of Agriculture estimates that five million children lived in food-insecure households in 2021.[6] By redirecting food that would otherwise be wasted to homes and schools, we can help feed our country's children.
- **Build Cleaner Communities** – Reducing waste and improving waste management can help create cleaner communities. Equitable access to food and organics waste collection can improve soil health, generate renewable energy, and keep economic and job benefits of organics recycling in those communities.

Feed the World – According to the Food and Agriculture Organization of the United Nations, from between 702 and 828 million people were affected by hunger in 2021.[8] They predict that by eliminating food loss and wasted food we would have enough food to feed all the chronically undernourished. They also expect that we wouldn't have to increase food production or put additional pressure on our natural resources to do so.

1.2 Project Description

In the sphere of surplus food management within hotels and messes, the systematic categorization of surplus food is a foundational step, critical for optimizing resource usage while minimizing waste. This categorization process involves dividing surplus food into two primary categories: Eatable Food and Non-eatable Food.

Eatable Food encompasses a diverse array of food items that remain safe and of high quality for consumption but are no longer required within the establishment. This category includes freshly prepared dishes, unopened packaged goods, and surplus ingredients. Despite being surplus, eatable food retains its nutritional value and is still suitable for redistribution to individuals and communities facing food insecurity. This not only addresses immediate hunger but also promotes social cohesion by fostering connections between establishments and the communities they serve.

On the other hand, Non-eatable Food refers to food waste that is unsuitable for direct consumption due to contamination, spoilage, or inedibility. This category comprises organic waste generated during food preparation, such as kitchen scraps and spoiled or expired food items. Despite being unfit for human consumption, non-eatable food retains inherent value as a resource for alternative uses, particularly in energy production through processes like anaerobic digestion.

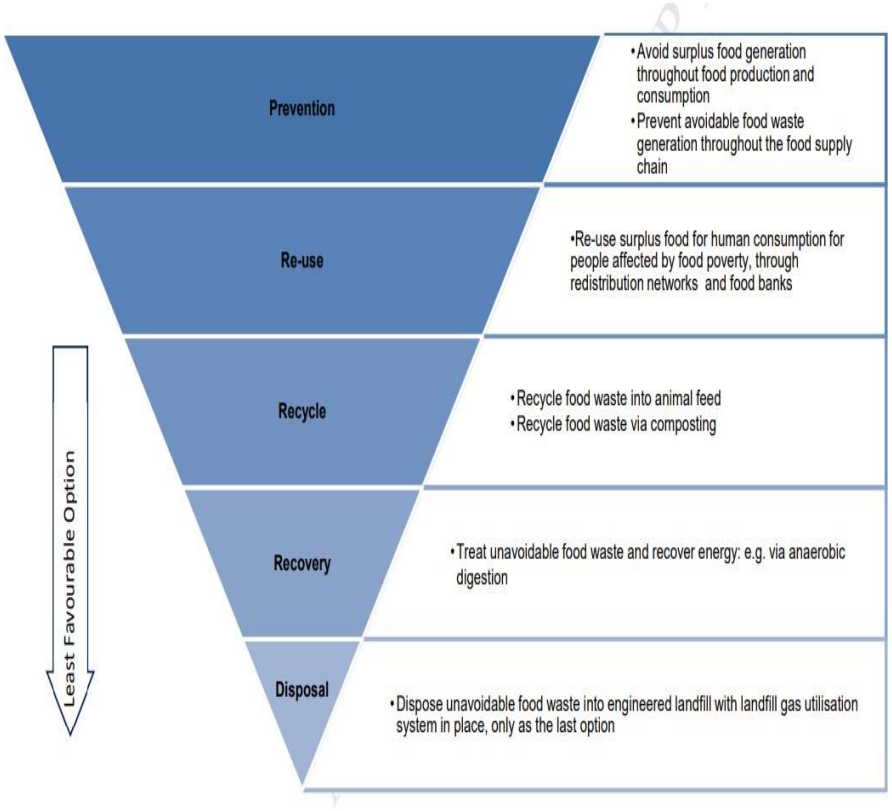

Figure 1.1- Food Life Cycle

By systematically categorizing surplus food into these distinct types, hotels and messes can develop targeted strategies for its management and utilization. Eatable food can be efficiently redistributed to alleviate food insecurity, while non-eatable food can be redirected towards energy production or composting, thereby minimizing environmental impact and contributing to a more sustainable and equitable food system.

1.3 Flow The Project

Introduction: This chapter introduces the critical intersection of sustainability and food insecurity in the hospitality industry. It outlines a novel approach to managing surplus food in hotels and messes, categorizing it into eatable and non-eatable types, to maximize social, environmental, and economic benefits.

Literature Review : This chapter reviews existing literature on the waste-to-wealth concept, highlighting the rationale and objectives behind reducing food waste. It examines challenges and potential solutions, drawing on case studies and real-world examples to contextualize the importance and feasibility of sustainable surplus food management.

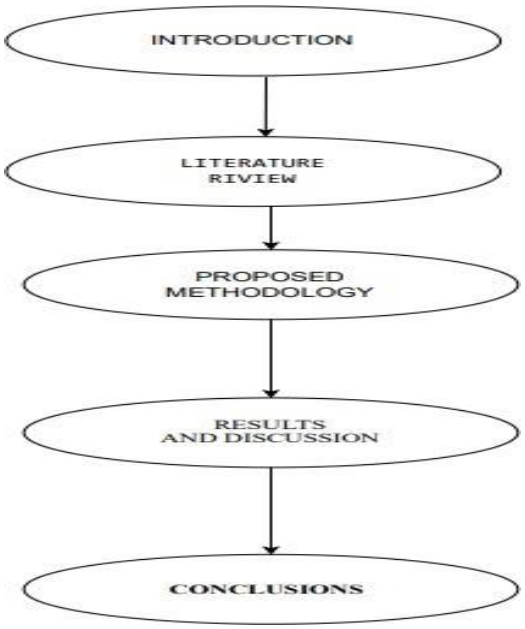

Figure 1.2 Project flow

Proposed Methodology: This chapter details the dual approach of categorizing surplus food into eatable and non-eatable types. It presents a feasibility assessment framework and criteria

for selecting case studies, ensuring a systematic and practical implementation of the proposed surplus food management strategy in the hospitality industry

Results And Discussion: This chapter presents the findings from the implementation of the proposed methodology. It discusses the impact on sustainability, food insecurity, and community engagement. The results are analyzed to understand the effectiveness and challenges of the dual categorization approach in real-world settings.

Conclusions: This chapter concludes the study by summarizing key insights and the benefits of the proposed surplus food management approach. It outlines future research directions and potential improvements, emphasizing the need for continued innovation and collaboration to enhance sustainability and social responsibility in the hospitality industry.

1.4 Sumamry

In today's world, the hospitality industry must address sustainability and food insecurity. Hotels and messes produce significant surplus food, presenting an opportunity and ethical concern. This project suggests categorizing surplus food into two types: eatable and non-eatable. Eatable food, which is safe and high-quality but no longer needed, can be distributed to nearby slums and vulnerable communities, providing immediate hunger relief and fostering community engagement. Non-eatable food, comprising scraps and inedible components, can be sent to biogas plants for anaerobic digestion, converting it into renewable energy and nutrient-rich digestate for agriculture.Reducing food waste saves resources, reduces greenhouse gas emissions, and prevents methane emissions from landfills. Composting non-eatable food returns nutrients to the soil, supporting future crops and improving water quality. Feeding people instead of landfills addresses food insecurity and helps feed children in need. Proper waste management contributes to cleaner communities and equitable resource access. Eliminating food waste could potentially feed millions of undernourished people without increasing food production.

