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Analysis of Food Waste Management Strategies to the Performance of Selected Up Market Hotels and Restaurant in Northern province in Rwanda; A Case of Volcana Lounge Restaurant and Fatima Hotel

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Abstract

Food waste management strategy is one among the techniques used to reduce negative impact of food waste in hotel. The purpose of this study was to analyse the food waste management strategies to the performance of selected up market hotel and restaurant in Northern Province in Rwanda case of Volcana Lounge Restaurant and Fatima Hotel. The study's specific objectives were to identify how Volcana Lounge Restaurant and Fatima Hotel managed food waste in 2021–2022, to examine how food waste management strategies affected them, and to determine the revenue affected by food waste. The study used descriptive research design. The target population was 50 Fatima hotel staff working in Food and beverages department and 50 from Volcana Lounge Restaurant staff working in food and beverage department. The data collection was done using questionnaires. The data was analysed by using SPSS Version 21.0. The results showed that, when it came to waste management strategies used at the Volcana Lounge Restaurant which was the prevention of food waste at source and supply chain, 9.1% of respondents gave them less significance, 60.6% gave it significance, and 30.3% said it was very significant consideration. As opposed to the Fatima Hotel, where 3.0% thought it to be of less significance, 42.4% found it to be significant, and 54.5% found it to be quite significant. It is now evident that both companies announced that one of the important tactics chosen to minimize food waste in Volcana Lounge Restaurant and Fatima Hotel is ensuring that the energy, water, and land resources that go into growing the food are used as waste management measures cause by preventing food waste at source and supply chain. Additionally, the study examined how uncontrolled food waste might affect revenue from the sale of food and beverages, and the findings was as follows. In the restaurant Volcana Lounge, 54.5% of respondents said it was to a big extent, while 45.5% said it was to a moderate extent. As a result, there is a sizable loss in the income generated from the sale of food and drink, which may be due to uncontrolled food waste. The study concludes that both Volcana Lounge Restaurant and Fatima Hotel exhibit diverse and environmentally conscious food waste management strategies, with a notable emphasis on source reduction and methane prevention. Furthermore, the study highlights the direct correlation between effective waste management and revenue generation, underlining the essential role of waste reduction in achieving financial and environmental sustainability in these establishments. The study recommends that both Volcana Lounge Restaurant and Fatima Hotel invest in research and technology to reduce food waste at its source, along with educational programs to increase awareness of environmental impacts. Partnerships with suppliers for intelligent packaging and eco-friendly materials should be explored. Additionally, the implementation of aggressive food waste tracking systems, cost-benefit analysis, environmental audits, and initiatives to turn waste into revenue are advised. Performance metrics should be established to evaluate the effectiveness of strategies and serve as a model for the industry.

Keywords: *Food Waste Management Strategies, Performance, Market Hotels and Restaurant, Rwanda*

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1.0 Introduction

Hotels around the world are implementing sustainability in all aspects of waste management, including operations. However, as Wan, Chan, and Huang (2017) and Sharma and Bansal (2013) point out, the extent to which hotel operators implement sustainable food waste management practices is determined by their level of environmental awareness. It continues to pose a significant environmental and financial risk to the hospitality and tourism industries (Okumus, Taheri et al, 2020). Furthermore, food waste in hotels has a greater impact on operations, the economy, and the environment (Salama and Abdelsalam 2021). In light of this, our research aims to compare the performance of selected upmarket hotels in Rwanda's Northern Province, specifically Volcana Lounge Restaurant and Fatima Hotel. Every year, more than 88 million tons (Mt) of food waste are generated in the European Union (EU). This accounts for more than 20% of food produced in the member countries and costs more than € 143 billion per year. Furthermore, it is estimated that 63 million tons of food are wasted each year in the UAE, with 40% of that waste coming from consumer-facing industries such as hotels (Prezkop, Stone et al, 2020).

Hotels in Kenya face issues such as environmental degradation, fluctuating demand, insecurity, and political and economic instability, all while attempting to establish a quality culture based on lowering costs and defect rates, as well as improving products and operational effectiveness. "At the household level, food is lost through storage, preparation, and also after preparation," it stated, "but these are things for which we can find solutions." For example, we discovered that some hotels in Kigali waste food that is not consumed in a day, and there was an initiative to re-distribute the unconsumed food to hungry people, which came as a way to reduce food loss while providing for the hungry (Liesse, 2021). Furthermore, Kigali's current waste management systems are dispersed among numerous different ministries and institutions, all of which adhere to waste management rules that represent only a small portion of their overall responsibility. While the system is now operational, fragmented, misdirected, and potentially incoherent waste management legislation can have serious consequences for administration efficiency (Rajashekar, Bowers et al, 2019). This demonstrates that many strategies must be implemented to combat food waste in hotels, which has an impact on the economics and operational performance of hotels. The primary goal of this study was to examine the impact of food waste management strategies on the performance of two upmarket hotels in Rwanda's Northern Province: Volcana Lounge Restaurant and Fatima Hotel. The following research objectives guided the study:

i. To identify the strategies adopted to control food waste in Volcana Lounge Restaurant and Fatima Hotel in 2021-2022.
ii. To investigate the revenue affected by food waste in Volcana Lounge Restaurant and Fatima Hotel in 2021-2022.
iii. To examine how the food waste management strategies influenced Volcana Lounge Restaurant and Fatima Hotel in 2021-2022.

