

Research Article

Assessing Factors for Food Waste Management Practice Among Budget Hotels in Cape Coast Metropolis

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Abstract

This study investigates the factors influencing food waste management practices among budget hotels in Cape Coast Metropolis, Ghana, with a particular focus on inventory management, food preservation, and reuse mechanisms. Food waste remains a significant global challenge with economic, environmental, and social implications, and hotels especially budget hotels are critical stakeholders in advancing sustainable practices within the hospitality sector. Despite its importance, little empirical research has explored food waste management in budget hotels in Ghana. This study therefore addresses the gap by systematically assessing strategies employed by budget hotels in Cape Coast to minimize food waste. A quantitative research approach was adopted, using a descriptive survey design. Data were collected from 96 management staff across 32 budget hotels selected through random and purposive sampling techniques. Structured questionnaires served as the main instrument for data collection, while the Statistical Package for Social Sciences (SPSS, version 28) was used for data analysis. Descriptive statistics and Relative Importance Index (RII) were applied to identify and rank the most significant practices. Findings revealed that regular stock audits and the First-In-First-Out (FIFO) method were the most effective inventory management strategies, ensuring proper rotation and use of food items. Preservation methods such as freezing and refrigeration were widely practiced and recognized for their role in extending the shelf life of perishable goods, though concerns about cost and access to advanced technologies were noted. Reuse mechanisms, particularly creative repurposing of leftovers into new dishes, also emerged as an effective practice, while food donation and recycling were less emphasized due to logistical challenges. The study concludes that while budget hotels in Cape Coast have adopted key food waste reduction measures, implementation remains uneven and constrained by limited resources and training gaps. It recommends continuous staff training, greater integration of technological solutions, and enhanced adoption of innovative preservation and reuse practices. These findings not only contribute to the academic discourse on sustainable hospitality management but also provide practical insights for hotel managers and policymakers seeking to reduce food waste and promote environmental sustainability in Ghana's hospitality industry.

Keywords

Food Waste Management, Budget Hotels, Inventory Management Practices, Food Preservation Techniques, Reuse Mechanisms, Hospitality Industry Sustainability, Waste Reduction Strategies

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Received: 13 September 2025; **Accepted:** 24 September 2025; **Published:** 18 October 2025



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1. Introduction

The hospitality industry plays a pivotal role in global socio-economic development, contributing significantly to employment creation, revenue generation, and cultural exchange. Within this sector, hotels serve as both economic drivers and facilitators of tourism, especially in emerging economies where tourism represents a substantial share of gross domestic product [23]. In Ghana, particularly in the Cape Coast Metropolis, hotels are essential to supporting the influx of domestic and international tourists, with budget hotels providing affordable accommodation options for students, business travelers, and leisure tourists [14, 22]. Despite their importance, these establishments face increasing operational challenges, among which food waste management is one of the most critical.

Food waste is a global sustainability challenge with significant economic, environmental, and social implications. The [6] estimates that nearly one-third of all food produced for human consumption is wasted each year. More recently, the [20] revealed that about 1.05 billion tons of food are wasted annually, with the hospitality and food service sectors being major contributors. Beyond financial losses, food waste contributes to greenhouse gas emissions, depletes natural resources, and raises ethical concerns regarding food insecurity [23]. In developing economies such as Ghana, where resource constraints are more pronounced, these implications are magnified.

Within hotels, food waste is often driven by a combination of factors, including inefficient inventory management, poor demand forecasting, improper food preservation, large portion sizes, and guest plate waste [11, 5]. Studies suggest that interventions such as the First-In-First-Out (FIFO) inventory system, freezing and refrigeration, portion control, and creative reuse of food significantly reduce waste [7, 13]. However, while research on food waste management in luxury and international hotel chains is expanding, there is limited empirical evidence focusing on budget hotels in sub-Saharan Africa. These establishments often operate under tighter margins and limited infrastructure, making food waste management both a financial necessity and an environmental imperative [14].