This project emphasizes the importance of categorizing surplus food to optimize resource use, minimize waste, and enhance sustainability and social responsibility. Despite challenges like

logistical issues and regulatory hurdles, proper planning and collaboration can create a more resilient and inclusive food system.

CHAPTER 2
LITERATURE REVIEW

In today's global landscape, the hospitality sector confronts a pivotal moment where the urgent call for sustainability converges with the imperative to tackle food insecurity. With a staggering volume of food discarded annually, hotels and dining facilities find themselves uniquely positioned to wield significant influence on both fronts. Surplus food, an inevitable byproduct of their operations, not only signifies a missed opportunity but also underscores ethical and environmental dilemmas. This research delves into an innovative strategy for surplus food management in hotels and dining establishments, proposing a dual-pronged approach aimed at maximizing social, environmental, and economic dividends.

By categorizing surplus food into two distinct classifications—eatable and non-eatable—this approach offers a practical solution that addresses immediate hunger relief alongside long-term energy sustainability. Eatable food, encompassing items still safe for consumption but no longer required within the establishment, can be swiftly distributed to nearby communities grappling with food insecurity. This real-time distribution model not only delivers immediate relief but also cultivates community engagement and goodwill.

Conversely, non-eatable food, including scraps and trimmings, presents a unique opportunity for resource recovery. Instead of relegating this organic waste to landfills, where it contributes to methane emissions and environmental degradation, it can be redirected to biogas plants for conversion into renewable energy. Through anaerobic digestion, these facilities convert food waste into valuable resources, yielding biogas for electricity generation and nutrient-rich digestate for agricultural applications.

By embracing this dual approach, hotels and dining establishments can diminish their environmental footprint, bolster local communities, and showcase a commitment to sustainability and social responsibility. Nevertheless, the implementation of such initiatives poses challenges, spanning logistical intricacies to regulatory hurdles. Nonetheless, with

meticulous planning, stakeholder collaboration, and innovative approaches, these challenges can be surmounted, paving the path toward a more resilient and inclusive food system.

In subsequent sections, this paper will probe the feasibility, benefits, challenges, and best practices associated with the proposed approach, drawing insights from existing literature, case studies, and real-world exemplars. By illuminating this pioneering strategy, it is anticipated that this research will inspire and inform endeavors to revolutionize surplus food management in the hospitality sector, heralding a more sustainable and equitable future.

In addition to the proposed dual approach to surplus food management, it's imperative to underscore the importance of data-driven decision-making and technological integration in enhancing efficiency and effectiveness. Leveraging advanced analytics and innovative

technologies, such as Internet of Things (IoT) devices and blockchain, can provide real-time insights into food inventory, consumption patterns, and wastage levels. This data can inform predictive modeling and optimization algorithms to streamline procurement, production, and distribution processes, thereby reducing food waste and improving resource utilization.

Furthermore, fostering partnerships and collaborations across sectors can amplify the impact of surplus food management initiatives. Engaging with local governments, non-profit organizations, food banks, and academic institutions can facilitate knowledge exchange, resource sharing, and collective action. Collaborative efforts can lead to the development of comprehensive solutions that address systemic issues related to food insecurity, environmental sustainability, and social equity.

2.1-Introduction to Waste to Wealth

In today's world, the hospitality industry is at a critical juncture, where the imperative of sustainability meets the urgent need to address food insecurity. With a staggering amount of food wasted annually, hotels and messes have a unique opportunity to make a substantial impact. Surplus food, a common byproduct of their operations, poses ethical and environmental concerns. This research explores a novel approach to managing surplus food, categorizing it into two types: eatable and non-eatable. Eatable food, still safe for consumption but no longer needed, can be swiftly distributed to nearby communities facing food insecurity, fostering community engagement. Non-eatable food, including scraps, presents an opportunity for resource recovery through conversion into renewable energy at biogas plants. This dual strategy aims to maximize social, environmental, and economic benefits, providing immediate relief while promoting long-term sustainability.

2.2 -Rationale and Objectives: 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.

2.3 CHALLENGES AND SOLUTIONS:

A. Regulatory Considerations: : Challenge: Compliance with food safety regulations and legal requirements presents a challenge for surplus food management initiatives, particularly regarding liability issues and liability protection. Solution: Collaborating with legal experts and regulatory authorities to navigate relevant regulations and obtain necessary permits or certifications ensures compliance with food safety standards. Developing standardized operating procedures and training staff on food handling and safety protocols mitigates the risk of liability and ensures the integrity of distributed food items.

B. Public Awareness and Acceptance: Challenge: Overcoming societal stigma and misconceptions surrounding surplus food, particularly regarding safety and quality concerns, can hinder public acceptance and participation in surplus food redistribution efforts. Solution: Implementing targeted public awareness campaigns and educational initiatives helps dispel myths and raise awareness about the safety and nutritional value of surplus food. Engaging with local media outlets, influencers, and community leaders am plifies messaging and fosters positive perceptions of surplus food redistribution efforts.

C. Financial Constraints: Challenge: Limited financial resources and budget con straints may pose barriers to the implementation and scalability of surplus food management initiatives, particularly for smaller establishments or those operating on tight margins. Solution: Exploring creative financing mechanisms, such as public private partnerships, grants, or crowdfunding campaigns, can provide additional funding to support surplus food manage ment initiatives. Demonstrating the economic benefits, such as cost savings from reduced waste disposal fees or poten tial revenue streams from biogas production, strengthens the business case for investment in surplus food management.

2.4 Sumamry

The hospitality sector faces a pressing need to address sustainability and food insecurity due to significant food waste. This research proposes a dual approach to surplus food management: distributing eatable surplus food to local communities and converting non-eatable food into renewable energy through biogas plants. This strategy aims to reduce waste, support communities, and promote sustainability. Implementing this approach requires careful planning, collaboration, and technology integration, such as IoT and blockchain, to enhance efficiency. Partnerships with local governments, NGOs, and other organizations can amplify impact. Challenges include regulatory compliance, public acceptance, and financial constraints, which can be mitigated through legal collaboration, awareness campaigns, and creative financing.

This study explores the feasibility, benefits, and best practices of this dual approach, aiming to inspire sustainable and socially responsible food management in the hospitality industry.

CHAPTER 3

PROPOSED METHODOLOGY

3.1 Dual Approach: Categorization of Surplus Food.

The dual approach to the categorization of surplus food in the hospitality industry, distinguishing between eatable and non-eatable food, represents a pivotal step towards effective and sustainable food management practices. At the heart of this approach lies a nuanced understanding of the diverse nature of surplus food generated within hotels, messes, and other food service establishments. By categorizing surplus food into these two distinct types, establishments can develop targeted strategies for its management and utilization, thereby minimizing waste and maximizing social, environmental, and economic benefits.