2.0 Theoretical Literature

Food waste is described as using food intended for human consumption for non-human uses, diverting food to feed animals, or discarding edible food (Pandey, 2021). It consists of both edible and inedible food components that are removed from the food supply chain and that can be handled

by disposal or recovery (Gustavsson, Bos-Brouwers et al, 2014). And the term food waste refers to food that is fit for human consumption that is wasted, whether or not it has been stored after it has passed its expiration date or allowed to decay. This happens frequently because food has spoilage, but there are other causes as well, like market surplus or specific customer shopping and eating behaviours (Kostecka, Garczyska et al, 2018). Schanes and Dobernig (2018) assert that food waste happens at every stage of production, from farming to distribution, to retail to consumption. Losses from cooking, purposeful food waste and loses from pests, molds or poor climate management are some of the causes of food waste (Schanes, Dobernig et al, 2018).

According to the definitions, food waste includes any by product or waste product from the production, processing, distribution, and consumption of food (Okazaki, Turn et al, 2008). Any food that is thrown away during the food service process in the hospitality industry is considered food waste for the purposes of this study. This might include leftovers from food processing or preparation, as well as dishes used for serving or waste from guests' plates. Additionally, for profit and non-profit establishments can be classified as a part of the hospitality sector (Vootla, Al Remeithi et al, 2018). The term food loss describes the loss of either food that was originally intended for human consumption, in terms of mass (dry matter) or nutritional content (Quality). These losses are mostly brought on by inefficiencies in the food supply chains, including inadequate infrastructure and logistics, a lack of technology, a lack of knowledge, expertise and management capacity on the part of supply chain actors, as well as restricted market access. A further factor is the impact of natural disasters (Kostecka, Garczyska et al, 2018). Food that is wasted or lost due to degradation is also referred to as food. Food loss and food waste are both included under the umbrella term wastage (Pandey, 2021)

2.1 Theoretical Framework

The study was founded on three theories, each of which provided unique insights into various aspects of food waste management. The Integrated Waste Management Theory advocates for a comprehensive and long-term approach to waste management (UNEP, 1996; Mwangi & Thuo, 2014; Elsaid & Aghezzaf, 2015). This theory is particularly relevant to the first research goal, which is to identify comprehensive food waste management strategies at Volcana Lounge Restaurant and Fatima Hotel. According to the Resource-Based View (RBV) Theory, internal resources can provide firms with a competitive advantage (Jureviciuos, 2013). This is consistent with the study's second goal, which is to investigate the impact of food waste on revenue, implying that effective food waste management can be a financial asset. Finally, Victor H. Vroom's Expectancy Theory proposes that people act based on their expectations of certain outcomes (Vroom, 1964; Miner, 2007). This relates to the third objective, which is to investigate the impact of food waste management strategies on the overall operations of the establishments. According to this theory, the effectiveness of such strategies may be dependent on employee motivation, which is influenced by their expectations of economic and environmental benefits. Taken together, these theories provide a solid foundation for comprehending the multifaceted aspects of food waste management, ranging from strategy formulation to revenue implications and employee motivation, in the context of Volcana Lounge Restaurant and Fatima Hotel.

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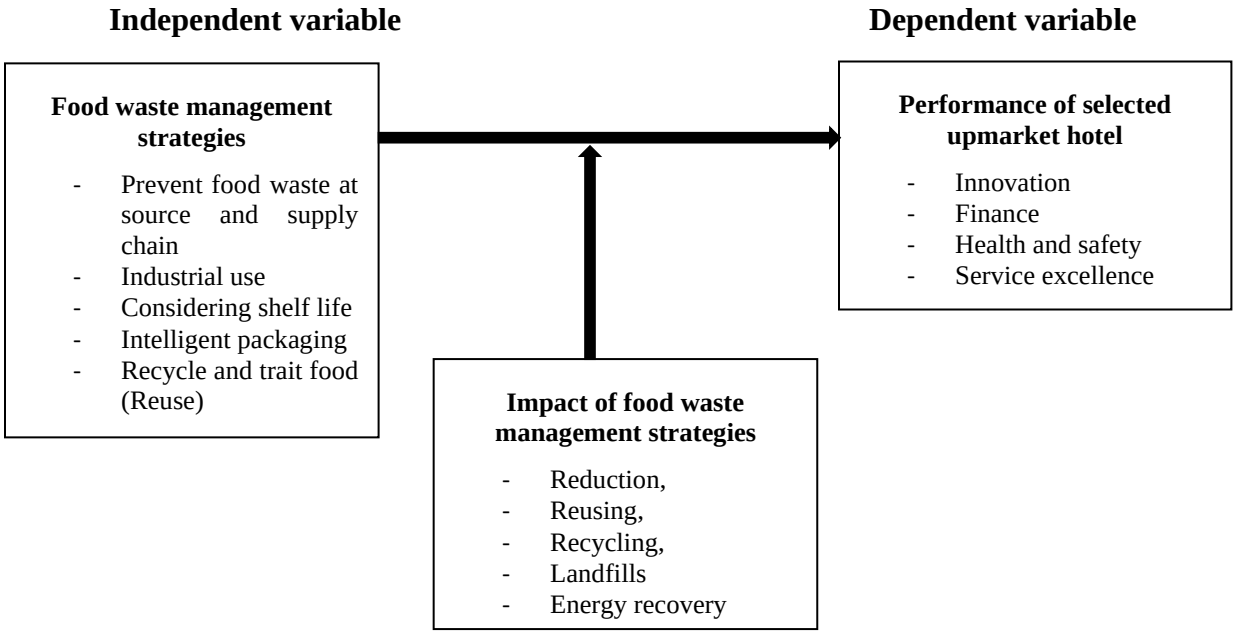
Journal of Hospitality and Tourism Management
Volume 6||Issue 5 ||Page 22-45||October|2023|
Email: info@stratfordjournals.org ISSN: 2706-6592

2.2 Conceptual Framework

The research in this study includes an examination of food waste management strategies in relation to the performance of selected upmarket hotels and restaurants in Rwanda's Northern Province, specifically the Volcana lounge restaurant and the Fatima hotel.In this case, the independent variable is food waste management strategies, which include preventing food waste at the source and throughout the supply chain, industrial use, taking shelf life into account, intelligent packaging and recycling, and trait food waste.



