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**A PILOT STUDY ON SUSTAINABLE FOOD
MANAGEMENT PRACTICES IN ISLAND HOTELS:
EXPLORING READINESS TOWARDS LOW-CARBON
OPERATIONS**

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Abstract:

Food management is a major contributor to carbon emissions and waste generation within the hospitality industry. Island hotels face additional operational challenges due to geographical isolation, heavy reliance on imported food supplies, and limited waste management infrastructure, which collectively intensify their environmental footprint. Although numerous hotel sustainability assessment tools exist, most are generic and do not adequately reflect the specific operational context of island-based hotels. Accordingly, this pilot study aims to develop and preliminarily test a sustainable food management instrument tailored to the island hotel context by assessing hotel managers' levels of awareness, understanding, and readiness to adopt low-carbon practices. A quantitative research design was employed using a structured questionnaire comprising 80 items across seven food management constructs. The pilot study involved food and beverage managers and kitchen supervisors from ten island hotels. Content validity and face validity were established through a systematic literature review and pilot field testing, while internal consistency reliability was assessed using Cronbach's Alpha. The results indicate high reliability across all constructs ($\alpha = 0.82-0.95$), with an overall alpha value of 0.92. Preliminary descriptive analysis further provides exploratory insights into variations in awareness and implementation levels of sustainable food management practices among island hotels. In conclusion, the pilot findings confirm that the developed instrument is clear, appropriate, and reliable for use in a full-scale study. This study contributes by providing a context-specific measurement tool that reflects the operational realities of island hotels and offers an empirical

foundation to support sustainable food management and the transition towards low-carbon hospitality operations in environmentally sensitive island destinations.

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Keyword:

Island Hotels, Low-Carbon Operations, Pilot Study, Readiness, Sustainable Food Management



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Introduction

The hospitality industry plays a pivotal role in supporting global tourism growth; however, it also contributes significantly to environmental degradation through food waste and carbon emissions (Filimonau & De Coteau, 2020; Gössling & Higham, 2021). Among various operational aspects, food management has been identified as one of the most resource-intensive processes, encompassing food purchasing, storage, preparation, and disposal (Papargyropoulou et al., 2014). Each stage of this food cycle is closely linked to the hotel's environmental footprint, particularly in relation to greenhouse gas (GHG) emissions, water use, and waste generation (Dhir et al., 2020). Consequently, sustainable food management has emerged as a critical area of concern in advancing environmental responsibility within the hospitality sector (Mihalic, 2024).

Island destinations present a particularly complex context for sustainable operations. Due to their geographical isolation and dependence on external supply chains, island hotels face greater challenges in sourcing food sustainably. Imported food products often require long-distance transportation, leading to higher carbon emissions and increased operational costs (Gössling & Higham, 2021). Additionally, limited waste management infrastructure on islands exacerbates food waste, which, when improperly handled, contributes to methane emissions and environmental pollution. These conditions underline the urgent need for tailored strategies that address the unique vulnerabilities of island-based hospitality operations (Mihalic, 2024).

Globally, the hospitality industry is increasingly realigning its operational practices with international sustainability frameworks such as the United Nations' Sustainable Development Goals (SDGs), particularly SDG 12, which emphasize responsible consumption and production. Within this context, hotels are encouraged to adopt low-carbon operational models that include sustainable food sourcing, waste reduction strategies, and energy-efficient cooking

and storage technologies. However, transitioning toward such practices is not solely a matter of technical adaptation; it requires systemic transformation involving managerial awareness, organizational readiness, cross-stakeholder collaboration, and supportive regulatory mechanisms (Jones et al., 2016).

Despite the growing scholarly attention to sustainability within the hospitality sector, empirical studies that assess hotels' readiness, especially those situated on islands to implement low-carbon food management practices, remain limited. Many hotels demonstrate awareness of sustainability principles, yet they often lack the structural capacity, financial resources, or supply-chain networks necessary to convert this awareness into consistent operational action. Consequently, the industry's progress toward carbon-reduction objectives remains fragmented and uneven across geographical and developmental contexts (Zaki, 2024).

This study, therefore, aims to bridge this gap by conducting a pilot investigation into the readiness of island hotels to implement sustainable food management practices as part of their transition towards low-carbon operations (Gössling & Peeters, 2015; Filimonau, 2020). By examining levels of awareness, current practices, and perceived challenges among hotel managers, this research provides foundational insights for the future development of a practical, scalable Sustainable Food Management Framework (Jones et al., 2020). Ultimately, the findings from this pilot study are expected to contribute to both academic understanding and policy formulation to promote sustainable, low-carbon hospitality operations, particularly in environmentally sensitive island destinations (Alreahi et al., 2022)

This pilot study contributes beyond instrument reliability by developing a sustainable food management measurement tool that focuses specifically on the operational food cycle in island hotels. Unlike existing green hotel or sustainability assessment tools that adopt a general hospitality perspective, this instrument incorporates context-specific constraints faced by island hotels, including logistical limitations, reliance on imported food supplies, and waste management challenges. Consistent with previous instrument development studies in low-carbon tourism, pilot studies play a crucial role in refining measurement items and establishing preliminary validity prior to large-scale implementation (Zasali et al., 2023).