In Cape Coast, where tourism is deeply intertwined with cultural heritage and community livelihoods, effective food waste management has broader implications. Hotels that adopt sustainable practices not only reduce operational costs but also enhance their environmental reputation, meet consumer expectations for eco-friendly services, and contribute to Sustainable Development Goal 12.3, which aims to halve global food waste by 2030 [21]. Moreover, the growing demand for sustainable hospitality practices highlights the need for localized studies that consider the contextual realities of resource availability, staff training, and consumer behavior in budget hotels.

This study addresses this gap by assessing the factors in-

fluencing food waste management practices among budget hotels in Cape Coast Metropolis. It focuses on three key dimensions: inventory management, food preservation methods, and food reuse mechanisms. By examining these factors, the study provides insights into how budget hotels can adopt cost-effective strategies to minimize waste while maintaining service quality. The findings are expected to inform hotel managers, policymakers, and other stakeholders about practical approaches to reducing food waste, ultimately promoting sustainability and profitability in Ghana's hospitality sector.

2. Literature Review

2.1. Theoretical Frame Work

2.1.1. Food-Waste Hierarchy

The food-waste hierarchy places prevention (avoid over-production, better procurement, portion control) at the top, then redistribution/reuse (donation, upcycling), recycling (composting, animal feed, anaerobic digestion), and disposal last. It provides normative guidance for which interventions should be prioritized in hotels (e.g., inventory controls and menu design before disposal). This hierarchy shapes the dependent construct food-waste management practice used in this study.

2.1.2. Operations & Inventory Theory

Classic operations and inventory theories (EOQ concepts, inventory turnover, JIT, FIFO) explain how ordering policies, safety stock, and inventory rotation determine on-hand perishables and spoilage risk. In hotel kitchens, poor forecasting or inappropriate safety stock levels raise the probability of expiry and spoilage; conversely, good turnover and FIFO reduce waste. This study treats inventory variables (inventory turnover ratio, safety stock, order quantity, ordering cost, technological inventory aids) as key independent variables that influence food-waste outcomes.

2.1.3. Theory of Planned Behavior (TPB)

TPB proposes that behavioral intention (managers and kitchen staffs intention to engage in waste-reducing practices) is predicted by attitude, subjective norms, and perceived behavioral control. Applied to hospitality, TPB explains how staff training, managerial commitment, and perceived feasibility (e.g., resource/time constraints) affect the consistent adoption of inventory rules, preservation procedures, and reuse mechanisms. Thus, TPB supplies the behavioral mechanism linking managerial/organizational context to observed practices and measured waste.

2.1.4. Circular Economy & Reuse Pathways

The circular economy lens frames reuse and redistribution (creative reuse, donation, recycling into energy/compost) as pathways that convert food surplus into value, improving environmental performance and potentially revenue or reputational gains. Barriers regulatory, logistical, food-safety concerns moderate the success of redistribution. This lens motivates the study's focus on reuse mechanisms as a core pillar of food-waste management.

2.2. Conceptual Issues

2.2.1. Conceptualizing Food Waste in Hospitality

Food waste is broadly defined as any edible food intended for human consumption that is discarded, lost, or degraded at any stage of the food supply chain [6]. In hospitality, food waste can be categorized into three streams: pre-consumer waste (procurement, storage, preparation losses), service waste (overproduction, buffet surplus, portion sizes), and post-consumer waste (plate leftovers) [5]. Recent studies emphasize that hotels contribute significantly to urban food waste streams, with estimates indicating that food service and hospitality generate 20 to 30% of avoidable food waste globally [20]. Conceptually, food waste in hotels reflects both operational inefficiencies and behavioral outcomes of managers, staff, and guests.

2.2.2. Inventory Management as a Conceptual Lens

Inventory management refers to the systematic control of procurement, storage, and usage of food products to ensure availability while minimizing spoilage and loss [11]. Key conceptual dimensions include inventory turnover ratio, safety stock management, order quantities, and FIFO rotation. In hotels, poor forecasting and inefficient ordering increase the likelihood of overstocking and wastage, while precise turnover monitoring and JIT practices help align supply with demand [19]. There is strong evidence across contexts that better forecasting, regular audits, and inventory-turnover monitoring reduce over-ordering and spoilage. Technology (POS + inventory integration) amplifies gains but must be affordable and maintained.