Intervening variable

Figure 1: Conceptual framework

Source: primary data (2022)

3.0 Research Materials and Methods

The study utilized a descriptive research design to gather information on food waste management strategies in selected hotels and restaurants in Northern Province, Rwanda (Akhtar, 2016). The target population for the research comprised 100 staff members from Fatima Hotel and Volcana Lounge Restaurant, all of whom were involved in food and beverage operations (Nigam, 2013). The sample size for each establishment was determined using BOUCHARD ALLAIN's formula (1990), resulting in 33 respondents from each location. This research design and sampling method provided a detailed understanding of the current status of food waste management strategies and their impact on the performance of these establishments.

4.0 Results

The study results are presented in sections.

4.1 Demographic characteristics of respondents

Demographic characteristics of respondents refer to specific attributes such as age, gender, job role, and years of experience, among others, that describe the individuals participating in a study. Understanding these characteristics is important as it helps to contextualize the research findings, allowing for more nuanced interpretations and potentially revealing patterns or trends that are influenced by these demographic factors.

4.1.1 Age Group of Respondents

The information collected from research participants in terms of age categories of respondents helped researcher to assess the categories of respondents who handle food waste in their daily life in hotels and restaurants. The information is presented in table below:

Table 1: Age Group of Respondents

Age group		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	Percentage	Frequency	Percentage
Valid	Below 18 years old	13	39.4	0	0
	Between 19 and 35	10	30.3	23	69.7
	Between 36 and 65	8	24.2	8	24.2
	Above 65	2	6.1	2	6.1
	Total	33	100.0	33	100.0

Source: Primary data, (2023).

At Volcana Restaurant, among respondents, 39.4% had below 18 years old; 30.3% had between 19 and 35 years old, 24.2 % were aged between 36 and 65 while 6.1% had above 65 years old. While at Fatima Hotel 69.7% were aged between 19 and 35, 24.2% were Between 36 and 65 and 6.1% of respondents were Above 65. This showed the respondents are mature enough on both restaurants and hotel and thi ensure that the given information are trustworthy.

4.1.2 Education Level of Respondents

In this study, education level of respondents was important to assess categories of staff who work in Hotels and Restaurants in Musanze district. Researcher due to the education of respondents trusted the information from different respondents. The information provided were summarized in below table.

Stratford Peer Reviewed Journals and Book Publishing
Journal of Hospitality and Tourism Management
Volume 6||Issue 5 ||Page 22-45||October|2023|
Email: info@stratfordjournals.org ISSN: 2706-6592

Table 2: Educational Level

Educational Level		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	Percent	Frequency	Percent
Valid	Primary	1	3.0	0	0
	Secondary	2	6.1	3	9.1
	University	30	90.9	30	90.9
	Total	33	100.0	33	100.0

Source: Primary data (2023)

Table 2 showed that at Volcana Lounge Restaurant 3.0% of respondents have finished primary level, 6.1% have finished their secondary studies while 90.9% have finished university level. This means that the majority of respondents had a high level of education and the information provided were of paramount important. While at Fatima Hotel 9.1% have graduated secondary studies and 90.9% were graduated in a university where they were carrying out a university studies. When you analyses the educational background of respondents this gives the hope that the given answers are true.

4.2 Presentations of Findings

4.2.1 Identification and Assessment of Food Waste Management Strategies

The first objective of the study was to identify the strategies adopted to control food waste in Volcana Lounge Restaurant and Fatima Hotel in 2021-2022 and results are presented in Table 3

Table 3: Prevents the Generation of Methane Gas

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
Not significance	1	3.0	7	21.2
Significance	16	48.5	21	63.6
Very significance	16	48.5	5	15.2
Total	33	100.0	33	100.0

Source: Primary data (2023)

The finding Volcana Lounge Restaurant from About preventing the generation of methane while preventing food waste at6 source and supply chain, 3% found not significance, 48.5% found that it is significance and 48.5% found out that it very significance. This shows that it is very and very signicance to prevent the generation of Methan gaz while preventing food waste at source. Whereas in Fatima Hotel 21.2 found it as not significance, 63.6% said that it is Significance and 15.2% found it as very significance. This showed that preventing the generation of methane while preventing food waste are significant to both hotel and volcana lounge restaurant.

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Stratford Peer Reviewed Journals and Book Publishing
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Volume 6||Issue 5 ||Page 22-45||October|2023|
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Table 4: Ensures that the energy, water and land resources that go into growing the food are not wasted

		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	**Percent**	**Frequency**	**Percent**
Valid	Less significance	3	9.1	1	3.0
	Significance	20	60.6	14	42.4
	Very significance	10	30.3	18	54.5
	Total	33	100.0	33	100.0

Source: Primary data (2023)

The result presented in table 4 showed that ensuring that the energy, water and land resources that go into growing the food as waste management strategies in Volcana Lounge Restaurant, 9.1% found them as less significance, 60.6% found it as significance and 30.3% found it as very significance. Where as in Fatima Hotel 3.0% found it as Less significance, 42.4% found it as Significance and 54.5% found it as Very significance. It is clear now where both establishments declared that ensuring that the energy, water and land resources that go into growing the food as waste management strategies is one among the significance strategies adopted to control food waste in Volcana Lounge Restaurant and Fatima Hotel. This inference is supported by Baker (2015) and Rahman, Park & Chi (2015) which noted that some organisations including hotels are faced with challenging barriers which make it difficult or impossible to incorporate sustainable environment or waste management practices into their daily organisational operations. Posiible barriers to adopting and implementing environmental best practices as noted by Styles, et. Al. (2015) and Bello, et. Al. (2016) include lack of awareness, lack of technological competencies, high costs of investments in new technologies, ineffective national environmental policies and inadequate or lack of environmental awareness programmes

