

OPEN ACCESS

Volume: 12

Special Issue: 2

Month: July

Year: 2024

P-ISSN: 2321-788X

E-ISSN: 2582-0397

Received: 20.06.2024

Accepted: 23.07.2024

Published: 30.07.2024

Citation:

Lakshmi, J., & Abisha Shanthini, V. (2024). To Study on Optimizing Resource Use and Reducing Waste by Using a Pioneering Analytical Method. *Shanlax International Journal of Arts, Science and Humanities*, 12(S2), 13–23.

DOI:

<https://doi.org/10.34293/sijash.v12iS2-July.7979>



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

To Study on Optimizing Resource Use and Reducing Waste by Using a Pioneering Analytical Method

Mrs. J. Lakshmi, MBA, M.Phil.,

*Assistance Professor, Rohini College of Engineering Technology
Kanyakumari, Palkulam, K. K. District, Tamil Nadu, India*

Ms. V. Abisha Shanthini, B.E., MBA.,

*Rohini College of Engineering Technology
Kanyakumari, Palkulam, K. K. District, Tamil Nadu, India*

Abstract

This study explores innovative analytical methods to optimize resource utilization and minimize waste, addressing the critical environment and economic challenges faced by hotel industries. By blending advanced data analytics and analytical techniques, this study aims to establish a sustainable operational framework for hotels. Through the examination of case studies from a range of food hotels, the study showcases how predictive analytics can help predict demand, streamline inventory management, decrease food wastage.

The main objective of the project is to get the full knowledge of the optimizing resource through daily sales tracking, daily purchase and inventory management, daily wastage monitoring in the hotel. By integrating these components, this project seeks to provide actionable insights and findings of solutions for restaurants. This approach was validated and data gathered by online survey from one restaurant and got 119 responds from 120 employee. The data was collected and processed using SPSS tool for analysis like (ANOVA, Chi-Square, Regression Analysis, Correlation Analysis) and Power bi for creating dashboard that provide value for restaurants. By this analysis it empowers restaurant managers with real-time data and insights, quick decision-making about resource management that will helps to reduce waste and optimize resource use to enhances operational efficiency, reduces costs, and improves overall profitability.

Keywords: Reducing Wastage, Optimizing Resources, Inventory Management, Online Survey, Power bi for Sashboard, Operational Efficiency, Advanced Data Analytical Techniques.

Introduction

Optimizing resource use and Reducing waste are essential for both economic viability and environmental sustainability. The sector faces significant challenges due to the high volume of perishable goods, fluctuating customer demand, and stringent regulatory requirements. Effective resource management not only reduces costs but also minimizes environmental impact, aligning with global sustainability goals.

Daily Purchases Management: Keeping track of daily purchases is vital for maintaining adequate inventory levels and controlling costs. Our project includes features to log daily purchases of food items and ingredients, ensuring that restaurants have the necessary supplies

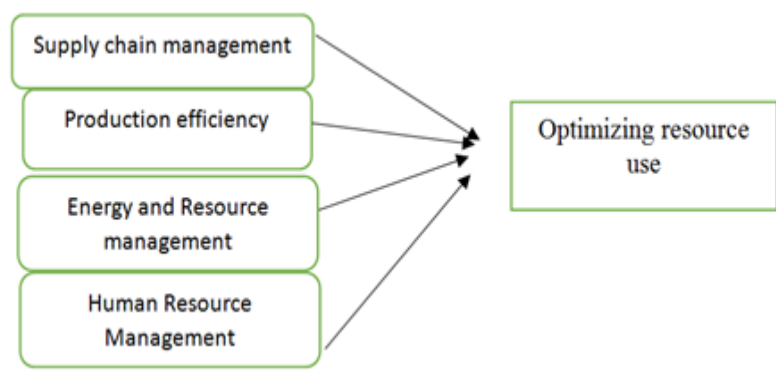
while minimizing excess inventory and reducing waste. Daily Wastage Monitoring: Minimizing wastage is a key aspect of sustainable and cost-effective restaurant operations. The project includes tools to record and analyze daily wastage of both food items and ingredients, helping managers identify areas for improvement and implement strategies to reduce waste.