2.2.3. Food Preservation Methods

Preservation is conceptualized as the application of techniques to extend shelf life, maintain nutritional value, and ensure food safety. Conventional methods include refrigeration, freezing, pickling, and packaging; recent innovations involve vacuum sealing, modified atmosphere packaging (MAP), and non-thermal technologies such as high-pressure processing [13, 10]. Preservation effectiveness is contingent on infrastructure (cold-chain reliability, energy stability) and organizational investment. For budget hotels in Ghana, refrigeration and freezing remain the dominant practices, though high costs and infrastructural constraints limit adop-

tion of advanced technologies. There is evidence that refrigeration/freezing remain the backbone of preservation in hotels; innovative non-thermal or advanced packaging methods can further reduce spoilage, but capital and operational constraints limit uptake in budget hotels.

2.2.4. Reuse and Circular Practices

Reuse is conceptually linked to the circular economy, which emphasizes retaining value in food through redistribution, creative reuse, or conversion into secondary products [1]. In hospitality, this includes re-purposing ingredients in new dishes, donating surplus food, or converting used cooking oil into biofuel. Preventive strategies (menu planning, portion control) are prioritized in the food-waste hierarchy, followed by reuse, recycling, and disposal [15]. When Prevention and redistribution are prioritized in the waste hierarchy; hotels can gain both reputational and operational benefits by integrating circular practices, but legal, logistic and food-safety hurdles require institutional or community partnerships.

2.2.5. Staff Training, Behavioral Norms, and Organizational Culture

Beyond operational systems, food-waste practices are shaped by human behavior. Drawing on the Theory of Planned Behavior (TPB), attitudes toward waste, perceived control (skills, resources), and social norms (managerial expectations, guest preferences) influence adoption of waste-minimization practices [18]. Conceptually, this highlights the need for training and awareness as mediators between technical interventions and actual outcomes.

2.2.6. Evidence from Developing Countries and Ghana

Empirical studies from Africa and other developing regions underline contextual constraints: intermittent power supplies, smaller kitchens with limited cold storage, variable guest flows, and limited capital for advanced preservation equipment. Case studies from Ghana and nearby countries indicate that many small/budget hotels rely on basic refrigeration/freezing and informal reuse (staff meals, ad-hoc donations), but systematic practices (formal inventory control, technology adoption, food donation partnerships) are less common. Your Cape Coast project corroborates this pattern: budget hotels in the metropolis report use of FIFO, regular audits and freezing/refrigeration as dominant techniques, but also gaps in formal reuse systems and staff training.

3. Methodology

This study adopted a descriptive cross-sectional survey design, which is appropriate for examining the prevalence of practices, perceptions, and associated factors at a single point in time [2]. The choice of design was influenced by the need to capture the inventory management, preservation, and reuse

practices of budget hotels in Cape Coast Metropolis, while also identifying relationships between these practices and overall food waste management effectiveness. Similar designs have been widely used in hospitality and food waste research [5, 11].

The research was conducted in the Cape Coast Metropolis, Ghana, a recognized tourism hub and cultural heritage city. The area was chosen because of its concentration of budget hotels that cater to diverse visitor groups, including tourists, students, and business travelers. Cape Coast hotels face unique challenges in food management due to fluctuating guest numbers, limited cold-storage infrastructure, and narrow profit margins, making them an ideal context for this study.

The study population comprised all registered budget hotels in Cape Coast Metropolis as listed by the Ghana Tourism Authority. From this population, a purposive sampling technique was applied to select hotels. A sample size of 120 respondents (hotel managers, supervisors, and kitchen staff) was determined using Yamane's (1967) simplified formula for finite populations, ensuring representativeness and efficiency.

Within each selected hotel, respondents were chosen using stratified random sampling to reflect the perspectives of both management and operational kitchen staff. This mixed sampling approach enhanced the reliability of responses by integrating both decision-making and implementation perspectives.