Problem Statement

The hospitality industry has been identified as a major contributor to environmental degradation, particularly through food-related operations that generate significant carbon emissions, energy consumption, and waste (Gössling et al., 2018; Filimonau & De Coteau, 2020). Although sustainability has become an increasingly emphasized agenda in global tourism, the actual translation of sustainable food management practices into daily hotel operations remains inconsistent, especially in island destinations where dependency on imported food and logistical constraints elevate carbon footprints.

Previous studies highlight that while hotel managers generally express awareness of sustainability principles, real implementation is hindered by structural and institutional barriers. These include financial constraints, lack of certified sustainable suppliers, staff skill limitations, and weak policy enforcement (Sucheran, 2015). Moreover, many sustainability initiatives are fragmented, focusing on single actions such as plastic reduction without addressing full-chain carbon reduction across food systems (Filimonau & Todorova, 2020).

This reflects a critical gap between awareness and the operationalization of low- carbon food management.

Despite a growing body of literature on sustainable hospitality, empirical evidence on island hotels' readiness for low-carbon food management remains limited (Jones et al., 2014). Without understanding readiness levels, frameworks aimed at supporting carbon-reduction transitions risk being ineffective or unsustainable. Therefore, this study addresses this gap by conducting a pilot assessment to explore island hotels' readiness to adopt sustainable food management practices, providing foundational insights for developing a comprehensive, context-specific framework for measurable carbon reduction and advancing low-carbon transitions in the hospitality sector.

Objective

1. Assess the level of awareness and understanding of hotel managers towards the concept of sustainable food management.
2. Identify the level of implementation of low-carbon food practices in hotel operations in the island area.

Literature Review

Pilot Study

A pilot study is a small-scale preliminary investigation carried out to assess whether the planned methods, questions, and procedures function effectively before the main study begins. Recent literature highlights that a pilot study is not merely a smaller version of the full research project, but an essential phase for evaluating the quality, suitability, and practicality of the research design (Eldridge et al., 2016; Aschbrenner et al., 2022). Modern research also makes a clear distinction between pilot studies and feasibility studies. A feasibility study examines whether a study can be conducted and what resources or preparations are required, whereas a pilot study tests specific components of the future study in a real setting to see how they work.

Current research further shows that pilot studies help identify early issues such as timing challenges in data collection, unclear survey items, the appropriateness of instruments, or logistical obstacles. By addressing these issues before the full study begins, researchers can enhance data quality and avoid delays or errors, ultimately making the main study more robust and reliable. Although some people use the terms pilot study and feasibility study interchangeably, recent evidence shows that the two are distinct. According to Pearson et al. (2020) explain that a feasibility study evaluates whether a study can be carried out, while a pilot study tests parts of the actual study on a smaller scale. Table 1 summarises the key differences between a feasibility study and a pilot study.

Table 1: Feasibility Study and Pilot Study

Criteria	Feasibility Study	Pilot Study
Definition Pearson et al. (2020)	A feasibility study examines whether a project is achievable and identifies the best way to move forward.	A pilot study asks the same question as the main study, but it is carried out on a smaller scale first to test how the full study will

Criteria	Feasibility Study	Pilot Study
		work

Sources: Pearson et al. (2020)

The Concept of Sustainable Food Management

Sustainable food management refers to a systematic approach that emphasizes control across the entire food supply chain from production, transportation, storage, and preparation to disposal by considering environmental, economic, and social impacts (Filimonau & De Coteau, 2020). This concept promotes the use of local ingredients to reduce carbon emissions associated with long-distance transportation, minimizing food waste through efficient menu planning, and practicing ethical purchasing that considers the welfare of workers and suppliers. Within the hospitality industry, sustainable food management also enhances corporate image and customer satisfaction, as an increasing number of tourists now view sustainability as an essential factor in choosing accommodation. This study is grounded in sustainable food systems frameworks and supported by circular economy principles and the food waste hierarchy, which emphasize waste reduction, resource efficiency, and closed-loop food systems. These frameworks provide the theoretical basis for assessing low-carbon readiness in hospitality operations, particularly in environmentally sensitive island destinations.