Table 5: Increase the Attractiveness Of The Packaged Product And Also Of The Food Companies

		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	Percent	Frequency	Percent
	Significance	14	45.4	8	24.2
	Very Significance	16	48.5	23	69.7
	Extremely essential	3	6.1	2	6.1
Total		33	100.0	33	100.0

Source: Primary data (2023)

The findings from Volcana Lounge Restaurant confirm that the increase the attractiveness of the packaged product and also of the food company's food waste strategy was confirmed by 45.4% of all respondents as significance, 48.5% of all respondents said that it is very significance and 6.1%

of all respondents said that it is extremely essential. This showed the researcher that once food were well packaged this help it to not be destroyed and wasted which help the restaurants in its development in terms of income generation. While in Fatima Hotel 24.2% said that it significance, 69.7% said that it is very significant and 6.1% said that it is extremely essential. Which make a research to conclude that the increase of the attractiveness of the packaged product and also of the food company's food waste strategy is very essential as confirmed by a big number of respondents.

Recycle and trait food (Reuse)

Table 6: Saving land, money that hotel and restaurant must use to dispose of waste in landfills

		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	Percent	Frequency	Percent
Valid	Less Significance	1	3.0	0	0
	Significance	19	57.6	5	15.2
	Very Significance	13	39.4	25	75.8
	Extremely essential	0	0	3	9.1
	Total	33	100.0	33	100.0

Source: Primary data (2023)

Recycle and trait food (Reuse) food helps in reducing its wastage and it helps to saves land and money that hotel must use to dispose of waste in landfills as the result from the respondents of Volcana Lounge Restaurant where 3.0 % said that it is less significant, 57.6% said that it is significant and 39.4% confirm that it is very significant. Once food waste is reused this save money and land used to dispose waste in landfills. Where as in Fatima Hotel 15.2% said that it is Significance, 75.8% said that it is very Significance and 9.1% said that it is extremely essential.

4.2.2 Economic Impact of Food Waste on Revenue

The second objective of the study was to investigate the revenue affected by food waste in Volcana Lounge Restaurant and Fatima Hotel in 2021-2022.

Table 1 : Restaurant's and Hotel's Environmental Degradation

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To small extent	2	6.1	0	0
To a moderate extent	16	48.5	11	33.3
To large extent	15	45.5	22	66.7
Total	33	100.0	33	100.0

Source: Primary data (2023)

Stratford Peer Reviewed Journals and Book Publishing
Journal of Hospitality and Tourism Management
Volume 6||Issue 5 ||Page 22-45||October|2023|
Email: info@stratfordjournals.org ISSN: 2706-6592

In Volcana Lounge Restaurant, the research assessed the Restaurant's environmental degradation, which may be caused by unmanaged food waste, where 45.5% said it is to large extent and 48.5% who said it is to moderate extent while 6.1% said it is to small extent. Whereas in Fatima hotel the result was in the following way: 33.3% of all respondents said that it is at a moderate extent and 66.7% said that it is at a large extent. Therefore, there is a significant of the Restaurants' environmental degradation, which may be caused by unmanaged food waste.

Table 2: Income Generation from Food and Beverage

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	**Percent**	**Frequency**	**Percent**
To a moderate extent	15	45.5	11	33.3
To large extent	18	54.5	22	66.7
Total	33	100.0	33	100.0

Source: Primary data (2023)

The research assessed the Income generation from food and beverage which may be hindered by un managed food waste and the result was as follow. In Volcana Lounge Restaurant, where 54.5% said it is to large extent and 45.5% who said it is to moderate extent. While in in Fatima Hotel 33.3% said that it is at a moderate extend while 66.7% said that it is at a large extent. Therefore, there is a significant loss of the Income generation from food and beverage, which may be caused by unmanaged food waste.

Extend you are aware of the ways Volcana lounge restaurant and Fatima hotel use to reduce food waste in 2021-2022

Table 10: Sorting and weighting food waste

		Volcana Lounge Restaurant		Fatima Hotel	
		Frequency	Percent	Frequency	Percent
Valid	To small extent	10	30.3	0	0
	To a moderate extent	17	51.5	12	36.4
	To large extent	5	15.2	19	57.6
	To very large extent	1	3.0	2	6.1
	Total	33	100.0	33	100.0

Source: Primary data (2023)

In Volcana Lounge Restaurant, the findings about the revenues spent on Sorting and weighting food waste, 30.3% reveled that there is expense at small extent, 51.5% said a moderate extent, 15.2% said to large extent while 3% said to very large extent. While in Fatima Hotel, 36.4% confirmed that it is to a moderate extent, 57.6% said that it is to large extent and 6.1% said that it

is to very large extent. This means if the hotels and restaurants do not properly apply Sorting and weighting food waste in a proper way it causes the establishments to lose money.

Table 11: Creating Awareness And Engaging Relevant Food Items

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To a moderate extent	17	51.5	6	18.2
To a large extent	9	27.3	26	78.8
To a very large extent	2	6.1	1	3.0
Total	33	100.0	33	100.0

Source: Primary data (2023)

When assessing the Creating awareness and engaging relevant food items , 6.1 % said that it is to very large extent, 27.3% said it is to large extent and 51.5% who said it is to moderate extent while 15.2%sait it is to small extent in Volcana Lounge Restaurant.. While in Fatima Hotel the result of findings are as follow: 18.2% of all responded said That it is to a moderate extent, 78.8% of all respondent said that it is to a large extent and 3.0% of all respondents said that it is at a very large extent. Therefore, there is a creating awareness and engaging relevant food items

Table 12: Avoiding The Habit of Wasting Ingredients Before They Are Prepared

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To a moderate extent	17	51.5	5	15.2
To large extent	14	42.4	27	81.8
To very large extent	2	6.1	1	3.0
Total	33	100.0	33	100.0

Source: Primary data (2023)

When assessing the avoiding the habit of wasting ingredients before they are prepared, 6.1 % said to very large extent, 42.4% said it is to large extent and 51.5% who said it is to moderate. While in Fatima Hotel the result of findings are as follow: 15.2% confirmed that it is To a moderate extent, 81.8% confirmed that it is to large extent and 3.0% confirmed that it is To very large extent.

