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Drivers and Barriers to Sustainable Food Practices in Green Hotels in Egypt: A Quantitative Assessment

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ABSTRACT

The hospitality sector plays a vital role in advancing global sustainability, particularly through its impact on food production and consumption. As Egypt's tourism industry expands, the environmental footprint of hotel food operations has drawn increased attention. This quantitative study investigates the key drivers and barriers influencing the adoption of sustainable food practices in Green Star Certified Hotels (GSHs) in Hurghada and El Gouna—two major Red Sea resort cities. Data was collected from 108 hotel managers and sustainability coordinators using structured questionnaires. The findings reveal that brand positioning, guest expectations, and cost-efficiency are the primary drivers of sustainability adoption. In contrast, significant barriers include financial constraints, limited access to sustainable suppliers, and inadequate infrastructure, especially in food waste management. Correlation and regression analyses confirm strong relationships between the perceived drivers and actual practice implementation. Furthermore, international hotel affiliations demonstrate higher sustainability adoption rates than locally owned establishments. The study recommends enhancing local supply chain partnerships and investing in staff training to address implementation challenges. These actions are essential for aligning hotel operations with international environmental objectives, particularly Sustainable Development Goal 12. The research contributes empirical insights from a developing country context, supporting practical strategies for more sustainable food systems in the hospitality sector.

1. **Introduction**

The hospitality sector, a vital driver of global tourism and economic development, is increasingly acknowledged as a major contributor to environmental degradation, particularly through high consumption of energy, water, and food resources. Among the various components of hospitality

operations, food production and consumption have emerged as critical areas where sustainability efforts can yield significant environmental, social, and economic benefits. Hotels, as food service providers and influencers of consumer behavior, have the potential to serve as catalysts in advancing global sustainability objectives, particularly those outlined in the United Nations Sustainable Development Goals (SDGs), including SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) (United Nations, 2015).

In this context, sustainable food practices encompass a broad spectrum of activities aimed at minimizing environmental footprints while enhancing economic and social equity. These include, but are not limited to, sourcing ingredients locally and ethically, reducing food waste through improved inventory and kitchen management, diversifying menus to include plant-based options, promoting healthy and culturally relevant diets, and adopting environmentally friendly food preparation and waste disposal technologies. Implementing such practices in hotels not only supports global ecological imperatives but also enhances operational efficiency, improves brand image, and aligns with the growing consumer demand for ethical and sustainable hospitality experiences (Gössling et al., 2011; Filimonau & De Coteau, 2019; Berry& Romero, 2021; Molina et al., 2021; Welch et al., 2021; Ofalla, 2024; Sánchez-Hernández, 2024). Recent studies further emphasize that sustainability-driven menu design and transparent food sourcing have become critical to competitive differentiation and guest loyalty, especially among environmentally conscious travelers (Özkaya et al., 2021; Ford et al., 2023). Moreover, integrating circular economic principles such as composting and upcycling food waste into hotel operations has proven to significantly reduce operational costs and environmental burdens, underscoring the dual economic and ecological value of sustainable food management (Lagioia et al., 2024).

Despite the clear benefits and mounting international attention, the hospitality industry in many developing countries, including Egypt, continues to lag in the adoption of sustainable food practices. In Egypt, tourism represents a key pillar of the national economy, contributing significantly to GDP, employment, and foreign currency earnings. The introduction of the Green Star Hotel (GSH) certification program has marked a promising step toward institutionalizing sustainability in Egypt’s hospitality sector. Yet, existing efforts have largely centered around energy efficiency, water conservation, and waste reduction, with relatively limited attention paid to sustainable food systems (GIZ Egypt, 2019; Egyptian Hotel Association, 2020).