Inventory Management: Effective inventory management in a restaurant involves precise tracking and forecasting to maintain optimal stock levels of food, beverages and maintenance items by using software. Demand forecasting based on historical data and seasonal trends help in adjusting inventory levels accordingly.

By integrating these four components, the Restaurant Resource Management Project provides a holistic solution for managing resources efficiently. It empowers restaurant managers with real-time data and insights, fostering a proactive approach to resource management that enhances operational efficiency, reduces costs, and improves overall profitability.

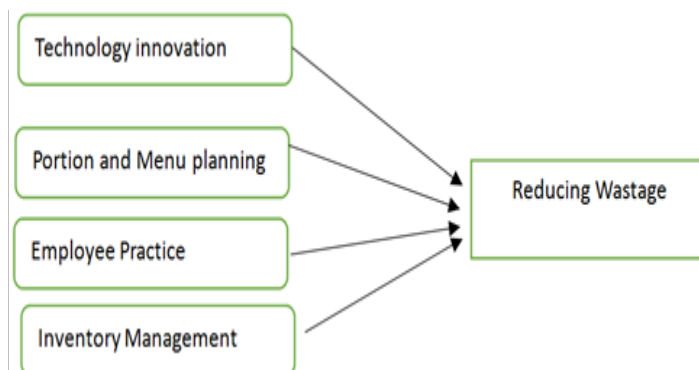
Frame Work

Factor 1



The framework for optimizing resource use in a restaurant involves several key factors. Supply chain management ensures the coordinated oversight of all processes from sourcing to delivery. Production efficiency focuses on minimizing waste and maximizing output quality. Energy and resource management aims to reduce consumption and enhance sustainability. Human resource management ensures employees are well-trained and engaged, impacting overall efficiency. Together, these elements contribute to an integrated approach for optimizing resource use in the restaurant industry.

Factor 2



The framework for reducing wastage in a restaurant encompasses several crucial factors. Technology innovation facilitates process improvements and waste minimization through advanced systems and tools. Portion and menu planning ensure that food quantities are optimized to reduce excess. Employee practice emphasizes the role of well-trained staff in maintaining efficient operations and minimizing waste. Inventory management keeps track of stock levels to avoid over-ordering and spoilage. Together, these elements contribute to a comprehensive strategy for reducing wastage in the restaurant industry.

Dashboard of Tracking Data

Dashboard helps to restaurant manager to keep track of all details like purchase, inventory, actual stock and predict the stock level in the inventory management that received and return goods. It is used to take quick decision making for managers and employers.



Industry Profile

The Information Technology (IT) sector is continuing to show robust growth and development, despite starting from a relatively smaller base compared to the national average. In the restaurant industry, IT companies are using technology to optimize resource use and reduce wastage. By implementing solutions like inventory management software and automated ordering systems, these companies aim to streamline operations, cut costs and enhance sustainability. Such project focused on improving efficiency reducing food waste and resources and ultimately increasing profitability for restaurant

In recent years, the IT industry has skilled strong increase, buoyed via advancements in digital generation and increasing reliance on cloud computing, artificial intelligence, and cybersecurity. job advent within IT corporations has been substantially study, with many companies expanding their personnel to fulfill developing needs for digital solutions.

In conclusion, the IT enterprise in 2024 keeps to thrive as a cornerstone of modern-day economies, riding technological innovation and economic growth. With growing call for digital solutions across industries, IT agencies are poised for endured growth and impact in shaping the destiny of enterprise and society.

Objective of the Study

Primary Objective

To study on optimizing resource use and reduce waste by using pioneering analytical methods.

Secondary Objective

1. To find out how to enhance employee engagement in optimizing resources, focus on reducing waste.
2. To study on Employee attitude towards workplace diversity after training and development.
3. To identify and implement effective and innovative techniques for improving inventory management system.
4. To find out evolution of smart purchasing can improve resources use and reduce waste.