Primary data were collected through a structured questionnaire consisting of both closed- and open-ended items. The questionnaire was divided into four sections, namely: demographics of respondents and hotel characteristics, Inventory management practices (e.g., FIFO, stock audits, JIT ordering, use of technology), Food preservation methods (e.g., refrigeration, freezing, pickling, and packaging), Reuse/circular practices (e.g., creative reuse, donation, recycling).

4. Results and Discussion

4.1. Demographic Profile of Respondents

The findings revealed that females (57.3%) slightly outnumbered males (42.7%) among the respondents. This indicates that budget hotels in Cape Coast employ more women in management-related or supervisory positions compared to men. This pattern may be linked to the hospitality industry's traditional reliance on female labor, especially in roles associated with service, food handling, and guest relations. The higher female representation aligns with global trends in the hospitality sector, where women often dominate in frontline

and middle management roles, though they remain underrepresented in executive positions.

The results show that a majority of respondents (52.1%) fall within the 20 to 30 years age bracket, followed by 31 to 40 years (20.8%). A smaller proportion are under 20 (16.7%), while only 8.3% and 2.1% are in the 41 to 50 and 51+ age groups, respectively. This distribution reflects a relatively young workforce in Cape Coast's budget hotels. A youthful workforce can be advantageous as it implies energy, adaptability, and openness to training in areas such as food waste management. However, the limited presence of older staff may suggest challenges in retaining experienced personnel or in balancing youthful enthusiasm with seasoned expertise.

Regarding educational attainment, the majority of respondents hold Diploma/HND qualifications (44.8%), followed by SHS/JHS graduates (33.3%), Bachelor's degree holders (19.8%), and only 2.1% with a Master's degree. This indicates that most staff in budget hotels possess technical or vocational education, reflecting the practical skill requirements of the hospitality industry. However, the relatively low proportion of respondents with higher academic qualifications suggests potential gaps in advanced managerial or research-oriented expertise. This highlights the need for continuous professional development programs to bridge knowledge gaps, especially in modern food waste management practices.

The workforce was spread across different departments, with the kitchen staff (27.1%) forming the largest proportion. This was followed by maintenance (21.9%), marketing (19.8%), front office (12.5%), food and beverage (10.4%), and housekeeping (8.3%). The dominance of kitchen staff is significant given the focus of this study on food waste, as kitchens are the primary areas where food handling, preparation, and potential wastage occur. The involvement of marketing and maintenance staff also demonstrates that food waste management is not only a kitchen issue but a cross-departmental responsibility involving logistics, sales, and operations.

Findings on years of work experience indicate that half of the respondents (50.0%) had 4 to 5 years of experience, while 33.3% had worked for 1 to 3 years. Only 11.5% had 7 to 9 years, and 5.2% had more than 10 years of experience. This suggests that the workforce is relatively young not only in age but also in professional experience. The dominance of employees with less than five years of service could affect institutional memory and consistency in implementing long-term strategies, including food waste reduction measures. However, it also reflects dynamism and potential for innovation if staff are properly trained.

4.2. Inventory Management Practices

Table 1. Relative index analysis on inventory management.

Inventory management practice employed by hotels to minimize food waste.	1	2	3	4	5	Relative Index	Total Number of Respondents (N)	RII=		
								5*N	Total	Rank
									/5*N	
Regular stock audits are conducted in our hotel to manage inventory effectively to reduce food waste.	23	22	48	52	165	310	96	480	0.646	1
We follow the FIFO method for managing inventory.	11	46	87	88	55	287	96	480	0.598	2
Our hotel uses just-in-time ordering to minimize food waste.	18	30	75	108	55	286	96	480	0.596	3
Technological solutions have enhanced our inventory management practices to reduce waste.	22	24	72	96	70	284	96	480	0.592	4
Real-time inventory tracking is utilized in our hotel to reduce waste	32	24	42	108	55	261	96	480	0.544	5

Source of Data; Field Data, 2025

Relative Importance Index (RII) analysis revealed that regular stock audits (RII = 0.646) and FIFO (RII = 0.598) were the most widely adopted inventory practices, followed by Just-In-Time (JIT) ordering (RII = 0.596) use of technological solutions (RII = 0.592) and Safety stock management and ordering cost analysis were less consistently applied.