Challenges in Island Areas

Hotels operating in island regions face several unique challenges, including high transportation costs, dependence on external suppliers, and limited infrastructure (Mensah, 2014; Wang et al., 2020). These constraints often complicate food logistics management and reduce the flexibility of hotels in implementing sustainable practices. Nevertheless, island locations also offer strategic opportunities to develop sustainable local supply networks, encourage menu creation based on locally sourced products, and promote green tourism focused on environmental sustainability. With the support of local communities and government policies that promote eco-friendly practices, island hotels have the potential to become effective models of low-carbon operations.

Methodology

Research Design

This study employs a quantitative research design to systematically assess sustainable food management practices and hotels' readiness for low-carbon operations. Data were collected using a structured questionnaire distributed via Google Forms to ensure efficient and standardized data collection. Before the main survey, a pilot test was conducted using the same Google Forms instrument to evaluate item clarity, reliability, and overall functionality. This approach allows the researcher to generate measurable insights and examine statistical relationships related to sustainable and low-carbon operational practices in island hotels (Creswell & Creswell, 2017).

Research Sample

The unit of analysis for this study is the hotel organization, while the main respondents include food and beverage managers, kitchen supervisors, or personnel directly involved in food purchasing and management. A purposive sampling technique was used to select 3- to 5-star

hotels operating in island destinations with in-house food services. For the pilot test, 10 hotels were selected to assess the clarity and reliability of the questionnaire instrument. In the main study, although the initial plan was to target approximately 30 to 60 hotels, the sample size was recalculated using the Krejcie & Morgan (1970) table, resulting in a recommended sample of 97 respondents to ensure representativeness and statistical robustness (Krejcie & Morgan, 1970). This larger sample size also helps to mitigate typical logistical challenges and access constraints associated with island-based hotels.

The inclusion of ten hotels is consistent with pilot study standards, which emphasize instrument testing, clarity, and feasibility rather than statistical generalizability. In this study, the hotel serves as the unit of analysis, while respondents consist of food and beverage managers and kitchen supervisors directly involved in food management operations. The pilot findings are therefore intended to inform instrument refinement prior to a full-scale study.

Data Collection

Data collection was conducted in two main stages. First, the questionnaire instrument was developed based on a review of previous literature and comprised four key constructs: (1) sustainable food sourcing, (2) food waste management, (3) ethical purchasing practices, and (4) readiness for low-carbon operations. A five-point Likert scale was employed to measure the degree of agreement with each statement. Second, the questionnaires were distributed via Google Forms and in person to hotel managers who agreed to participate. A pilot test was carried out in 10 hotels to assess item clarity, reliability, and the instrument's functionality. The collected data were then analysed statistically to identify patterns and relationships in the context of sustainable food management and low-carbon readiness in island hotels (Rassiah, Nasir, Subramaniam, & Saleeth, 2024). The food management questionnaire consists of 80 self-assessment items representing the 7 main elements of food management as presented in Table 2. The questionnaire consists of 80 items distributed across seven constructs, namely purchasing, preparation, storage, presentation, waste management, green communication action, and food service and safety. All items were measured using a five-point Likert scale.

Table 2: Construct and No. of Items

No.	Construct	No. of Items
1	Purchasing	18
2	Preparation	12
3	Storage	9
4	Presentation	10
5	Waste Management	13
6	Green Communication Action	11
7	Food Service and Safety	7
	Total	80

Data Analysis

Quantitative data were analysed using SPSS software to produce descriptive statistics such as frequencies, percentages, means, and standard deviations, to identify patterns of food management practices and levels of readiness for low-carbon operations. The internal reliability of the instrument was assessed using Cronbach's alpha coefficient, with values above

0.70 considered acceptable for social research. Correlation analysis (Pearson) was used to determine the relationship between sustainable food management practices and levels of readiness for low-carbon operations. Table 3 presents the acceptable reliability threshold, Cronbach Alpha (α), as supported by recent research (Nasrollah et al., 2025).

Table 3: Interpretation of Cronbach's Alpha Score

Cronbach's Alpha (α)	Reliability
≥ 0.90	Very good and effective
0.80 – 0.89	Good and acceptable
0.70 – 0.79	Acceptable
0.61 – 0.69	Item needs repair
≤ 0.60	Items need to be dropped

Sources: Nasrollah et al. (2025)

Validity, Reliability and Research Ethics

In this pilot study, instrument validity was assessed in terms of content validity and face validity. Content validity was established through systematic literature review and alignment with sustainable food management and low-carbon operation frameworks. Face validity was evaluated during pilot testing to assess item clarity, relevance, and contextual suitability. Internal consistency reliability was subsequently assessed using Cronbach's Alpha. Content validity was assessed using the Item Content Validity Index (I-CVI), which has been widely applied in hospitality and low-carbon tourism instrument development studies to evaluate item relevance and representativeness (Zasali et al., 2023).