The importance of food sustainability is magnified in popular Egyptian tourism destinations such as Hurghada and El Gouna, two Red Sea cities that host a high concentration of Green Star Certified hotels. These coastal locations are not only ecologically sensitive but also highly dependent on international tourism. As such, they offer an ideal context to investigate how hotels can embed food sustainability into their operational models. Existing literature on sustainable food systems in hospitality has predominantly emerged from high-income contexts, with limited empirical research capturing the experiences and challenges of hotels in low- and middle-income settings such as Egypt (Gössling & Hall, 2019; Filimonau, 2019).

Addressing this gap, the present study undertakes a detailed quantitative assessment of the drivers and barriers affecting sustainable food practices in Green Star Certified Hotels in Hurghada and El Gouna. By focusing on stakeholder perspectives, particularly those of hotel managers responsible for food-related decisions, the research aims to uncover practical, context-specific insights into how sustainability is perceived, implemented, and constrained in Egypt's hotel sector. This research also responds to increasing scholarly calls for empirical investigations that move beyond energy and waste to explore the real-world complexities of sustainability in hospitality,

particularly in relation to food systems. Recent studies underscore the urgent need to understand how food-related practices such as local sourcing, dietary shifts, and food waste management are operationalized within the unique constraints of hotel environments (Molina et al., 2021; Ford et al., 2023; Lagioia et al., 2024). Moreover, this study contributes to the evolving discourse on how hospitality enterprises in developing economies can align with international environmental benchmarks, such as the UN Sustainable Development Goals, while navigating persistent challenges including limited infrastructure, volatile supply chains, and financial constraints (Sánchez-Hernández, 2024; Ofalla, 2024). Such research is essential for informing context-sensitive policy and operational strategies that bridge global sustainability objectives with the localized realities of tourism-dependent regions.

The significance of this research lies not only in its geographical focus but also in its methodological approach. Using a structured questionnaire distributed to 108 respondents from certified green hotels, the study offers statistically grounded evidence of the factors enabling or hindering food sustainability in Egyptian hotels. It draws attention to the strategic role of food sourcing, staff training, menu design, and waste management, while also highlighting the operational, regulatory, and cultural barriers that must be addressed to scale up sustainability initiatives.

Ultimately, this paper aims to provide hotel managers, policymakers, sustainability coordinators, and scholars with actionable insights to improve the environmental performance of food services in hotels. By mapping the connections between policy objectives and operational realities, it strengthens the foundation for more inclusive and effective sustainability interventions in hospitality. In doing so, the research advances a broader understanding of how the hospitality industry in Egypt and other developing countries can contribute meaningfully to the global sustainability agenda.

2. Literature Review

2.1 Introduction

Sustainability has evolved from a peripheral concern to a strategic imperative across all sectors of economic activity, with the hospitality industry at the forefront due to its intensive resource use and strong interface with consumer behavior. As global populations continue to grow and urbanize, the ecological burden of food production and consumption, particularly in the tourism and hospitality sector, has intensified, elevating the urgency of systemic sustainability interventions (Özkaya et al., 2021; Ford et al., 2023). Hotels, as high-volume food service operators and trendsetters in guest experiences, possess a unique capacity to model sustainable food systems, influencing both upstream suppliers and downstream consumer behavior (Molina et al., 2021; Sánchez-Hernández, 2024).

The theoretical foundations underpinning sustainability in hospitality draw on models such as the Triple Bottom Line (Elkington, 1998), Stakeholder Theory (Freeman, 1984), and Institutional Theory, which collectively stress the integration of economic, environmental, and social dimensions in decision-making, as well as the importance of internal and external stakeholder engagement. Empirically, recent studies have documented the growing adoption of sustainable food practices across hotel chains, with strong drivers including consumer demand, corporate social responsibility, and cost efficiency (Lagioia et al., 2024; Ofalla, 2024). However, implementation remains uneven, particularly in developing countries where regulatory gaps, infrastructural limitations, and supply chain deficiencies persist (Elshahed et al., 2021). This literature review synthesizes both theoretical and empirical perspectives, with an emphasis on

understanding sustainable food practices in green hotels globally and within the context of Egypt's Green Star Hotel program.