Needs of the Study

1. The study is done to track and respond promptly to daily fluctuations in sales, purchases, waste, and inventory.
2. To optimize use of resources like inventory and staff time, ensuring maximum efficiency and cost-effectiveness.

Scope of the Study

Comprehensive Analysis of Daily Sales Performance: This scope involves detailed tracking and analysis of daily sales data and other services. The goal is to monitor revenue streams, identify high and low-performing areas, and provide insights for strategic decision-making.

Resource Utilization Mapping: Resource utilization mapping involves creating detailed visual representations of how resources flow through the company's various departments and processes.

Limitation of the Study

- Advanced analytical methods for pinpointing and reducing wastage might not be fully explored.
- Implementing changes might face opposition or practically it may difficult to adopt.
- Employee survey responses may be inaccurate.

Review of Literature

Harsh Agarwal (2020) One-third of the total food produced gets wasted according to the Food and Agriculture Association of the United Nations. This wastage accounts for 1.3 billion tones and the scarcity of food is one of the major concerns globally. This paper presents comprehensive research on various factors that lead to the wastage of food in the retail sector. And a robust methodology is proposed which aims at reducing the waste to as minimal as possible in this sector. A method is proposed which integrates the inventory prediction and forecasting technique with smart dustbins which uses state of the art object detection technique to analyze the waste that gets thrown into bins in order to provide with insights to help optimize the use of raw materials that are used in preparing food and further redistribution and valorization of unpredictable waste. Thus, producing minimal food waste.

Elizabeth Fernandes, Sergio Moro, Paulo Cortez, Fernando Batista, Ricardo Ribeiro (2021) This study proposes a method for simplifying restaurant managers' decision-making by combining live social media customer feedback and historical sales data in a sales forecast model (using Trip Advisor data and the Bass model). The collected data was processed using data analytics to create a dashboard that provides value to restaurateurs by leveraging online reviews and sales forecasting. Restaurant management experts evaluated the dashboard and provided positive

feedback, highlighting the time saved in the decision-making process. Thus, this innovative approach provides a high-precision sales forecast that can be tested in other hospitality contexts. In terms of practical implications, the proposed dashboard provides an overall picture of the business.

Research Methodology

This study will use a mixed-methods approach, combining quantitative data analysis with qualitative insights. This approach allows for a comprehensive understanding of resource use and waste management in restaurant. The primary research questions will focus on identifying patterns in resource consumption and waste generation, and evaluating the effectiveness of analytical methods in optimizing these processes.

Research Design

The research design is the based framework, which provides guidelines for research process. It is a route map according to which the research is to be conducts. The research design specifies the methods for data collection and data analysis determine the source of data.

Sampling Techniques: Convenience sampling was used to complete the survey

Sample Size: The sample size for the survey is 120 employers of all branches in Le Arabia Restaurant, Kazhakuttam.

Source of Data

There are two types of data:

1. Primary data
2. Secondary data

Primary Data

Primary data for the restaurant resource optimization and waste reduction project will be gathered through surveys, interviews, and direct observations.

Secondary Data

Secondary data will be gathered from a variety of existing sources for the project aimed at optimizing resource use and reducing waste in restaurants. This includes previous sales data, inventory records, and wastage logs kept by the restaurant, which will provide historical insights into operational trends and inefficiencies

Area of Study

The study was conducted in Saasvaap Techies Private Limited, Tiruvandrum. As one of their project is undertaken for my final year project.

Period of the Study

The study was conducted over four months from March 2024 to July 2024.