Therefore, there is a significance of avoiding the habit of wasting ingredients before they are prepared.

Awareness of the environmental impact of unmanaged food waste

Stratford Peer Reviewed Journals and Book Publishing
Journal of Hospitality and Tourism Management
Volume 6||Issue 5 ||Page 22-45||October|2023|
Email: info@stratfordjournals.org ISSN: 2706-6592

Table 13: Air Pollution in Hotel

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To small extent	7	21.2	0	0
To a moderate extent	17	51.5	8	24.2
To large extent	8	24.2	25	75.8
To very large extent	1	3.0	0	0
Total	33	100.0	33	100.0

Source: Primary data (2023)

In Volcana Lounge Restaurant, the research assessed the Air pollution in hotel where 3.0% said that there to very large extent 24.2% said it is to large extent and 51.5% who said it is to moderate extent while 21.2% said it is to small extent. While in Fatima Hotel, 24.2% confirmed that it is at a moderate extent and 75.8% said that it is at a large extent. For that reason, there is a significant of the Air pollution in hotel and restaurant and restaurants which may be caused by unmanaged food waste.

Table 14: Unattractive Appearance Of Hotel And Restaurants Environment

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To small extent	2	6.1	0	0
To a moderate extent	15	45.5	3	9.1
To large extent	15	45.5	14	42.4
To very large extent	1	3.0	16	48.5
Total	33	100.0	33	100.0

Source: Primary data (2023)

In Volcana Lounge Restaurant, the research assessed the Unattractive appearance of hotel environment, where 3.0% said that there to very large extent 45.5% said it is to large extent and 45.5% who said it is to moderate extent while 6.1% said it is to small extent. While in Fatima Hotel 9.1% said that it is at a moderate extent, 42.4% said that it is at a large extent and48.5% of all respondents said it is at a very large extent. Therefore, there is a significant of the unattractive appearance of hotel environment if food waste are not well managed.

Stratford Peer Reviewed Journals and Book Publishing
Journal of Hospitality and Tourism Management
Volume 6||Issue 5 ||Page 22-45||October|2023|
Email: info@stratfordjournals.org ISSN: 2706-6592

4.2.3 Influence of Food Waste Management Strategies on Operational Performance

The third objective of the study was to investigate how food waste management strategies affected Volcana Restaurant Lounge and Fatima Hotel in 2021-2022

Table 15: Innovation

	Volcana Lounge Restaurant		Fatima Hotel	
	Frequency	Percent	Frequency	Percent
To a moderate extent	10	30.3	6	18.2
To large extent	16	48.5	14	42.4
To very large extent	7	21.2	13	39.4
Total	33	100.0	33	100.0

Source: Primary data (2023)

In Volcana Lounge Restaurant, the research assessed the Innovation, where 21.2% said that there to very large extent 48.5% said it is to large extent and 30.3% who said it is to moderate. Therefore, there is a significant of the Innovation. While in Fatima Hotel the result was as follow: 18.2% of all respondents said that food waste management strategies helped in innovation at a moderate extent, 42.4 at large extent and 39.4% at a very large extent. Therefore, there is a significant of the Innovation caused by food waste management strategies.

4.3 Multiple Regression Analysis

Multiple Regression Analysis is a statistical method used to examine the relationship between one dependent variable and two or more independent variables.

Table 16: Innovation And Prevent Food Waste at Source and Supply

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.538	2.041		3.204	.003
	Prevent the generation of methane gas	.025	.221	.021	.114	.910
	Ensures that the energy, water and land resources that go into growing the food are not wasted	-.187	.255	-.143	-.731	.471
	Economic benefits	-.471	.327	-.277	-1.439	.161
a. Dependent Variable: Innovation						

Where Y_1= Innovation, X_1=Prevent the generation of methane, X_2= Ensures that the energy, water and land resources that go into growing the food are not wasted, X3= Economic benefits.

$Y_{1=}$ ß$_0$ + ß$_1X_1$ + ß$_2X_2$+ ß$_{3.}X_3$.

$Y_{1=}$ 6.538 + 0.025X_1 -0.187X_2-0.471X_3

Holding all factors constant, innovation is increased by 6.538 and this value is statistically significant because the p-value of 0.003 is less than 0.05. A unit increase in prevent the generation of methane increases innovation by 0.025 and this increase is statistically insignificant because the p-value of 0.910 is greater than 0.05. A unit increase in ensuring that the energy, water and land resources that go into growing the food are not wasted decreased the innovation by 0.187 and this decrease is statistically insignificant because the p-value of 0.471 is greater than 0.05. A unit increase in economic benefits decreased the innovation by 0.471 and this decrease is statistically insignificant because the p-value of 0.161 is less greater than 0.05.

Table **17: Finance** And Prevent Food Waste At Source And Supply Chain

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.282	1.847		3.402	.002
	Prevent the generation of methane	.098	.200	.082	.489	.628
	Ensures that the energy, water and land resources that go into growing the food are not wasted	.095	.231	.074	.412	.684
	Economic benefits	-.718	.296	-.429	-2.425	.022
a. Dependent Variable: Finance						

Where; $Y_{2=}$ Finance, $X_{1=}$ Prevent the generation of methane, $X_{2=}$Ensures that the energy, water and land resources that go into growing the food are not wasted, $X_{3=}$ Economic benefits.