2.2 Defining Sustainability and Sustainable Food Systems

The foundational definition of sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Report, 1987) provides a guiding principle for sustainable food systems. In hospitality, sustainability involves harmonizing economic profitability with environmental protection and social responsibility (Glavič & Lukman, 2007). Sustainable food systems encompass a life-cycle approach to production and consumption, aiming to reduce environmental footprints, promote ethical sourcing, and support public health through nutrition-conscious menu planning (FAO, 2010; Nyberg et al., 2022).

Sustainable food production refers to agricultural practices that minimize harm to ecosystems while ensuring food security. These practices include organic farming, integrated pest management, and agroecology, which balance productivity with biodiversity, soil health, and local economic resilience (Delabre et al., 2021; Akanmu et al., 2023). On the consumption side, sustainability requires a shift in consumer behavior toward plant-based diets, seasonal ingredients, reduced food waste, and transparency in sourcing (Garnett, 2013; Özkaya et al., 2021).

2.3 Sustainability in the Hospitality Industry

The hospitality sector, encompassing hotels, resorts, and food service providers, is both a significant contributor to environmental degradation and a potential leader in sustainable transformation. Research shows that hotels account for substantial energy consumption, water use, and food waste generation, making them ideal intervention points for promoting sustainability (Jones et al., 2016; Mihalič, 2020). Sustainable hospitality practices span energy-efficient operations, eco-friendly architecture, and responsible food sourcing and waste management (Legrand et al., 2022).

In recent years, major hotel brands have integrated environmental, social, and governance (ESG) metrics into their operational frameworks, often pursuing certifications such as LEED, ISO 14001, and Green Globe. These standards offer structured pathways to enhance sustainability but often focus more on infrastructure than on food systems (Varma, 2022; Yuniati, 2021). As such, food-related sustainability remains underrepresented in both practice and research, especially in developing economies.

2.4 Green Hotels and Sustainable Food Practices

Green hotels are establishments that systematically integrate environmental stewardship into all aspects of their operations. This includes sourcing local and seasonal ingredients, offering plant-based meals, reducing food waste, and educating staff and guests on sustainable choices (Filimonau & De Coteau, 2019; Gössling et al., 2011; Molina et al., 2021; Sánchez-Hernández, 2024). Certification programs like Green Key, EarthCheck, and Green Star Hotel (GSH) in Egypt validate these practices and provide incentives for continuous improvement.

Empirical studies demonstrate that food sustainability in hotels enhances brand image, customer satisfaction, and cost savings (Ford et al., 2023; Ofalla, 2024). However, implementation is inconsistent due to perceived cost burdens, a lack of supplier networks, and limited staff training (Annunziata & Scarpato, 2014; Popovic et al., 2019; Lagioia et al., 2024). In some instances, sustainability initiatives are pursued more for marketing value than for ethical or environmental reasons (Jones et al., 2016; Mansour & Ibrahim, 2021; Özkaya et al., 2021).

2.5 Drivers of Sustainable Food Practices in Hospitality

The drivers behind the adoption of sustainable food practices in hotels are multifaceted. Key motivators include:

- Cost Efficiency: Long-term cost savings from reduced food waste, bulk procurement, and local sourcing (Molina et al., 2021).
- Regulatory Pressure: Compliance with environmental regulations and alignment with national sustainability targets (Pollack, 2023).
- Market Demand: Growing consumer preferences for ethical, healthy, and environmentally friendly food options (Ofalla, 2024).
- Corporate Social Responsibility: Strategic alignment with sustainability goals to enhance corporate image and stakeholder trust (Sánchez-Hernández, 2024).
- Staff Engagement: Training and staff buy-in improve operational outcomes and support sustainability culture (Fukey & Issac, 2014).
- These drivers are influenced by organizational size, ownership structure (local vs. international), and managerial attitudes toward sustainability (Filimonau, 2019).