Research Gap

The evaluated study focuses on sales forecasting and customer feedback analysis, but it also identifies significant problems in restaurant resource optimization and waste reduction. It lacks comprehensive procedures for inventory management, effective purchasing, and reducing food waste. Furthermore, the impact of worker procedures on resource utilization and waste is under explored. The study also does not evaluate various operational models or best practices

among restaurants, which could be useful benchmarks. Integrating several data sources, including as sales, inventory, purchase records, and waste logs, is required to construct comprehensive, multifaceted optimization solutions. Addressing these gaps can result in new, data-driven methods to improving operational efficiency and sustainability in the restaurant business

Data Analytical Tools

- Percentage Analysis
- ANOVA
- Chi-Square test
- Regression Analysis
- Correlation Analysis

Regression Analysis

To determine the influence of enhance employee engagement in optimizing resources, focus on reducing waste over the success of an organization.

Significant level: 0.05%

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.929	.474		4.069	.000
1	b)It is management recognizes and rewards efforts for employee to reduce waste.	.012	.097	.012	.124	.902
	c) The company provides sufficient training on how to optimize resources effectively	.084	.117	.074	.715	.476
	d) It is regular discussion about waste reduction strategies during team meeting.	.479	.109	.427	4.402	.000
a. Dependent Variable: e) Reducing waste and optimize resource use is essential for the success of our organization						

The regression equation is $Y = a + bX$

Y is dependent variable success of organization

X is independent variable recognizes, training and discussion

b is regression coefficient of all variables B

a is regression constant 1.929

Sub the values,

$$Y = 1.929 + 0.479(0.4) X = 2.1206$$

Interpretation:

P (.000) < 0.05%

Therefore, it can be inferred that changes in discussion (X) will increase the success of an organization and helps to reduce waste and optimize resource use by 2.120%.

Anova Analysis

Ho: There is no significance difference between the age and employee attitude in training, diversity initiative, enhance team dynamic, identifying, awareness.

H1: There is significance difference between the age and employee attitude in training, diversity initiative, enhance team dynamic, identifying, awareness. @ 0.05%

$$y_i = \mu + a_i + e_i$$

Were,

Y_i = Random variable

μ = General mean effect

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
a) I trained on best practices for reducing waste and optimize resource use in restaurant.	Between Groups	1.056	2	.528	.683	.507
	Within Groups	89.650	116	.773		
	Total	90.706	118			
b) It is more supportive of diversity initiatives in the workplace following the training.	Between Groups	.484	2	.242	.410	.664
	Within Groups	68.440	116	.590		
	Total	68.924	118			
c) The training has significantly enhanced team dynamics and collaboration within the team.	Between Groups	.934	2	.467	.643	.527
	Within Groups	84.175	116	.726		
	Total	85.109	118			
d) I feel more proactive in identifying and reduction waste in my daily tasks after the training	Between Groups	1.458	2	.729	.759	.470
	Within Groups	111.332	116	.960		
	Total	112.790	118			
e) Training has increased my awareness of how to resources effectively in the restaurant.	Between Groups	.368	2	.184	.216	.806
	Within Groups	99.094	116	.854		
	Total	99.462	118			

Interpretation

The F value .683 which is significant at .507, which is more than 0.05. The null hypothesis is accepted, thus it concluded as there is no significant difference between the age and the trained practices.

From above Table all F value is more than 0.05%.

So, H₀ accept

Ho: There is no significance difference between the age and employee attitude in training, diversity initiative, enhance team dynamic, identifying, awareness.

Chi-Square Test

H₀: There is no significance difference between qualification and Innovation technology such as data analytics for developing dashboards could improve restaurant inventory levels and decision-making

H₁: There is significance difference between qualification and Innovation technology such as data analytics for developing dashboards could improve restaurant inventory levels and decision-making @ 0.05%

$$\text{chi - square test} = \frac{\sum(O - E)^2}{E}$$

Were,

O - Observed frequencies, E - Expected frequencies

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.347a	8	.242
Likelihood Ratio	9.938	8	.269
Linear-by-Linear Association	2.842	1	.092
N of Valid Cases	119		
a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .49.			

Interpretation

The value of F 0.242 is greater than significant level at 0.05%.

So, it is H0 is accepted.

Therefore, there is no significance difference between qualification and Innovation technology such as data analytics for developing dashboards could improve restaurant inventory levels and decision-making.