$Y_{2=}$ ß$_0$ + ß$_1X_1$ + ß$_2X_2$+ ß$_{3.}X_3$

Y2= 6.282 +0.098 X_2 – 0.718$_{.}X_3$

Holding all factors constant, Finance is increased by 6.282 and this value is statistically significant because the p-value of 0.003 is less than 0.05. A unit increase in prevent the generation of methane increases Finance by 0.098 and this increase is statistically insignificant because the p-value of 0.628 is greater than 0.05. A unit increase in eensures that the energy, water and land resources that go into growing the food are not wasted increased the Finance by 0.098 and this increase is statistically insignificant because the p-value of 0. 684 is greater than 0.05.A unit increase in economic benefits decreased the finance by 0.718 and this decrease is statistically significant because the p-value of 0.022 is less greater 0.05.

Table 18: ANOVA table between financial performance of hotel and the strategies adopted to control food waste in Hotel

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.616	3	1.205	2.618	.070[b]
	Residual	13.353	29	.460		
	Total	16.970	32			

a. Dependent Variable: Finance

b. Predictors: (Constant), Economic benefits, Prevent the generation of methane, nsuring that the energy, water and land resources that go into growing the food are not wasted.

Source: Primary data (2022).

The researcher also conducted the analysis of variance to determine the significance of the model. The model between financial performance of hotel and the strategies adopted to control food waste in Hotel. The relationship found to be insignificant since the p-value was greater than 0.05.

Table 19: Health and safety and prevent food waste at source and supply chain

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.723	1.917		2.464	.020
	Prevent the generation of methane	.104	.208	.092	.499	.622
	Economic benefits	-.034	.307	-.021	-.109	.914
	Ensures that the energy, water and land resources that go into growing the food are not wasted	-.200	.240	-.165	-.832	.412

a. Dependent Variable: Health and safety

Where; Y_3= Health and safety, X_1=Prevent the generation of methane, X_2= Economic benefits, X_3=Ensures that the energy, water and land resources that go into growing the food are not wasted.

$Y_3 = ß_0 + ß_1X_1 + ß_2X_2 + ß_3X_3$.

$Y_3 = 4.723 + 0.104X_1 - 0.034X_2 - 0.200X_3$.

Holding all factors constant, Health and safety is increased by 4.723 and this value is statistically significant because the p-value of 0.020 is less than 0.05. A unit increase in preventing the

generation of methane increases Health and safety by 0.104 and this increase is statistically insignificant because the p-value of 0.622 is greater than 0.05. A unit increase in ensures that the energy, water and land resources that go into growing the food are not wasted decreased the Health and safety by 0.200 and this decrease is statistically insignificant because the p-value of 0.412 is greater than 0.05. A unit increase in economic benefits decreased the Health and safety by 0.034 and this decrease is statistically insignificant because the p-value of 0.914 is greater than 0.05.

Table 20: Service Excellence And Prevent Food Waste At Source And Supply Chain

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.345	1.940		2.240	.033
	Prevent the generation of methan	-.129	.210	-.109	-.615	.543
	Economic benefits	.329	.311	.198	1.056	.300
	Ensures that the energy, water and land resources that go into growing the food are not wasted	-.279	.243	-.218	-1.148	.260
a. Dependent Variable: Service Excellence						

Where; y_4= Service Excellence, X_1=Prevent the generation of methane, $X_{2=}$ Economic benefits, $X_{3=}$Ensures that the energy, water and land resources that go into growing the food are not wasted.

$Y4_{=}\ ß_0 + ß_1X_1 + ß_2X_2 + ß_{3.}X_3$.

$Y4_{=}\ 4.345 - 0.129X_1 + 0.329X_2 - 0.27X_3$.

Holding all factors constant, Service Excellence is increased by 4.345 and this value is statistically significant because the p-value of 0.003 is less than 0.05. A unit increase in ppreventing the generation of methane decreases Service Excellence by 0.129 and this decrease is statistically insignificant because the p-value of 0.543 is greater than 0.05. A unit increase in economic benefits increased the Service Excellence by 0.329 and this increase is statistically insignificant because the p-value of 0.300 is greater 0.05. A unit increase in ensuring that the energy, water and land resources that go into growing the food are not wasted decreased the Service Excellence by 0. 279 and this decrease is statistically insignificant because the p-value of 0. 260 is greater than 0.05.

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Table 21: Innovation and Industrial Use

Coefficients[a]					
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	4.460	1.485		3.003	.005
	Food waste conservation	-.242	.251	-.177	-.965	.342
	Food waste recovery	.173	.256	.124	.677	.503
a. Dependent Variable: Innovation						

Where Y_1= Innovation, X_1= Food waste conservation, X_2= Food waste recovery.

$Y_1 = ß_0 + ß_1X_1 + ß_2X_2$.

$Y_1 = 4.460 - 0.242X_1 + 0.173X_2$.

Holding all factors constant, Innovation is increased by 4.460 and this value is statistically significant because the p-value of 0.005 is less than 0.05. A unit increase in Food waste conservation decreases innovation by 0.242 and this decrease is statistically insignificant because the p-value of 0.342 is greater than 0.05. A unit increase in Food waste recovery increased the innovation by 0.173 and this decrease is statistically insignificant because the p-value of 0.503 is greater than 0.05.

Table 22: Finance and Industrial use

Coefficients[a]					
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	5.190	1.497		3.467	.002
	Food waste conservation	-.105	.253	-.078	-.416	.680
	Food waste recovery	-.136	.258	-.099	-.525	.604
a. Dependent Variable: Innovation						

Where; Y_2= Finance, X_1= Food waste conservation, X_2= Food waste recovery.