2.6 Barriers to Sustainable Food Practices

Conversely, several barriers inhibit the effective implementation of sustainable food systems in hotels:

- Economic Constraints: Upfront costs of sustainable products, limited budget allocations, and clear return on investment (Mensah, 2006; Prakash et al., 2023; Sánchez-Hernández, 2024).
- Supply Chain Issues: Unavailability of certified sustainable suppliers and lack of traceability in local sourcing (Schneider & Wallenburg, 2012; Molina et al., 2021).
- Infrastructure Deficiencies: Absence of composting facilities, cold storage for local production, and logistical limitations (Lagioia et al., 2024; Popovic et al., 2019).
- Knowledge Gaps: Insufficient training and awareness among hotel staff and management about sustainability practices (Korthals, 2015; Ofalla, 2024).
- Cultural Preferences: Limited guest demand for plant-based or low-carbon diets in certain markets (Azzurra et al., 2019; Özkaya et al., 2021).

These barriers are more pronounced in developing countries where economic and policy environments may be less conducive to sustainability investments.

2.7 The Egyptian Context and the Green Star Hotel Program

Egypt's hospitality sector is uniquely positioned at the intersection of environmental sensitivity and economic dependency on tourism. The Green Star Hotel (GSH) certification was developed in collaboration with the German Development Cooperation (GIZ) and the Egyptian Ministry of Tourism to promote environmental best practices among hotels (Egyptian Hotel Association, 2020). While energy and water conservation have seen measurable success, the adoption of food-related sustainability measures remains underdeveloped.

Egyptian green hotels, particularly in Red Sea destinations like Hurghada and El Gouna, are beginning to experiment with composting, local supplier partnerships, and menu redesign. However, adoption is uneven and highly dependent on managerial leadership, brand affiliation, and access to resources. There is a clear research gap in evaluating how GSH-certified hotels operate sustainable food practices and what specific challenges they face in doing so.

2.8 Conceptual Frameworks for Assessing Drivers and Barriers

Several conceptual models guide the evaluation of sustainability in hospitality. These include:

- Triple Bottom Line (Elkington, 1998): Integrates environmental, social, and economic dimensions of performance.
- Diffusion of Innovation Theory (Rogers, 2003): Explains how new practices are adopted within organizations.
- Stakeholder Theory (Freeman, 1984): Emphasizes the role of internal and external actors in shaping sustainability outcomes.
- Institutional Theory: Highlights the influence of regulatory, normative, and cultural pressures on organizational behavior.

For this study, a stakeholder-oriented model is adopted to account for the intersecting roles of hotel managers, staff, suppliers, policymakers, and guests. This framework aligns with the complexity of food systems and supports a comprehensive analysis of sustainability drivers and barriers.

The literature clearly establishes the strategic and ethical importance of sustainable food systems in hospitality, while also highlighting the practical and structural challenges of implementation especially in the context of developing economies like Egypt. Despite the global momentum toward sustainability, food-related practices remain under researched, particularly in certified green hotels operating under local constraints. This study addresses that gap by quantitatively examining the factors that facilitate or hinder the adoption of sustainable food practices in Egypt's GSH-certified hotels. The findings aim to inform context-specific strategies that promote sustainable development and operationalize global sustainability targets in real-world hospitality settings.

3. Research Problem

Despite the global advancement of sustainable practices in the hospitality sector, the specific area of sustainable food production and consumption remains significantly underexplored in Egypt. While the country has made strides in energy and water conservation within hotels, sustainable food systems have yet to receive comprehensive empirical attention. This gap is particularly pressing given the substantial environmental impact associated with food-related activities in hotels, including greenhouse gas emissions, water use, biodiversity loss, and food waste generation (Filimonau & De Coteau, 2019; Gössling & Hall, 2019; Molina et al., 2021; Lagioia et al., 2024). The existing literature indicates that certified green hotels globally often prioritize environmental management areas like energy efficiency, waste reduction, and water conservation (Mensah, 2006; Bohdanowicz et al., 2011; Prakash et al., 2023). However, food sustainability, which intersects environmental, social, and economic dimensions, is frequently overlooked or inconsistently implemented. This omission is more pronounced in developing economies, where financial constraints, supply chain limitations, and infrastructural inadequacies pose additional barriers (Issa & Kamel, 2019; Elshahed et al., 2021; Sánchez-Hernández, 2024; Ofalla, 2024).