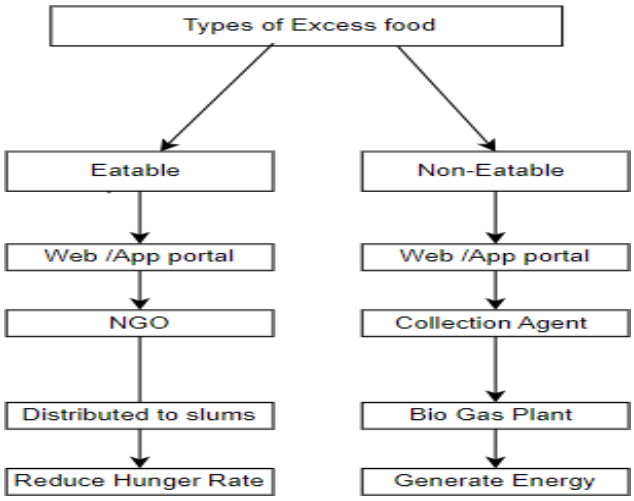

Figure 3.1-Proposed Dual Approach

3.1.1 Eatable food

Eatable food, encompassing items that remain safe and suitable for consumption, constitutes a valuable resource that can be leveraged to address food insecurity and hunger within local

communities. This category includes a wide array of food items, ranging from freshly prepared dishes to unopened packaged goods, which retain their nutritional value and palatability. Rather than allowing these edible resources to go to waste, establishments can adopt real-time redistribution channels to swiftly distribute surplus eatable food to nearby slums, shelters, or vulnerable populations. Collaborating with local non-profit organizations, community centers, or food banks facilitates the efficient and equitable distribution of surplus food, ensuring that it reaches those in need in a timely manner. The distribution of surplus eatable food not only provides essential nutrition to individuals facing food insecurity but also fosters community engagement, empowerment, and social cohesion. By actively involving local residents, community leaders, and volunteers in the distribution process, establishments can create opportunities for meaningful interaction and collaboration, strengthening community bonds and solidarity. Moreover, empowering recipients to participate in decision-making processes, such as menu planning or meal preparation, enhances their sense of ownership and dignity, while respecting their cultural preferences and dietary needs.

Figure 3.2-Variety of Eatable Food

Eatable Leftover Food Distribution with the Help of NGOs:

In the fight against hunger and food wastage, the redistribution of leftover, but still edible, food holds immense potential. This potential is particularly evident when coordinated efforts are made between hospitality establishments and non-governmental organizations (NGOs). In this essay, we delve into the critical role NGOs play in the distribution of eatable leftover

food, the challenges they face, and the strategies they employ to ensure efficient and effective redistribution.

NGOs serve as vital intermediaries between surplus food providers, such as hotels, restaurants, and cafeterias, and vulnerable communities in need of sustenance. Their involvement in the redistribution process is multifaceted, encompassing logistical coordination, food safety assurance, and community engagement. One of the primary functions of NGOs is to establish and maintain channels for the collection, storage, and distribution of surplus food. This involves collaborating with food donors to arrange regular pickups or deliveries of leftover food, ensuring that it is safely transported and stored before reaching its intended recipients.

Food safety is of paramount importance in the redistribution process, and NGOs play a crucial role in upholding rigorous standards. They implement strict protocols for the handling, storage, and distribution of leftover food to mitigate the risk of contamination and foodborne illness. This includes training volunteers and staff members on proper food handling techniques, maintaining proper temperature controls during transportation and storage, and conducting regular inspections to ensure compliance with food safety regulations.Community engagement lies at the heart of NGO-led leftover food distribution efforts. By working closely with local communities, NGOs gain valuable insights into their specific needs and preferences, enabling them to tailor their distribution programs accordingly. This may involve conducting needs assessments, organizing community events or workshops, and soliciting feedback from beneficiaries to continually improve service delivery. Moreover, NGOs often collaborate with other social service providers, such as shelters, soup kitchens, and community centers, to maximize the reach and impact of their redistribution efforts. Despite the invaluable contributions of NGOs to leftover food distribution, they face numerous challenges in their endeavors. One such challenge is the stigma associated with surplus food, which can hinder public acceptance and participation in redistribution programs. To address this challenge, NGOs employ various strategies to raise awareness about the safety and nutritional value of leftover food, dispel myths and misconceptions, and foster a culture of food sharing and solidarity within communities.

Another challenge is the logistical complexity of coordinating food collection and distribution operations, particularly in urban areas with dense populations and limited resources. NGOs must navigate logistical constraints such as transportation costs, storage facilities, and volunteer availability to ensure the timely and efficient delivery of leftover food to those in need. This often requires creative problem-solving and collaboration with local businesses, government agencies, and community partners to overcome logistical barriers and streamline operations.

In conclusion, the redistribution of eatable leftover food with the help of NGOs is a critical component of efforts to combat hunger and food wastage. By leveraging their expertise in logistics, food safety, and community engagement, NGOs play a pivotal role in ensuring that surplus food reaches those who need it most. Despite the challenges they face, NGOs continue to make significant strides in redistributing leftover food and making a positive impact on the lives of vulnerable individuals and communities.

Figure 3.3-Food Distribution of Different NGOs

3.1.2 Non-eatable food

In parallel with the distribution of surplus eatable food, the effective utilization of non-eatable food presents a critical opportunity for establishments to minimize waste and maximize resource efficiency. Non-eatable food, comprising organic waste that is unsuitable for direct consumption due to contamination, spoilage, or inedibility, holds significant potential for

conversion into valuable resources through processes such as anaerobic digestion. This category includes various forms of food waste generated during food preparation, such as kitchen scraps, food trimmings, and spoiled or expired food items. Transporting non-eatable food waste to biogas plants serves as a primary means of converting organic waste into renewable energy, thereby contributing to climate change mitigation and resource conservation efforts. Bio gas plants utilize anaerobic digestion processes to break down organic matter in oxygen-free environments, producing biogas as a methane-rich fuel for electricity generation, heating, or cooking purposes. Additionally, the residual digestate generated during the process serves as a nutrient-rich fertilizer for agricultural applications, closing the loop on organic waste management and promoting soil health and fertility.

The implementation of this dual approach to surplus food categorization is not without its challenges, ranging from logistical complexities to regulatory hurdles. However, with proper planning, stakeholder collaboration, and innovation, these challenges can be overcome, paving the way for a more resilient and sustainable food system. By embracing the principles of sustainability, social responsibility, and innovation, establishments can not only minimize their environmental footprint but also make meaningful contributions to food security, poverty alleviation, and climate resilience within their communities and beyond. In conclusion, the dual approach to the categorization of surplus food into eatable and non-eatable types represents a transformative paradigm shift in the hospitality industry's approach to food management. By recognizing the inherent value of surplus food and adopting targeted strategies for its redistribution and utilization, establishments can mitigate waste, address food insecurity, and promote social, environmental, and economic sustainability. Through concerted efforts and collective action, we can build a future where surplus food is no longer wasted but instead serves as a catalyst for positive social change and environmental stewardship.

Figure 3.4-Type of Non Eatable Food

The process of converting food waste into biogas:

The process of converting food waste into biogas, known as anaerobic digestion, is a fascinating and sustainable method that holds promise for addressing both environmental and energy challenges. Anaerobic digestion is a biological process in which microorganisms break down organic matter in the absence of oxygen, producing biogas as a byproduct. This process occurs in several stages and involves various biochemical reactions, ultimately yielding biogas that can be used as a renewable energy source. Let's delve into the details of the food waste to biogas process:

Figure 3.5-Converting Non Eatable Food into Renewable Energy

Feedstock Preparation: The first step in the anaerobic digestion process is the preparation of feedstock, which consists of organic waste materials such as food scraps, agricultural residues, and wastewater sludge. Feedstock may undergo pre-treatment procedures such as shredding, grinding, or homogenization to increase surface area and facilitate microbial access to the organic matter.

Digestion Stage: Once prepared, the feedstock is introduced into an anaerobic digester, a sealed container or reactor where microbial activity occurs. Inside the digester, anaerobic bacteria and other microorganisms break down complex organic compounds present in the feedstock through a series of biochemical reactions. These reactions result in the production of biogas and a nutrient-rich slurry known as digestate.

Biochemical Reactions: During digestion, organic matter is converted into biogas through four main biochemical reactions: hydrolysis, acidogenesis, acetogenesis, and methanogenesis.

Hydrolysis: Complex organic molecules such as carbohydrates, proteins, and lipids are broken down into simpler compounds by hydrolytic enzymes, releasing sugars, amino acids, and fatty acids.