$Y_{2=} ß_0 + ß_1X_1 + ß_2X_2$.

$Y_{2=} 5.190 - 0.105X_1 - 0.136X_2$.

Holding all factors constant, Finance is increased by 5.190 and this value is statistically significant because the p-value of 0.002 is less than 0.05. A unit increase in Food waste conservation decreases innovation by 0.105 and this decrease is statistically insignificant because the p-value of 0. .680 is greater than 0.05. A unit increase in Food waste recovery increased the Finance by 0.136 and this

decrease is statistically insignificant because the p-value of 0.604 is greater than 0.05. According to other researchers, Needless to say, food waste costs in many ways to the food service operators. Just for the pre-disposal phases of food waste, there are three different types of expenses: raw Economic costs of food waste Pre-disposal costs Raw material costs Labour costs Energy used for food preparing and storing costs Disposal costs Labour costs for trash disposal Gargabe hauling costs 20 material costs, labour costs, and the costs of energy used for food preparation and storing. However, the costs do not end here. Food waste continues to cost even after disposal, due to the fact that it costs the operators to hire labour to handle the trash disposal and garbage hauling service. (Baldwin & Shakman, 2012, 62-63).

Table 23: Service excellence and Industrial use

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.041	1.476		2.061	.048
	Food waste conservation	.057	.249	.043	.228	.821
	Food waste recovery	.228	.254	.167	.895	.378
a. Dependent Variable: Service Excellence						

Where Y_3= Service Excellence, X_1= Food waste conservation, X_2= Food waste recovery.

$Y_{3=} ß_0 + ß_1X_1 + ß_2X_2$.

$Y_{3=} 3.041+0.057\ X_1 + 228\ X_2$.

Holding all factors constant, Service Excellence is increased by 5.190 and this value is statistically significant because the p-value of 0. 048 is less than 0.05. A unit increase in Food waste conservation increases Service Excellence by 0.057 and this increase is statistically insignificant because the p-value of 0. 821 is greater than 0.05. A unit increase in Food waste recovery increased the Service Excellence by 0. 378 and this increase is statistically insignificant because the p-value of 0. 378 is greater than 0.05.

Table 24: Innovation and Considering Shelf life

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	6.233	1.967		3.169	.004
	The expiration date	-.308	.329	-.181	-.938	.356
	Best by date	-.233	.306	-.147	-.761	.452
a. Dependent Variable: Innovation						

Where Y_1= Innovation, X_1= The expiration date, X_2= Best by date.

$Y_1 = ß_0 + ß_1X_1 + ß_2X_2$.
$Y_1 = 6.233 - .308X_1 - .233\ X_2$.
Holding all factors constant, innovation is increased by 5.190 and this value is statistically significant because the p-value of 0. 048 is less than 0.05. A unit increase in the expiration date decreases innovation by 0.233 and this decreases is statistically insignificant because the p-value of 0. 356 is greater than 0.05. A unit increase in Best by date decreased the innovation by 0. 378 and this increase is statistically insignificant because the p-value of .452 is greater than 0.05

Table 25: Service Excellence and Considering Shelf life

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.967	1.739		5.157	.001
	The expiration date	-.642	.290	-.386	-2.209	.035
	Best by date	-.667	.271	-.430	-2.461	.020
a. Dependent Variable: Service Excellence						

Let Y_3= Finance , X_1= The expiration date, X_2= Best by date.

$Y_3 = ß_0 + ß_1X_1 + ß_2X_2$.

$Y_3 = 8.967 - 0.642X_1 - 0.667\ X_2$.

Holding all factors constant, Service Excellence is increased by 8.967 and this value is statistically significant because the p-value of 0. 001 is less than 0.05. A unit increase in the expiration date decreases Service Excellence by 0. 642 and this decrease is statistically significant because the p-value of 0. 035 is less than 0.05. A unit increase in Best by date decreased the Service Excellence by 0. 667 and this decrease is statistically significant because the p-value of 0. 020 is less than 0.05.

Table 26: ANOVA Between Between Service Excellence And The Best By Date & The Expiration Date

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.519	2	1.759	3.996	.029[b]
	Residual	13.208	30	.440		
	Total	16.727	32			
a. Dependent Variable: Service Excellence						
b. Predictors: (Constant), Best by date, The expiration date						

Source: Primary data (2022).

The researcher also conducted the analysis of variance to determine the significance of the model. The model between Service Excellence and the best by date & the expiration date. The relationship found to be significant since the p-value was less than 0.05.

5.0 Discussions of the Findings

Objective One: The study sought to identify the strategies implemented for controlling food waste at Volcana Lounge Restaurant and Fatima Hotel for the years 2021-2022. According to the findings, both establishments utilized a variety of methods to manage food waste effectively. These methods ranged from prevention at the source and throughout the supply chain to recycling and reuse of food waste. One of the notable points was the attention to preventing methane gas emissions, which 48.5% of Volcana Lounge respondents and 63.6% of Fatima Hotel respondents found significant or very significant. This is indicative of a broader environmental consciousness beyond just the issue of food waste. Additionally, both establishments were keen on considering the shelf life of food products, thus ensuring minimal waste due to spoilage. They also focused on intelligent packaging methods that not only reduced food waste but also lowered environmental impacts and increased product attractiveness. Statistics revealed that for Volcana Lounge Restaurant, 48.5% found methane prevention to be very significant, contrasting slightly with Fatima Hotel where only 15.2% found it to be very significant. This information complements a study by Mohan, Deepak & Sharma (2017) that also emphasizes waste reduction at the source as a priority.