Correlate Analysis

To find out the relationship between smart purchasing and manage all resources through effective purchasing practices.

H0: There is no relationship between smart purchase and manage all resource.

H1: There is a relationship between smart purchase and manage all resource.

Significant level @ 0.01level

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Were,

n = Number of pairs of scores

$\sum x$ = Sum of x scores

$\sum y$ = Sum of y scores

$\sum x y$ = Sum of the product of paired scores

$\sum x^2$ = Sum of the squared of x scores

$\sum y^2$ = Sum of the squared of y scores

Correlation Analysis

Correlations			
		b) Smart purchasing has helped to avoid purchasing unnecessary items, thereby reducing waste.	c) It is better able to manage all resources and reduce through effective purchasing practices.
b) Smart purchasing has helped to avoid purchasing unnecessary items, thereby reducing waste.	Pearson Correlation	1	.395**
	Sig. (2-tailed)		.000
	N	119	119
c) It is better able to manage all resources and reduce through effective purchasing practices.	Pearson Correlation	.395**	1
	Sig. (2-tailed)	.000	
		119	119
Correlation is significant at the 0.01 level (2-tailed).			

Interpretation

P 0.395 > 0.01 Level

H0 accepted,

The correlation co-efficient between smart purchasing and manage all resources through effective purchasing practices 0.395 which indicate 39% of there is no relationship between smart purchase and manage all resource.

Suggestion

- Implement recognition programs like waste reduction and resource optimization. This could include monthly awards, certificates, or public recognition during meetings.
- Create an open environment where employees can share their ideas and experiences.
- Give clear guidelines and procedures for waste reduction and resource optimization. From that employees understand and implement strategies.
- Promote practices that support diversity, such as diverse hiring practices, inclusive team-building activities, and creating affinity groups for underrepresented employees.

Conclusion

The findings of this project indicated that the implementation of effective inventory management system and smart procurement practices can lead to resources efficiency and it will decrease in waste through the use of skilled employees, extensive diversity training and efficient employee engagement. The results show that organizational recognition, effective training and regular discussion are important in fostering a culture of sustainability. While using advanced analytical technology and real time scheduling system improves team performance and efficiency. Smart purchasing practices will always optimize resource allocation and reduce unnecessary expenses. By incorporating these strategies, organizations can improve resource management, reduce waste and promote sustainability, positioning them for long-term success in a competitive market place.

References

1. Kraiboon, Phalalorn., Sales and inventory management system for restaurant business., (1999). <https://repository.au.edu/server/api/core/bitstreams/dfc848a8-b652-4423-8e3a-990bb29ac33b/content>.