Acidogenesis: Fermentative bacteria convert the intermediate products of hydrolysis (sugars, amino acids, and fatty acids) into volatile fatty acids (VFAs), alcohols, and organic acids, producing hydrogen and carbon dioxide as byproducts.

Acetogenesis: Acetogenic bacteria further metabolize VFAs and alcohols to produce acetic acid (vinegar) and additional hydrogen and carbon dioxide.

Methanogenesis: Methanogenic archaea utilize hydrogen and carbon dioxide, along with acetate and other organic compounds, to produce methane (CH_4) and carbon dioxide (CO_2) through a series of biochemical reactions. Methane is the primary component of biogas and serves as a valuable renewable fuel.

Biogas Recovery: As methane and carbon dioxide are generated during the digestion process, they accumulate within the anaerobic digester, forming biogas. Biogas typically consists of approximately 50-70% methane (CH_4), 30-50% carbon dioxide (CO_2), and trace amounts of

other gases such as hydrogen sulfide (H2S) and ammonia (NH3). To recover biogas for energy use, it is extracted from the digester and collected in a storage vessel or gas holder.

Biogas Utilization: Biogas can be utilized as a renewable energy source for various applications, including electricity generation, heating, and cooking. Depending on the specific needs and infrastructure available, biogas may be used directly in gas engines, turbines, or boilers to produce heat and power. Alternatively, biogas can be upgraded through purification processes to remove impurities such as carbon dioxide and hydrogen sulfide, yielding biomethane suitable for injection into natural gas pipelines or use as a transportation fuel.

Digestate Management: After digestion, the residual material remaining in the digester, known as digestate, retains valuable nutrients such as nitrogen, phosphorus, and potassium. Digestate can be separated into solid and liquid fractions and used as a nutrient-rich fertilizer for agricultural purposes, improving soil health and crop yields.

Overall, the food waste to biogas process offers a sustainable and circular solution for managing organic waste while simultaneously producing renewable energy and valuable byproducts. By harnessing the power of anaerobic digestion, we can mitigate greenhouse gas emissions, reduce dependence on fossil fuels, and promote environmental sustainability.

Optimal paíamctcí of biogas gc□cíatio□ :

Table 3.1-Data of Energy from different Non Eatable Food

Material used	PH	COD(g/l)	TS(g/l)	TVS(g/l)	Amount of biogas produced(ml)	Reference
Kitchen Waste	4-7.1	5-25	80-110	68-93	89.37	Dupade Vikrant et al (2013)
Cow dung(200g)	7.25		8		23.75	Dupade Vikrant et al (2013)
Cow dung(400g)	7.25		8		60.02	Dupade Vikrant et al (2013)
Cooked food	5	615.1(mg/l)			87	PoonamV.Shukla etal(2010)
Banana Waste	5	600.2(mg/l)				PoonamV.Shukla etal(2010
Vegitable Waste	6.5	553(mg/l)				PoonamV.Shukla etal(2010
Apple	8.62	74.7	11		0.1L/gVSS	J markos et al(2010)
Acidophilus milk	8.63	74.6	12		0.4L/gVSS	-
Mixed food waste	8.31	252.0	12			-
Ham	8.42	222.6	21		1.3L/gVSS	-
Salami	8.37	729.5	28			-
Domestic Solid Waste			70	52.883	45	UsmanM.A. et al(2011)
Boiled Rice	6.8-7.2				.011126m^3/kg	Subodh Kumar Sau et al
Food waste	6				1090ml/day	Ojikutu AbimbolaO et al (2014)
Decanter cake	4.94	13.35	23.96%	20.71%	3809	Thaniya Kaosol et al (2012)
Paper	6.6-7.6				1001	Momoh et al (2008)
Kitchen wet waste	6.93		12.35%		.6m^3	Navjot Riar et al

3.2 Feasibility Assessment Framework

The feasibility assessment framework plays a crucial role in evaluating the viability and sustainability of surplus food management initiatives within the hospitality industry. This framework encompasses a comprehensive analysis of various factors, including economic, environmental, and social considerations, to determine the feasibility of implementing and scaling surplus food management practices. By systematically assessing these factors, establishments can make informed decisions and develop strategies that maximize the benefits of surplus food management while mitigating potential risks and challenges.One of the key components of the feasibility assessment framework is the economic feasibility analysis, which involves evaluating the costs and benefits associated with surplus food management initiatives. This analysis includes conducting a cost-benefit analysis to assess the financial implications of food collection, transportation, storage, and distribution against potential savings from reduced waste disposal fees and operational efficiencies. Additionally, calculating the return on investment (ROI) from surplus food management initiatives helps

quantify the financial benefits over time and justify investments in infrastructure upgrades or logistical improvements. Exploring revenue generation opportunities, such as selling surplus food-derived biogas or by-products, further enhances the economic feasibility of initiatives and offsets initial investment costs.

In addition to economic considerations, the feasibility assessment framework includes an environmental impact analysis to evaluate the sustainability implications of surplus food management practices. This analysis involves conducting a lifecycle assessment to quantify the environmental impacts associated with diverting organic waste from landfills and producing renewable energy from biogas. Assessing emissions reductions, waste diversion rates, and resource efficiency improvements provides valuable insights into the environmental performance of surplus food management initiatives and helps measure progress towards sustainability goals. Identifying opportunities for resource efficiency improvements, such as optimizing food production processes or implementing energy-saving measures, further enhances the environmental benefits of surplus food management initiatives and reduces the overall ecological footprint of hospitality operations.

Furthermore, the feasibility assessment framework incorporates a social impact assessment to evaluate the effects of surplus food management initiatives on local communities and vulnerable populations. This assessment involves assessing improvements in food security, nutrition, and social cohesion resulting from surplus food redistribution efforts. Engaging stakeholders through participatory processes, such as community consultations or beneficiary feedback mechanisms, ensures that initiatives align with community needs and priorities and promote equitable access to surplus food resources. Monitoring indicators of health and well-being outcomes, such as nutritional intake, food safety compliance, and community satisfaction, provides valuable insights into the social impact of surplus food management initiatives and informs program improvements. Despite the potential benefits of surplus food management initiatives, several challenges may arise during implementation, including regulatory considerations, public awareness, and financial constraints. Addressing these challenges requires proactive strategies and innovative solutions to ensure the effectiveness and sustainability of surplus food management efforts. By integrating economic, environmental, and social considerations into the feasibility assessment framework,

establishments can develop robust strategies for surplus food management that maximize benefits for both their operations and the communities they serve. Through concerted efforts and collective action, surplus food management initiatives can contribute to a more sustainable and equitable food system, where surplus food is valued as a valuable resource rather than wasted.

3.3 Case Study Selection Criteria

The selection of case studies is a critical aspect of research, as it provides real-world examples and insights that can inform and enrich the study's findings. In the context of surplus food management in hospitality, selecting appropriate case studies allows for the examination of various strategies, challenges, and best practices employed by different establishments. One such establishment that presents an intriguing case study is "Gopal Ji Mess," located near the KIET Group of Institutions in Ghaziabad, India.

Gopal Ji Mess serves as an ideal case study due to its proximity to the academic campus and its relevance to the research context. As a popular eatery frequented by students, faculty, and staff of the institution, Gopal Ji Mess plays a significant role in providing meals and catering services to a diverse clientele. This case study presents an opportunity to explore how surplus food is managed within the context of a busy eatery and the potential challenges and solutions encountered in the process.

The selection criteria for the Gopal Ji Mess case study include several key factors:
Proximity and Accessibility: Gopal Ji Mess's location near the KIET Group of Institutions ensures easy access for researchers and facilitates data collection efforts. Proximity allows for regular observation and interaction with staff and customers, providing valuable insights into daily operations and surplus food management practices.