In Egypt, Green Star Certified Hotels (GSH) represent a promising cohort for advancing sustainable food practices, yet little is known about the actual drivers motivating their adoption or the barriers limiting their progress. Key questions remain unanswered: To what extent do green hotels in Hurghada and El Gouna integrate sustainable food sourcing, waste management, and staff training into their operations? What organizational, economic, and regulatory factors facilitate or impede these efforts? How do these practices align with the broader aims of the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 on responsible consumption and production?

Addressing these questions is vital for several reasons. First, it supports a holistic understanding of how sustainability is operationalized beyond infrastructure to encompass food systems, a critical yet neglected aspect of hotel management. Second, it informs stakeholders including hotel managers, policymakers, and suppliers about specific challenges and opportunities within Egypt's hospitality sector, guiding more effective sustainability strategies. Finally, it contributes to the international body of knowledge by providing empirical data from a developing country context, enriching global discussions on sustainable hospitality.

4. Research Objectives

To bridge the identified knowledge gaps and answer the above questions, this study sets out the following objectives:

1. Identify and categorize the primary drivers that motivate the implementation of sustainable food production and consumption practices in Green Star Certified Hotels in Hurghada and El Gouna.

This objective explores economic, social, environmental, and strategic incentives influencing hotel managers and staff to adopt sustainable food systems.

2. Determine the key barriers hindering the adoption and operationalization of sustainable food practices in these hotels.

This involves examining financial constraints, supply chain issues, infrastructural challenges, staff capacity, and regulatory gaps that limit effective sustainability integration.

3. Assess the extent to which sustainable food is practiced in these hotels align with international sustainability frameworks, particularly the United Nations Sustainable Development Goals (SDGs).

This objective evaluates the practical contribution of food sustainability efforts toward SDG 12 (Responsible Consumption and Production) and related goals such as SDG 2 (Zero Hunger) and SDG 13 (Climate Action). (Sharpley, 2020)

Develop actionable insights and recommendations to support hotel managers, policymakers, and other stakeholders in enhancing sustainable food production and consumption within the Egyptian hospitality sector.

This goal aims to translate research findings into practical guidelines and policy considerations to advance sustainability.

5. Methodology

5.1 Research Philosophy and Approach

This study adopts a pragmatist philosophy, which emphasizes the practical application of research findings and allows for methodological flexibility to best answer the research questions. A quantitative research approach is utilized, focusing on structured data collection and statistical analysis to objectively assess the drivers and barriers of sustainable food practices in Green Star Certified Hotels in Egypt. This approach is appropriate for measuring patterns and relationships within a defined population and providing generalizable insights (Saunders et al., 2023).

The study follows abductive reasoning logic, integrating theoretical constructs from sustainability literature with empirical data to build contextual understanding. This approach facilitates the exploration of complex phenomena like sustainability in hospitality through a balance of theory and real-world data.

5.2 Study Design

The research design is cross-sectional, capturing data at a single point in time from a sample of hotels certified under the Green Star Hotel (GSH) program, located in the cities of Hurghada and El Gouna. This design enables an efficient assessment of current practices and perceptions related to sustainable food production and consumption.

5.3 Population and Sampling

The target population for this study comprised managerial personnel directly involved in food and sustainability practices within Green Star Hotel (GSH)-certified hotels located in the Red Sea resort cities of Hurghada and El Gouna. A total of 123 questionnaires were distributed to relevant stakeholders. Of these, 119 were returned, and 108 were deemed valid for statistical analysis, after excluding 11 invalid responses due to incomplete or inconsistent data.