Objective Two: Revenue and its relationship with food waste was another primary focus of the study. Both establishments experienced significant impacts on their income due to food waste. Environmental degradation was another concern, and statistics showed that 45.5% of respondents from Volcana Lounge Restaurant and 66.7% from Fatima Hotel felt that unmanaged food waste had a large impact on environmental degradation. On the financial side, income from food and beverage outlets was found to be substantially affected by food waste. Specifically, 54.5% of respondents from Volcana Lounge Restaurant felt the impact to a large extent, while 66.7% of respondents from Fatima Hotel felt the same. This aligns with findings from research by Baldwin & Shakman (2012), which revealed that food waste has multiple financial implications including raw material costs, labor costs, energy costs, and disposal costs. The study therefore underscores the immediate necessity for effective food waste management strategies to minimize these impacts and maximize revenue.

Objective Three: The last objective concentrated on assessing the impacts of food waste management strategies on various key performance indicators, namely, Innovation, Finance, and Health and Safety. According to the findings, the impacts were generally significant in both establishments. For instance, in the area of innovation, 48.5% of respondents from Volcana Lounge and 42.4% from Fatima Hotel reported a large extent of impact. Financial impacts were also notable, with 48.5% from Volcana Lounge and 45.5% from Fatima Hotel observing a very large extent of impact. In the realm of health and safety, the results were somewhat mixed but still pointed towards a significant impact; 51.5% of respondents from Volcana Lounge found a moderate impact while 45.5% from Fatima Hotel observed a large extent of impact. These findings suggest that effective food waste management goes beyond merely reducing waste; it significantly

influences various aspects of business operations, reinforcing the need for comprehensive and well-planned strategies.

6.0 Conclusion

The study concludes that strategies for controlling food waste at Volcana Lounge Restaurant and Fatima Hotel are both diverse and multi-faceted, suggesting an overall heightened awareness of the importance of waste management. Notably, both establishments prioritize reducing food waste at the source, indicating a shift towards more sustainable operational practices. This is supported by the data showing the significance both establishments place on preventing methane emissions, highlighting an overarching environmental consciousness that extends beyond just the immediate issue of food waste. Additionally, intelligent packaging and shelf-life considerations also emerged as significant strategies, further pointing towards an integrated approach. The variations in the perceived importance of methane prevention between the two establishments could be indicative of different environmental priorities or possibly differing levels of public awareness and education among their clientele. It's clear that for these businesses, food waste management is not just a matter of corporate social responsibility, but also a crucial operational concern.

The study also concludes that there is a direct correlation between effective food waste management and revenue generation for both Volcana Lounge Restaurant and Fatima Hotel. An overwhelming majority of respondents from both establishments felt that poor waste management has severe financial and environmental repercussions. With nearly two-thirds of respondents from Fatima Hotel and over half from Volcana Lounge indicating a significant impact on income due to food waste, it becomes clear that financial sustainability is closely tied to environmental sustainability. Furthermore, the data strongly corroborates existing research suggesting that food waste is not merely an environmental issue but also has substantial financial implications including, but not limited to, raw material costs, labor costs, and disposal costs. These findings affirm that establishments must adopt effective waste management strategies not just for ethical or environmental reasons, but as a crucial measure for financial stability and success.

Moreover, the study concludes that the impacts of effective food waste management strategies are wide-ranging, affecting various key performance indicators like innovation, finance, and health and safety. In both establishments, respondents reported significant impacts, particularly in the areas of innovation and finance, confirming that food waste management is integral to broader business strategies. Interestingly, in the area of health and safety, the findings were slightly varied between the two establishments, suggesting that the implementation and outcomes of food waste strategies might differ based on specific operational needs or challenges. This highlights the need for customizable or adaptable strategies that can meet the unique needs of individual establishments. The overarching implication is that food waste management is not an isolated operational element but an integral part of overall business strategy, touching on everything from financial performance to employee well-being and innovation. Therefore, there is an immediate need for well-thought-out, comprehensive food waste management plans that are aligned with the broader objectives and key performance indicators of the business.

7.0 Recommendations

The study recommends that both Volcana Lounge Restaurant and Fatima Hotel further invest in research and technology for reducing food waste at the source, particularly focusing on the prevention of methane emissions. Given the varying levels of significance perceived by the establishments in the area of methane prevention, it may be beneficial to invest in educational programs for staff and patrons to increase awareness about the environmental impacts of food waste. Given the positive reception of intelligent packaging and shelf-life management, both establishments should consider partnerships with suppliers who can provide packaging solutions that extend the shelf-life of food items, thereby reducing waste. These partnerships could also explore the possibility of using eco-friendly materials in the packaging to reduce environmental impact further.

In addition, given the significant implications of food waste on revenue, the study recommends the implementation of more aggressive food waste tracking systems in both establishments. This data could then be used to refine purchasing practices, menu designs, and portion sizes, aiming for optimal resource use with minimal waste. A cost-benefit analysis may also be valuable in assessing the economic benefits of different food waste management strategies, allowing for more targeted and effective interventions. Furthermore, considering the environmental degradation indicated by the respondents, it would be prudent for both businesses to undertake periodic environmental audits to measure the real-world impacts of their waste and to adjust strategies accordingly. Initiatives to turn waste into revenue, such as composting organic waste for sale, should also be explored.

The study further recommends that to further encourage innovation, both establishments should consider establishing a dedicated team or committee responsible for continually assessing, implementing, and improving food waste management strategies. This committee could also be responsible for conducting regular training sessions for staff on best practices in food waste management, with an emphasis on its impact on key performance indicators like finance and health and safety. Since the data suggested that food waste management has differing impacts on health and safety in the two establishments, customized safety protocols should be developed based on the unique challenges and needs of each business. Finally, to evaluate the overall effectiveness and impact of these strategies, performance metrics should be identified and tracked. This will not only provide a quantitative basis for ongoing improvement but also can serve as a model for other businesses in the industry.

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