3.3.1 Relevance to Research Context: Gopal Ji Mess's operations align closely with the research focus on surplus food management in hospitality. As a food service establishment

catering to a large customer base, Gopal Ji Mess likely encounters surplus food issues and implements strategies to address them, making it a pertinent case study for the research.

3.3.2 Diversity of Operations: Gopal Ji Mess's diverse menu offerings, meal service formats, and customer demographics offer a rich context for studying surplus food management practices. By examining various aspects of the Mess's operations, including food preparation, inventory management, and waste disposal, researchers can gain comprehensive insights into surplus food handling processes.

3.3.3 Collaboration Potential: Establishing collaboration with Gopal Ji Mess facilitates access to internal data, staff interviews, and observational opportunities, enhancing the depth and quality of the case study. Collaborative partnerships foster transparency, trust, and mutual benefit, allowing researchers to gather accurate and detailed information essential for analysis.

3.3.4 Potential for Impactful Findings: Given its significance as a local eatery and its relevance to the research topic, findings from the Gopal Ji Mess case study have the potential to generate valuable insights, inform best practices, and contribute to the broader discourse on surplus food management in hospitality. By documenting successes, challenges, and lessons learned, researchers can offer practical recommendations for improving surplus food management practices in similar settings.

Overall, the selection of Gopal Ji Mess as a case study aligns with the research objectives and provides a rich and relevant context for studying surplus food management in the hospitality industry. Through in-depth exploration and analysis of Gopal Ji Mess's operations, researchers can uncover valuable insights that contribute to advancing knowledge, informing policy, and promoting sustainable practices in surplus food management

3.4 Summary

The hospitality industry's dual approach to surplus food management involves categorizing food into eatable and non-eatable types. Eatable food, still safe for consumption, can be redistributed to local communities to address food insecurity, with NGOs playing a key role in logistics and community engagement. Non-eatable food, which is not suitable for consumption, can be converted into renewable energy through anaerobic digestion, reducing waste and producing biogas and fertilizer.

Implementing this approach requires addressing regulatory, public acceptance, and logistical challenges. A feasibility assessment framework evaluates economic, environmental, and social factors to ensure sustainable practices. The case study of "Gopal Ji Mess" near the KIET Group of Institutions in Ghaziabad, India, provides real-world insights into surplus food management in a busy eatery, aiming to document best practices and challenges to inform broader sustainable food management efforts in the hospitality sector.

CHAPTER 4

RESULTS AND DISCUSSION

A.Hosted on Microsoft Azure Virtual Machine: Our website is hosted on Microsoft Azure Virtual Machine, leveraging the power and flexibility of cloud computing. With Azure VM, we benefit from high-performance infrastructure, scalability to accommodate fluctuating traffic demands, and robust security features to safeguard our data and applications. Azure's global network of data centers ensures reliable up time and low latency, delivering a seamless user experience to our visitors worldwide. Additionally, Azure VM offers a range of management and monitoring tools, empowering us to optimize performance, control costs, and streamline operations. Overall, hosting our website on Azure VM provides a reliable and **scalable solution for our online presence.**

4.1 JMeter Testing: Testing website performance using JMeter provides valuable insights into its ability to handle various levels of traffic and user interactions. The results obtained from JMeter tests, including graphs depicting throughput, average response time, and median response time, offer critical metrics for assessing the website's performance under load. is c rucial for identifying potential This analysis bottlenecks, optimizing resource allocation, and ensuringa seamless user experience.

•**Throughput:** Throughput is a key metric measured in transactions per unit of time, indicating the number of HTTP requests processed by the website within a given timeframe. The throughput graph generated by JMeter illustrates the website's capacity to handle concurrent user requests. A high throughput value signifies robust performance, indicating that the website can efficiently process a large volume of requests without experiencing slowdowns or failures. Conversely, a low throughput value suggests potential performance issues or constraints that may require optimization.

•**Average:** Average response time, another essential metric derived from JMeter tests, quantifies the time taken for the website to respond to user requests. The average response

time graph provides insights into the website's responsiveness and efficiency in serving user interactions. A lower average response time indicates faster website performance, ensuring prompt delivery of content and services to users. Conversely, a higher average response time may indicate latency issues or resource constraints that could degrade the user experience.

•**Median:** Median response time complements the average response time by providing a measure of the central tendency of response times observed during testing. The median response time graph depicts the distribution of response times across user requests, highlighting the typical or median time taken for the website to respond. Similar to the average response time, a lower median response time indicates better website performance and user satisfaction. Monitoring both average and median response times enables a comprehensive assessment of website performance and helps identify outliers or anomalies in response time distribution. Analyzing the results of JMeter tests involves interpreting the generated graphs and identifying patterns or trends that may indicate areas for improvement. For example, spikes or dips in throughput graph may signify fluctuations in traffic vol ume or unexpected surges in user activity. Similarly, increases in average or median response times may indicate performance degradation under load, necessitating further investigation into underlying causes such as server overload, network latency, or inefficient code execution.

This research paper has explored the feasibility, benefits, challenges, and best practices associated with surplus food management initiatives in hospitality settings. By categorizing surplus food into edible and non-edible types, establishments can devise targeted strategies that maximize social impact while minimizing waste. Edible food distribution programs provide essential nutrition to individuals and communities facing food insecurity, fostering social cohesion and empowerment. Meanwhile, non-edible food utilization initiatives harness the energy potential of organic waste, contributing to renewable energy generation and climate change mitigation.

Despite the inherent complexities and obstacles, numerous case studies and best practices demonstrate the tangible benefits of surplus food management initiatives. From luxury hotels to military mess facilities, establishments across the hospitality sector have successfully implemented innovative solutions to reduce food waste, support local communities, and advance sustainability goals. By leveraging partnerships, technology, and stakeholder

engagement, hotels and messes can replicate and adapt these strategies to their unique contexts, driving positive change within their operations and beyond.

As the hospitality industry continues to evolve, surplus food management remains a pressing priority, requiring ongoing commitment and collaboration from all stakeholders. By embracing the principles of sustainability, social responsibility, and innovation, hotels and messes can not only minimize their environmental footprint but also make meaningful contributions to food security, poverty alleviation, and climate resilience. Through concerted efforts and collective action, we can build a future where surplus food is no longer wasted but instead serves as a catalyst for positive social, economic, and environmental transformation.

1-Cpu Credit Use

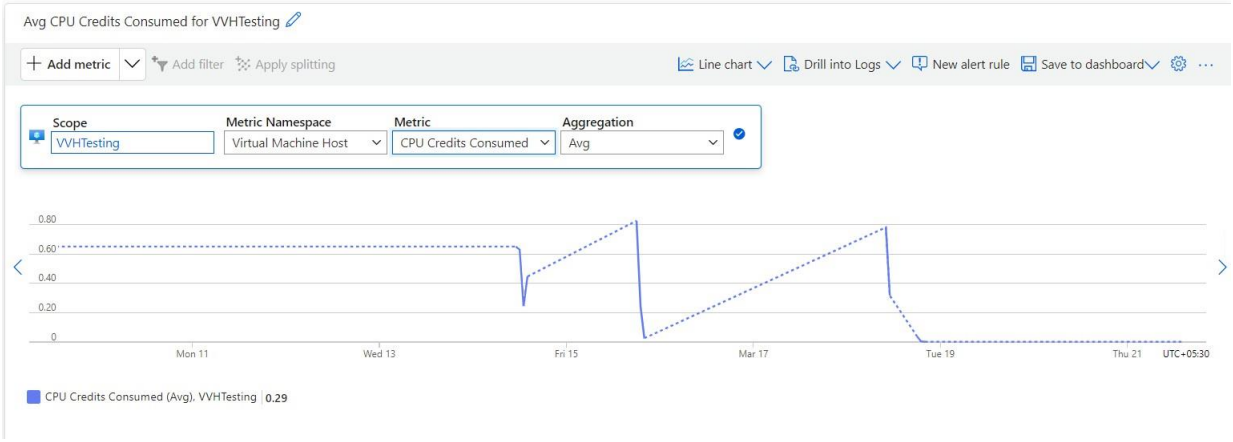

Figure 4.1 CPU Credit Used

The figure titled "Fig. 4. CPU Credit Used" illustrates the average consumption of CPU credits over a specified period. The graph features a y-axis representing the CPU credits consumed (measured in vCPU-hours) and an x-axis indicating the time of day.