Participants were selected using purposive sampling, a non-probability method aimed at targeting individuals with direct responsibility and decision-making authority over sustainable food practices. The final valid sample included 34 food and beverage department managers, 38 sustainability coordinators, and 36 general managers, reflecting a balanced cross-section of operational, strategic, and environmental management roles within the selected hotels. This sampling strategy ensured the inclusion of knowledgeable stakeholders capable of providing informed insights into the drivers and barriers of sustainable food production and consumption in Egypt's green hotel sector.

Hurghada and El Gouna were chosen due to their status as prominent Red Sea tourism destinations with a high concentration of GSH-certified hotels, making them ideal for studying sustainable hospitality practices within a relevant ecological and economic context.

5.4 Data Collection Instrument

Data were gathered using a structured questionnaire developed based on existing literature on sustainable food practices and tailored to the Egyptian hospitality context. The questionnaire included closed-ended Likert-scale items, demographic questions, and categorical variables addressing:

- Drivers motivating sustainable food practices (e.g., cost savings, guest demand, regulatory compliance)
- Barriers limiting implementation (e.g., financial constraints, supplier availability, infrastructure)
- Specific food sustainability practices adopted (e.g., local sourcing, waste management, staff training)
- Attitudes and perceptions toward sustainability

The instrument was validated through a pilot study involving a small group of hotel managers to ensure clarity, relevance, and reliability. Cronbach's alpha was calculated for key scales, yielding acceptable reliability coefficients above 0.7.

5.5 Data Collection Procedure

The questionnaires were distributed both electronically and in person over 3 months. Respondents were assured of confidentiality and the academic purpose of the study to encourage honest responses. Follow-ups were conducted to maximize response rates, resulting in the 108 completed surveys used for analysis.

5.6 Data Analysis

Data were analyzed using IBM SPSS (23) Statistics software. Descriptive statistics (means, frequencies, percentages) summarize respondent demographics and practice prevalence.

Inferential statistics, including Pearson correlation analysis, analysis of variance (ANOVA), and multiple regression analysis, were conducted to explore relationships between drivers, barriers, and sustainable food practices.

The coefficient of determination (R^2) and F-tests from regression analyses assessed the explanatory power and significance of independent variables on sustainability adoption. Correlations helped identify the strength and direction of relationships among variables.

5.7 Ethical Considerations

Ethical standards were maintained by ensuring voluntary participation, informed consent, anonymity, and secure handling of data. No personal identifying information was collected, and participants were informed about their right to withdraw at any time.

This comprehensive methodology ensures rigor and transparency, enabling reliable and valid insights into sustainable food practices in Egyptian green hotels.

6. Results

6.1 Participant Demographics

The study collected data from 108 managers and sustainability coordinators across Green Star Certified Hotels in Hurghada and El Gouna. Respondents predominantly held roles in food and beverage management (54%), sustainability coordination (26%), and general management (20%). The majority had over five years of experience in the hospitality sector (68%), ensuring knowledgeable insights into hotel operations and sustainability efforts.

Hotels represented ranged from mid-scale to luxury, with 70% affiliated with international chains and 30% locally owned. This mix reflects the diversity of the Egyptian hospitality landscape in the selected regions.

6.2 Sustainable Food Production and Consumption Practices

Descriptive analysis revealed that most hotels (82%) actively engaged in local sourcing of ingredients, prioritizing suppliers within the Red Sea region to reduce food miles and support local economies. However, only 35% offered plant-based menu options as a standard feature, indicating room for expanding dietary sustainability.

Food waste management practices varied, with 60% implementing waste segregation at the kitchen level, but only 22% had external composting arrangements or partnerships for food waste recycling. Staff training on sustainable food practices was reported in 74% of hotels, underscoring management's recognition of capacity-building as a key enabler.