Chi-square tests indicated a significant relationship between inventory turnover ratio and food waste levels ($= 12.34$, $p < 0.05$). This suggests that hotels with higher turnover rates recorded lower spoilage levels.

The findings demonstrate that inventory management

practices are the strongest determinant of food waste reduction in budget hotels. This aligns with Liu et al. (2020), who reported that poor forecasting and over-purchasing were the leading causes of waste in restaurants and hotels. The emphasis on stock audits and FIFO in Cape Coast hotels resonates with [19] study in Poland, which found inventory rotation practices to be highly effective in curbing spoilage.

The limited focus on safety stock and order-cost optimization, however, suggests knowledge gaps. This indicates a need for training managers on advanced procurement models, as recommended by [7].

4.3. Food Preservation Methods

Table 2. Relative index analysis on Preservation analysis.

Utilization of food waste preservation method as mean to reduce food waste.	1	2	3	4	5	Relative Index	Total Number of Respondents (N)	RII=		
								5*N	Total	Rank
									/5*N	
Freezing is a common method used in your hotel to preserve food	16	18	57	102	125	324	96	480	0.675	1
The cost of food preservation method is a concern for our hotel	15	28	48	128	95	314	96	480	0.652	2

Utilization of food waste preservation method as mean to reduce food waste.	1	2	3	4	5	Relative Index	Total Number of Respondents (N)	RII=		
								5*N	Total	Rank
									/5*N	
salt preservation methods in our hotel are regularly used and updated	17	32	39	100	125	313	96	480	0.650	3
Refrigeration is effectively used in our hotel to preserve food and reduce waste	23	20	45	104	110	302	96	480	0.629	4
Chemical preservation equipment is used in our hotel to maintain food quality	20	20	66	96	100	302	96	480	0.629	5

Source of Data; Field Data, 2025

Among preservation strategies, freezing (RII = 0.675) and pickling (RII = 0.650) were ranked highest, while refrigeration (RII = 0.629) and chemical preservatives (RII = 0.629) were less frequently used. Respondents reported that high electricity costs and unreliable power supply were key barriers to more effective preservation.

Regression analysis confirmed that preservation methods were positively associated with food-waste management effectiveness ($= 0.42, p < 0.01$).

The prominence of freezing reflects global hospitality

practice, where cold-chain methods remain the backbone of preservation [13]. Yet, the reported barriers high electricity costs and unreliable power confirm challenges unique to budget hotels in developing economies. Similar findings were reported by [14] in Accra, where inadequate cold storage and high operational costs undermined preservation practices.

These results imply that technical solutions must be complemented by policy support (e.g., energy subsidies, renewable energy adoption) to improve preservation reliability in resource-constrained hotels.

4.4. Reuse and Circular Practices

Table 3. Relative Index Analysis on Reuse Mechanism.

Reuse mechanisms	1	2	3	4	5	Total	Total Number of Respondents (N)	RII=		
								5*N	Total	Rank
									/5*N	
Creative reuse of food	23	38	33	76	120	290	96	480	0.604	1
New dishes are created from leftover food to reduce waste	26	32	48	64	110	280	96	480	0.583	2
Recycle used cooking oil for biofuel	26	28	57	88	75	274	96	480	0.489	3
Excess food is donated to charities	21	58	33	112	35	259	96	480	0.478	4
Use leftover food as animal food	28	28	33	108	80	277	96	480	0.469	5

Source of Data; Field Data, 2025

Creative reuse of ingredients into new dishes (RII = 0.604) emerged as the most common reuse practice. However, formal food donation systems and recycling initiatives such as conversion of used cooking oil to biofuel were rare, largely due to regulatory and logistical constraints.

Regression results showed that reuse mechanisms were significant predictors of waste reduction ($= 0.38, p < 0.05$), although their overall contribution was smaller than that of preservation and inventory management.

The results show that while creative reuse is common,

formal donation and recycling pathways remain underdeveloped. This mirrors findings by [1], who highlighted regulatory and logistical hurdles that prevent hotels from donating surplus food. The lack of infrastructure for food redistribution in Cape Coast underscores the need for government and NGO partnerships to facilitate circular practices.