The internal consistency of the questionnaire instrument was carefully assessed using Cronbach's alpha, a widely recognized measure of reliability, with α values above 0.70 considered acceptable for social science research (Sigüenza et al., 2024). This step was essential to ensure that all items within each construct measured the same underlying concept and that the instrument would yield stable, consistent results in the main study. Ethical considerations were strictly maintained: informed consent was obtained from all participants, participant confidentiality was safeguarded, and respondents were allowed to withdraw voluntarily at any point without any negative consequences. All collected data were securely managed and used solely for academic purposes, and ethical approval was granted.

Research Findings

The overall findings indicate that the instrument developed to assess sustainable food management practices demonstrates a high level of reliability and is suitable for use as a measurement tool in this study. The analysis of Cronbach's Alpha for each construct reveals strong internal consistency, where the constructs Purchasing ($\alpha=0.93$; 18 items), Preparation ($\alpha=0.95$; 12 items), and Food Service and Safety ($\alpha=0.90$; 7 items) fall within the excellent range. Meanwhile, the constructs Storage ($\alpha=0.87$; 9 items), Presentation ($\alpha=0.84$; 10 items), Waste Management ($\alpha=0.82$; 13 items), and Green Communication Action ($\alpha=0.83$; 11 items) demonstrate good reliability. The findings of this pilot study are consistent with earlier low-carbon tourism research, which highlights the importance of developing context-specific measurement instruments that reflect actual operational practices within hotel departments (Zasali et al., 2023).

Overall, the total of 80 items recorded a Cronbach's Alpha value of $\alpha=0.92$, indicating that the instrument possesses strong validity and reliability. In addition to reliability analysis, preliminary descriptive findings suggest that respondents demonstrated relatively higher awareness of food safety and waste management practices, while green communication actions and low-carbon initiatives showed comparatively weaker performance. These findings indicate areas requiring refinement prior to the full-scale study. These findings show that all items exhibit satisfactory internal consistency and can produce stable results across repeated measurements. Therefore, the instrument is deemed appropriate for use in the actual study to evaluate sustainable food management practices in island hotel settings. Detailed reliability values for each construct can be referred to in Table 4.

Table 4: Cronbach's Alpha Value of Instrument by Construct

No.	Construct	Cronbach's Alpha Value	No. of Items	Strengths
1	Purchasing	0.93	18	Excellent
2	Preparation	0.95	12	Excellent
3	Storage	0.87	9	Good
4	Presentation	0.84	10	Good
5	Waste Management	0.82	13	Good
6	Green Communication Action	0.83	11	Good
7	Food Service and Safety	0.90	7	Excellent
Total		0.92	80	Good

Implication

The high reliability of the pilot-tested questionnaire indicates that it can be confidently used as a valid tool to assess sustainable food management practices in island hotels. For hotel practitioners, this implies that the instrument can guide the evaluation of current operational practices, identify areas requiring improvement, and support the implementation of strategies to enhance efficiency, reduce food waste, and promote sustainability.

For researchers, the validated questionnaire provides a strong foundation for future studies, allowing for consistent and reliable data collection across similar hotel settings. The findings also highlight the importance of piloting instruments to ensure clarity, relevance, and feasibility, particularly when dealing with operationally complex and resource-limited environments such as island hotels. This ensures that subsequent research or policy recommendations are evidence-based and practically applicable.

Conclusion

In conclusion, the pilot study conducted on the instrument measuring sustainable food management practices in island hotels has demonstrated that the questionnaire developed is appropriate, reliable, and suitable for use in the actual study. The reliability analysis showed high Cronbach's Alpha values across all constructs, indicating strong internal consistency, and confirming that the instrument is capable of accurately measuring the intended concepts. Improvements made based on the pilot findings have further enhanced the clarity, relevance,

and suitability of the items, particularly within the unique operational context of island hotels, which often face distinct logistical and resource-related challenges.

Furthermore, the pilot study has enabled the researcher to gain a deeper understanding of fieldwork requirements, including respondents' readiness, comprehension of items, and potential constraints during data collection. Feedback from respondents contributed to the refinement of item structure and sequencing, thereby strengthening the overall quality of the instrument. Overall, the pilot study has provided a strong foundation for implementing the full-scale research in a more organised, efficient, and seamless manner. It is hoped that the improved instrument will generate accurate, meaningful, and impactful findings in assessing sustainable food management practices within island hotel operations.

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Author Contribution Statement: Nor Kalsum Mohd Isa: Study conception, study design, project supervision, and article revision. Nur Alyasyahira Azli Syam: Data collection, data measurements, ethical approval, and article writing, data measurement.

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