2. Do Nam Trung, S. Kumar, Resource use and waste management in Vietnam hotel industry, Volume 13, Issue 2, January 2005, <https://doi.org/10.1016/j.jclepro.2003.12.014>.
3. Víctor M. Giménez-García, José Luis Martínez-Parra, Frank P. Buffa, Improving resource utilization in multi-unit networked organizations: The case of a Spanish restaurant chain, Volume 28, Issue 1, February 2007, <https://doi.org/10.1016/j.tourman.2005.12.021>.
4. Svetlana Rodgers, Innovation in food service technology and its strategic role, Volume 26, Issue 4, December 2007, <https://doi.org/10.1016/j.ijhm.2006.10.001>.
5. Sanaa I. Pirani, Hassan A. Arafat, Reduction of food waste generation in the hospitality industry, Volume 132, 20 September 2016, <https://doi.org/10.1016/j.jclepro.2015.07.146>.
6. Durrani, Amir S., and Lakshman Rajagopal., Restaurant human resource managers' attitudes towards workplace diversity, perceptions and definition of ethical hiring. & quot; International Journal of Hospitality Management 53 (2016): 145- 151. <https://doi.org/10.1016/j.ijhm.2015.10.009>.
7. Berkowitz, Sarah Elizabeth. Providing flexible food portions in a restaurant setting: Impact on business operations, food consumption and food waste. MS thesis. University of Minnesota, 2015. <https://www.proquest.com/openview/41fd2887c21acea5014a35c6523480e8/1?pq-origsite=gscholar&cbi=18750>.
8. A. Lasek, N. Cercone, J. Saunders, Smart restaurants: survey on customer demand and sales forecasting, <https://doi.org/10.1016/B978-0-12-803454-5.00017-1> 2016.
9. Zongguo Wen , Shuhan Hu, Djavan DeClercq & M. Bruce Beck, Design, implementation, and evaluation of an Internet of Things (IoT) network system for restaurant food waste management, Volume 73, March 2018, <https://doi.org/10.1016/j.wasman.2017.11.054>.
10. Sakaguchi, Leo, Nina Pak, and Matthew D. Potts. & quot; Tackling the issue of food waste in restaurants: Options for measurement method, reduction and behavioral change., Journal of Cleaner Production 180 (2018): 430-436. <https://doi.org/10.1016/j.jclepro.2017.12.136>.
11. Tian, Hanqin, et al., Optimizing resource use efficiencies in the food–energy–water nexus for sustainable agriculture: From conceptual model to decision support system." Current Opinion in Environmental Sustainability 33 (2018): 104-113. <https://doi.org/10.1016/j.cosust.2018.04.003>.
12. Charlebois, Sylvain., Supply-based food waste in the food service industry: the case of Delish Restaurants., World Journal of Agricultural Sciences (2014). https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Supply-Based+Food+Waste+in++the+Food
13. Sharmitha, S., and P. Karthikeyan., Smart Food Wastage Management System in IoT with Effective Alerts using MQTT Protocol, Indian Journal of Food Engineering (IJFE) ISSN (2021): 2583-1275. <https://www.ijfe.latticescipub.com/wp-content/uploads/papers/v1i1/A100221121.pdf>.
14. Meisam Ranjbari, Michael Saidani, Zahra Shams Esfandabadi, Wanxi PengS uShiung Lam, Mortaza Aghbashlo, Francesco Quatraro, Meisam Tabatabae Two decades of research on waste management in the circular economy: Insights from bibliometric, text mining, and content analyses, Volume 314, 10 September 2021, <https://doi.org/10.1016/j.jclepro.2021.128009>
15. Cheryl Baldwin, Nana Wilberforce, Amit Kapur, Restaurant and Food Service Life Cycle Assessment and Development of a Sustainability Standard (2009).
16. Almanza, B., Frash, R. E., McKeig, M. J., Sullivan-Reid, C. (2016). Classifying restaurants to improve usability of restaurant research. International Journal of Contemporary Hospitality Management, 28(7), 1467–1483. <https://doi.org/10.1108/IJCHM-12-2014-0618>.
17. Mabaso, Cynthia H., and D. S. Hewson., Employees' perceptions of food waste management in hotels, African Journal of Hospitality, Tourism and Leisure 7.4 (2018): 0-15. https://ajhtl.com/uploads/7/1/6/3/7163688/article_48_vol_7_4__2018.pdf.

18. de Souza, Benitis Moreira, and Jonas Gomes da Silva. & How to reduce food waste in the B_M company's restaurant, "Oct 2020" https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=How+to+reduce+food+waste+in+the+B_M+company%60s+restaurant&btnG.
19. De Clercq, Djavan, et al., Biomethane production potential from restaurant food waste in megacities and project level-bottlenecks: a case study in Beijing, *Renewable and Sustainable Energy Reviews* 59 (2016): 1676-1685. <https://doi.org/10.1016/j.rser.2015.12.323>.
20. Liggayu, Alaine, et al., A Mixed-Method Approach Workforce Optimization for Fast-Food Restaurants., *Proceedings of International Conference on Technological and Social Innovations 2018*. http://www.ejikei.org/Conf/ICTSI2018/proceedings/materials/proc_files/GS_papers/GS_A012_/CameraReady_ICTSI2018_GS-A012.pdf.