Moreover, adoption of reuse strategies also reflects behavioral dimensions. As [18] argue, staff attitudes and perceived behavioral control influence whether food is creatively repurposed or discarded. Thus, expanding training and fostering a waste-reduction culture could amplify the impact of reuse mechanisms.

The regression model explained 63% of the variance in food-waste management effectiveness ($R = 0.63$). Among the three predictor groups, inventory management ($\beta = 0.48$, $p < 0.001$) had the strongest influence, followed by preservation methods and reuse practices.

The findings reinforce the food-waste hierarchy [15, 17], where prevention (through inventory management) and preservation are prioritized, while reuse offers complementary but underexploited benefits. The regression model demonstrates that a holistic approach combining inventory control, preservation reliability, and reuse yields the greatest waste reductions.

5. Conclusions and Recommendations

This study assessed the factors influencing food waste management practices among budget hotels in the Cape Coast Metropolis, focusing on inventory management, food preservation methods, and reuse mechanisms. The findings confirm that food waste remains a critical operational and environmental challenge, but also reveal that budget hotels are actively engaging in a variety of waste-reduction practices.

Inventory management emerged as the strongest determinant of waste reduction. Regular stock audits, FIFO rotation, and the adoption of technological solutions such as real-time tracking were widely practiced and significantly associated with lower waste. However, advanced procurement approaches such as safety stock optimization and cost-based ordering remain underutilized.

Food preservation methods such as freezing and refrigeration were highly effective and commonly used, though barriers such as unreliable electricity supply and high energy costs constrained their full potential. Advanced preservation technologies (e.g., modified atmosphere packaging, vacuum sealing) are virtually absent from budget hotel operations [9].

Reuse mechanisms, particularly creative reuse of ingredients into new dishes, were practiced. However, structured systems for food donation, recycling, or biofuel conversion were rarely applied due to regulatory uncertainty and logistical limitations.

The study further highlighted that staff training and competence play a mediating role in the successful implementa-

tion of inventory, preservation, and reuse practices. Without adequate training, technical systems are less effective.

Hotels should institutionalize regular audits, expand FIFO use, and adopt forecasting tools to better align procurement with demand. Training staff in modern inventory techniques such as just-in-time ordering could further reduce spoilage [12, 8].

Hotels should prioritize energy-efficient refrigeration and freezing units, supported by renewable energy (e.g., solar backup) to counter unreliable power. Adoption of cost-effective packaging solutions could further extend shelf life [3].

Managers should formalize creative reuse strategies and explore safe donation partnerships with local NGOs, schools, and food banks, following guidelines to address food safety and liability concerns [4].

Enhance training and awareness: Continuous staff training on food safety, portion control, and waste tracking should be institutionalized. Integrating staff into decision-making processes can strengthen a waste-reduction culture [16].

Government agencies should provide incentives for investment in cold-chain technologies and renewable energy to reduce food spoilage.

Clear policies and liability protections should be introduced to encourage hotel community partnerships for redistributing surplus food [21].

Local governments can promote partnerships for waste-to-energy projects, such as converting used cooking oil into biofuel, thereby reducing landfill waste while creating new value streams.

Future studies should expand beyond Cape Coast to compare practices across Ghana and other West African countries.

Longitudinal research is recommended to examine how training, technology adoption, and regulatory changes influence food-waste reduction over time

Abbreviations

SPSS	Statistical Package for the Social Sciences
FIFO	First-In, First-Out
JIT	Just-In-Time
RII	Relative Importance Index
UNEP	United Nations Environment Programme
SDG	Sustainable Development Goal
GDP	Gross Domestic Product
NGO	Non-Governmental Organization
GTA	Ghana Tourism Authority
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Conceptualization SO, MH and MAB, methodology, SO,

MH and MAB; validation, SO; formal analysis, SO; investigation, SO, and MAB; resources, SO, MH and MAB; data curation, SO; writing original draft preparation, SO and MH; writing review and editing, SO, and MAB; visualization, SO, and MAB; supervision, SO and MH.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest. No funders had any role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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