Key observations from the graph include:

Initial Spike: At the beginning of the monitoring period, there is a noticeable spike in CPU credit usage, reaching up to approximately 8 credits. This spike indicates a period of high computational demand.

Decline and Stabilization: Following the initial peak, there is a rapid decline in CPU credit consumption. After this sharp decrease, the usage stabilizes at a much lower level, around 1 credit, and continues this trend with minor fluctuations until around 5 PM.

Further Decline: After 5 PM, the CPU credit usage drops further, stabilizing at an even lower level, close to zero, suggesting a significant reduction in computational activities or load on the system.

Low and Stable Usage: From 6 PM onwards, the CPU credit consumption remains very low and stable, indicating minimal activity during this period.

In conclusion, surplus food management in hotels and messes is not merely a challenge to be addressed but an opportunity to be seized—a chance to create a more equitable, resilient, and sustainable food system for generations to come.

2-Platform Analysis

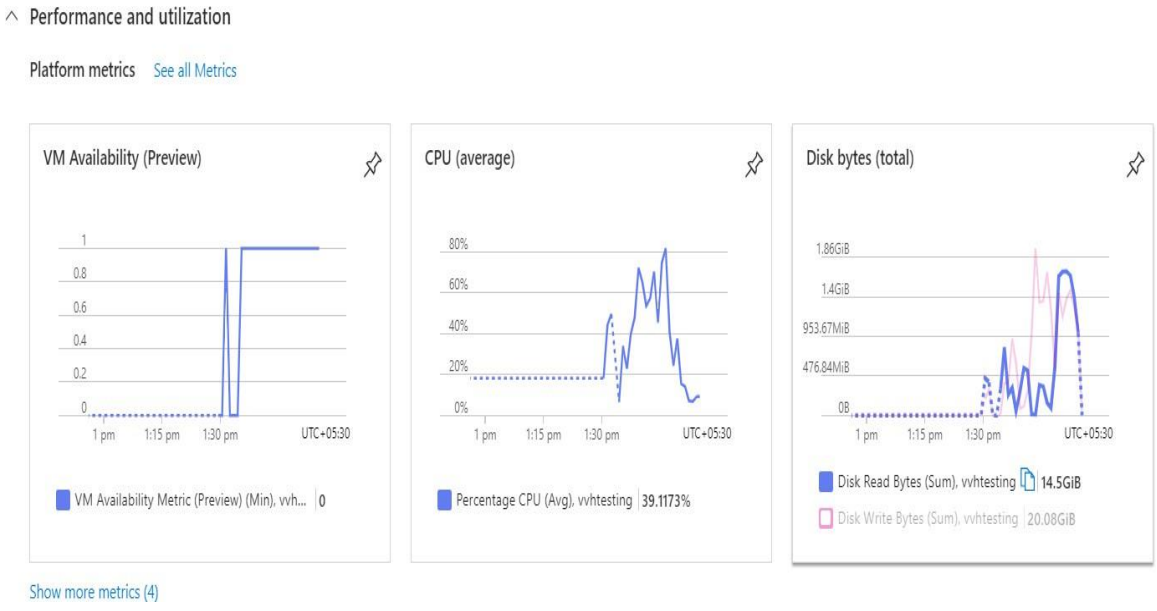

Figure 4.2 Platform Analysis

Platform Analysis displays three metrics: VM Availability, CPU usage, and Disk bytes. The VM Availability remains consistent at 100% throughout.

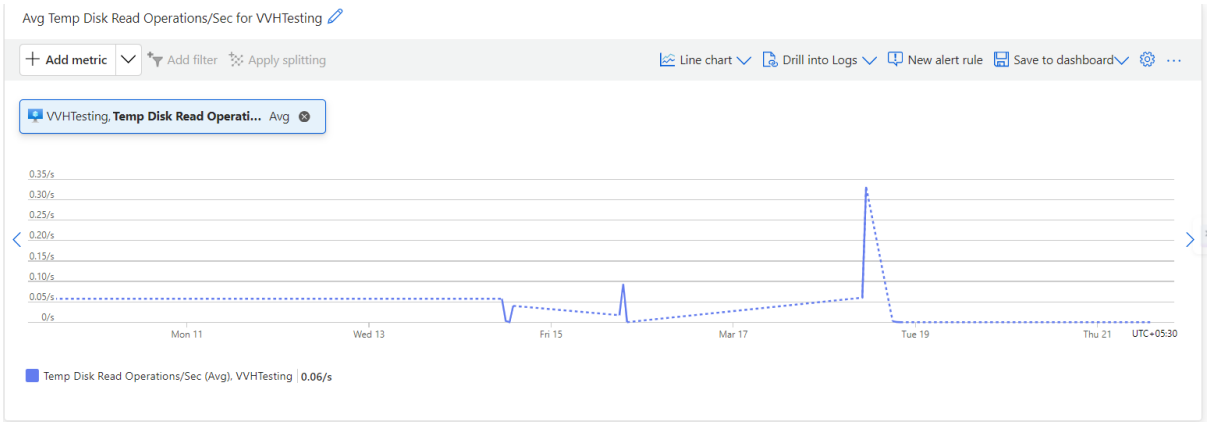

Figure 4.3 Disk Read

CPU usage shows a significant drop from around 30% to near 0% between 1 PM and 2 PM. Disk bytes exhibit sporadic spikes, with read operations peaking around 19.14 MiB and write operations around 4.1 Kib.

3-Bandwidth Analysis

Bandwidth illustrates the disk bandwidth consumption percentage over time.

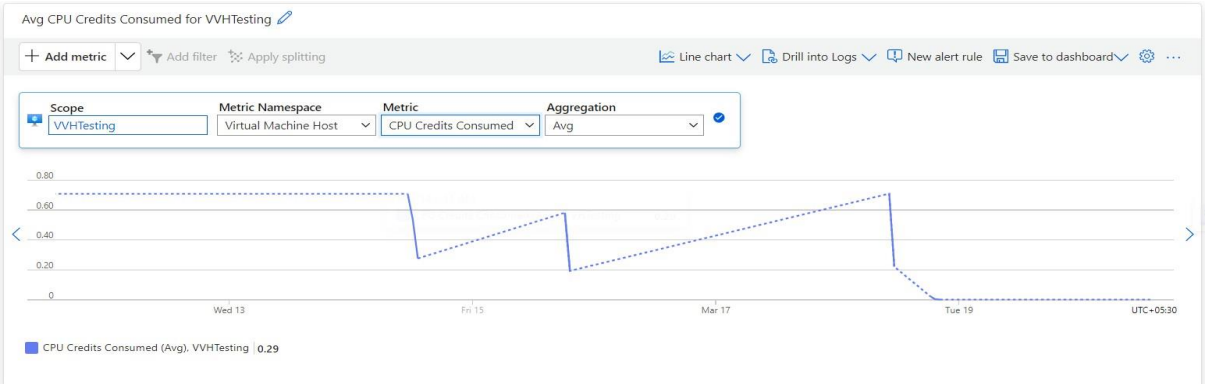

Figure 4.4 Bandwidth Analysis

Initially, there is a sharp increase in usage, peaking around 5.7%. This is followed by a rapid drop to nearly 0% by mid-morning. After a period of minimal activity, bandwidth usage

gradually increases again in the afternoon, peaking before sharply declining to zero by the evening, indicating a significant reduction in disk activity.

Input of Different Value of Different Systems

Where M = Machine Table 4.1

HTTP REQUEST	THROUGHPUT/MINUTES			AVERAGE			MEDIAN		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
100	585.943	589.87	584.96	373	377.8	375	325	340	327.2
250	595.147	598.98	600.87	334	323	335	296	300	298
500	779.412	812.87	770.54	333	336	345	296	300	296
1000	593.564	600.43	598.45	336	340	330	297	300	301

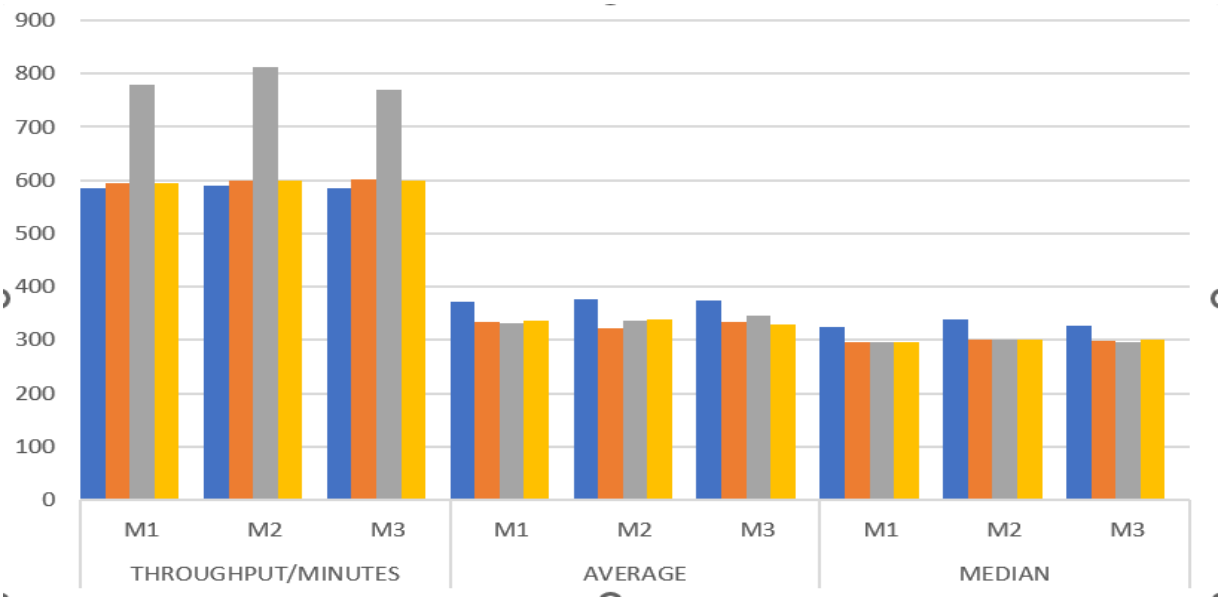

Figure 4.5-Different Value of Different Machines

4.2 Summary

Our website is hosted on a Microsoft Azure Virtual Machine, ensuring high performance, scalability, and robust security with reliable uptime and low latency. JMeter testing provides insights into website performance, measuring throughput, average response time, and median response time. High throughput and low response times indicate efficient performance, helping identify and address bottlenecks. Surplus food management in the hospitality industry involves categorizing food into edible and non-edible types. Edible food can be redistributed to communities, while non-edible food can be converted into renewable energy which is very helpful to environment.

CHAPTER 5

CONCLUSION

The management of surplus food in hotels and messes presents a multifaceted challenge with far-reaching implications for sustainability, social responsibility, and environmental stewardship. Through the dual approach of distributing surplus eatable food to address immediate hunger needs and utilizing non-eatable food for renewable energy production, establishments have the opportunity to transform surplus food from a liability into a valuable resource.

This research paper has explored the feasibility, benefits, challenges, and best practices associated with surplus food management initiatives in hospitality settings. By categorizing surplus food into eatable and non-eatable types, establishments can devise targeted strategies that maximize social impact while minimizing waste. Eatable food distribution programs provide essential nutrition to individuals and communities facing food insecurity, fostering social cohesion and empowerment. Meanwhile, non-eatable food utilization initiatives harness the energy potential of organic waste, contributing to renewable energy generation and climate change mitigation.

Despite the inherent complexities and obstacles, numerous case studies and best practices demonstrate the tangible benefits of surplus food management initiatives. From luxury hotels to military mess facilities, establishments across the hospitality sector have successfully implemented innovative solutions to reduce food waste, support local communities, and advance sustainability goals. By leveraging partnerships, technology, and stakeholder engagement, hotels and messes can replicate and adapt these strategies to their unique contexts, driving positive change within their operations and beyond.

As the hospitality industry continues to evolve, surplus food management remains a pressing priority, requiring ongoing commitment and collaboration from all stakeholders. By embracing the principles of sustainability, social responsibility, and innovation, hotels and

messes can not only minimize their environmental footprint but also make meaningful contributions to food security, poverty alleviation, and climate resilience. Through concerted efforts and collective action, we can build a future where surplus food is no longer wasted but instead serves as a catalyst for positive social, economic, and environmental transformation.

In conclusion, surplus food management in hotels and messes is not merely a challenge to be addressed but an opportunity to be seized—a chance to create a more equitable, resilient, and sustainable food system for generations to come. By adopting comprehensive food management practices, the hospitality industry can lead the way in demonstrating that responsible resource management is both achievable and beneficial. This entails continuous monitoring and improvement of surplus food handling processes, robust training programs for staff, and active engagement with local communities and organizations dedicated to food redistribution and waste management.

Furthermore, policy advocacy and alignment with global sustainability goals such as the United Nations Sustainable Development Goals (SDGs) can provide a framework for systemic change. Establishments should advocate for policies that support food recovery and recycling, provide incentives for reducing waste, and encourage the development of infrastructure to support these initiatives.

Finally, education and awareness are critical components of any successful surplus food management program. Raising awareness among guests and employees about the importance of reducing food waste and the positive impacts of surplus food initiatives can foster a culture of sustainability. Encouraging guests to participate in these efforts, for example, through portion control or by opting into donation programs, can amplify the impact.

By implementing these strategies, the hospitality industry can play a pivotal role in addressing one of the most pressing issues of our time. Through innovation, dedication, and a commitment to sustainability, hotels and messes can transform the challenge of surplus food into a powerful opportunity to drive social and environmental progress, ultimately contributing to a healthier planet and a more just society.

5.1 Future Scope

The future scope of surplus food management in the hospitality industry is vast and promising. Building on the foundational practices outlined in this research, several key areas offer significant potential for further development and innovation:

Technological Advancements:

AI and Data Analytics: Utilizing artificial intelligence and advanced data analytics can enhance the precision of food inventory management, predicting surplus more accurately and enabling proactive measures to minimize waste.

Blockchain Technology: Implementing blockchain for traceability can ensure transparency and accountability in food distribution chains, from surplus food collection to redistribution, enhancing trust and efficiency.

Enhanced Collaboration and Partnerships:

Cross-Sector Collaborations: Strengthening partnerships between the hospitality industry, non-profits, food banks, and government agencies can create more robust and integrated surplus food management systems.

Global Networks: Establishing global networks and platforms for knowledge sharing and best practices can help standardize surplus food management processes across different regions and cultures.

Policy and Regulation Development:

Supportive Legislation: Advocating for policies that incentivize surplus food donations, provide tax benefits, and establish clear guidelines for food safety in redistribution can create an enabling environment for surplus food management initiatives.

Waste Reduction Mandates: Governments could implement regulations mandating waste reduction targets for hospitality establishments, driving industry-wide commitment to sustainability.

Innovative Food Redistribution Models:

Community-Based Models: Developing localized, community-based food redistribution hubs can increase the efficiency of surplus food distribution, ensuring it reaches those in need more swiftly.

Mobile Applications: Creating user-friendly mobile apps that connect hotels and messes with nearby charities and individuals in need can streamline the process of surplus food donation.

Educational Programs and Training:

Staff Training: Continuous education and training programs for hospitality staff on best practices in food waste reduction and surplus management can institutionalize sustainable practices.

Guest Awareness: Engaging guests through educational campaigns about the impacts of food waste and encouraging their participation in surplus food initiatives can amplify efforts.

Sustainable Practices Integration:

Circular Economy Models: Integrating surplus food management into broader circular economy models can help establishments minimize waste by repurposing it in creative and sustainable ways.

Zero-Waste Goals: Setting and striving towards zero-waste goals can drive innovation and commitment across the hospitality industry, pushing the boundaries of what is achievable in surplus food management.

Impact Measurement and Reporting:

Standardized Metrics: Developing standardized metrics for measuring the impact of surplus food management initiatives can help establishments track their progress, identify areas for improvement, and communicate their successes.

Transparency Reporting: Regularly publishing detailed reports on surplus food management efforts and outcomes can foster transparency and accountability, enhancing public trust and stakeholder engagement.

Renewable Energy and Biogas Production:

Organic Waste to Energy: Expanding the use of non-eatable surplus food in renewable energy production, such as biogas, can significantly reduce the environmental footprint of the hospitality industry.Innovative Technologies: Exploring cutting-edge technologies for converting organic waste into energy more efficiently and at a larger scale can enhance the sustainability of these initiatives.By focusing on these areas, the hospitality industry can continue to evolve its surplus food management practices, making substantial contributions to sustainability, social responsibility, and environmental stewardship. The future of surplus food management holds immense potential to drive positive change, transforming challenges into opportunities for a better, more sustainable world.

5.2 Summary

Managing surplus food in hotels and messes can greatly benefit sustainability, social responsibility, and environmental stewardship. By distributing edible surplus food to those in need and converting non-edible food into renewable energy, establishments can reduce waste and support local communities. Successful case studies show that innovative approaches in food management can significantly advance sustainability goals. The hospitality industry is encouraged to leverage technology, foster partnerships, advocate for supportive policies, and raise awareness to enhance surplus food management practices. Through continuous effort and collaboration, surplus food can be transformed from a challenge into a valuable resource, driving positive social and environmental impact.

REFERENCES

1. FAO. (2019). EFERENCES The Stateof : Food Security inthe World 2019. Food and and Nutrition Agriculture Organization United of the Nations.

2. United Nations Environment Programme. (2020). Food Waste Index Report 2021. United Nations Environment Pro gramme.

3. Rama Dhanariya, Sarita Sharma, A. Sharma, S. Verma. (2014). A Review on Biogas Production from Food Waste. Agricultural and Food Sciences, Environmental Science.

4. Mess ABC Case Study: Interviews with Mess Personnel and Documentation on Biogas Production Initiative.

5. Sustainable Hospitality Coalition. (2020). Best Practices Guide: Food Waste Reduction in Hospitality. 6. Community Kitchen Initiative Case Study: Interviews with Program Coordinators and Documentation on Meal Preparation Collaborative.

7. Parfitt, J., waste Barthel, M. Macnaughton, within food supply S. (2010). chains: quantification Food and potential for change to 2050. Society Philosophical Transactions B: Biological Sciences, of the Royal 365(1554), 3065-3081.

8. Loopstra, R., & Tarasuk, V. (2013). Food bank usage is a poor indicator of food insecurity: Insights from Canada. Social Policy & Administration, 47(7), 834-855.

9. Gregory, P., & Ingram, J. (2016). Climate change and food security. Royal Society of London.

10. Food and Agriculture Organization Na (2021). Tackling Food Waste: Policy Interventions to of the United tions. Reduce HospitalitySector. Food Losses and Waste in the

11. Ellen MacArthur Foundation. (2019). Cities and Circular Economy for Food: Circular Economy in Cities: Evolving the Beyond Waste. Circular Economy

12. European Commission. (2019). A Action Plan fora Circular Economy Cleaner and More Competitive Europe.

13. World Economic Forum. (2020). Accelerating Sustain able Production: Transforming Business and Society.

14. Hawkes, C. (2015). Promoting Healthy Diets Through Nutrition Education An and Changes in International Reviewof the Food Environment: Actions and Their Effectiveness. Nutrition Education 15. Food and Changes in and the Food Environment. Agriculture Organization (2019). tions. Toolkit: Reducing the of the United Na Food Wastage Footprint

APPENDIX

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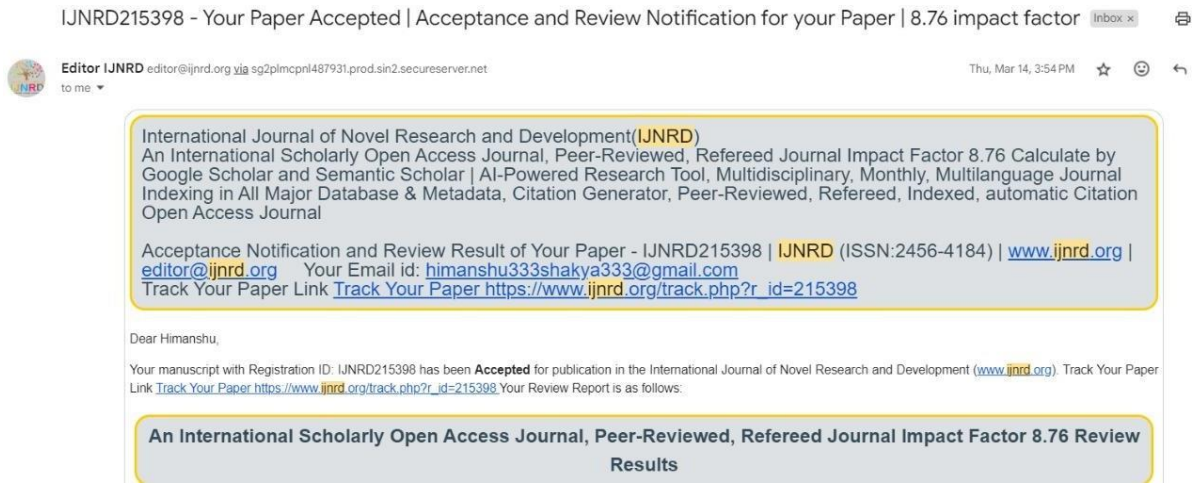

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Submission Summary

Conference Name	International Conference on Intelligent Computing and Communication Techniques
Track Name	ICICCT2024 (General Track)
Paper ID	880
Paper Title	Sustainable Management of Surplus Food in Hotels and Messes: A Dual Approach
Abstract	Abstract—In today's world, the issue of food wastage has become a significant concern, particularly in the hospitality industry where surplus food is a common occurrence. This research paper explores a dual approach to managing surplus food in hotels and messes. The approach involves categorizing surplus food into two types: eatable food and non-eatable food. Eatable food, which remains safe for consumption, can be distributed to nearby slums to feed hungry individuals in real-time. On the other hand, noneatable food can be transported to bio gas plants to produce renewable energy. This paper examines the feasibility, benefits, and challenges associated with each approach, highlighting the potential for sustainability and social impact. Index Terms—component, formatting, style, styling, insert
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