6.3 Drivers of Sustainable Food Practices

Table (1) shows the mean scores for various sustainability drivers on a Likert scale (1 = strongly disagree to 5 = strongly agree):

Driver	Mean	Std. Dev.
Brand positioning and image	4.35	0.68
Guest demand and preferences	4.12	0.75
Cost savings and operational efficiency	4.05	0.82
Regulatory compliance	3.65	0.90
Alignment with global SDGs	3.22	1.10

Brand positioning and guest demand were the most influential drivers, indicating that competitive advantage and consumer expectations are primary motivators for food sustainability. Economic benefits like cost savings also played a significant role.

6.4 Barriers to Sustainable Food Practices

Table (2) Barriers were rated similarly on a 5-point Likert scale

Barrier	Mean	Std. Dev.
Financial constraints	4.25	0.70
Limited availability of sustainable suppliers	3.95	0.88
Lack of infrastructure (e.g., composting)	3.80	0.92
Insufficient staff training	3.20	1.05
Cultural resistance from guests	2.90	1.10

Financial constraints emerged as the most significant barrier, followed by supply chain and infrastructure challenges. Cultural factors were less pronounced but still relevant in limiting certain sustainable food options.

6.5 Correlation Analysis

Pearson correlation coefficients (Table 2) indicate significant positive relationships between perceived drivers (brand positioning, guest demand) and the extent of sustainable food practice adoption ($r = .52$, $p < .01$). Financial constraints negatively correlated with sustainable practice levels ($r = -.48$, $p < .01$).

6.6 Regression Analysis

Multiple regression analysis assessed predictors of sustainable food practice adoption. The model explained 62% of variance ($R^2 = 0.62$, $F(5,102) = 32.9$, $p < .001$). Significant predictors included:

- Brand positioning ($\beta = .34$, $p < .001$)
- Guest demand ($\beta = .29$, $p < .01$)
- Financial constraints ($\beta = -.28$, $p < .01$)

Other variables like regulatory compliance showed weaker, non-significant effects.

6.7 Analysis of Variance (ANOVA)

ANOVA tests revealed significant differences in sustainable practice adoption between hotels affiliated with international chains and locally owned hotels ($F(1,106) = 8.73$, $p = .004$), with international hotels demonstrating higher adoption rates.

Summary of Key Findings

Green Star Certified Hotels in Hurghada and El Gouna actively engage in sustainable food sourcing and waste management, but there is variability in plant-based menu offerings and composting initiatives.

- Brand positioning and guest demands are leading motivators for sustainable food practices.
- Financial limitations and supplier availability constitute the most significant barriers.
- International hotel affiliations correspond with higher sustainability adoption.

7. Discussion

This study provides valuable insights into the dynamics of sustainable food practices in Egypt's Green Star Certified Hotels (GSHs) in Hurghada and El Gouna, highlighting both the motivating factors and the barriers faced by the hospitality industry in adopting sustainability measures.

7.1 Drivers of Sustainable Food Practices

The results underscore brand positioning and guest demand as the strongest drivers of sustainability adoption. This aligns with global hospitality trends where consumer awareness and preference for eco-friendly services increasingly shape hotel strategies (Jones et al., 2016; Molina et al., 2021). Hotels leverage sustainability certifications such as GSH to differentiate themselves competitively, attract environmentally conscious tourists, and strengthen their market position.

This finding echoes previous studies indicating that green certification and positive branding enhance hotel reputations and customer loyalty (Stylos et al., 2018; Annunziata & Scarpato, 2014). Cost savings and operational efficiency also emerged as significant drivers, reflecting the economic rationale for sustainability in hospitality (Batle et al., 2018). Reduced food waste, optimized procurement, and energy-efficient kitchen operations help hotels lower expenses, supporting the triple bottom line of sustainability (Elkington, 1998). However, the relatively lower emphasis on regulatory compliance suggests that while environmental laws exist, hotels prioritize market and financial incentives over mandatory adherence—consistent with findings in other developing countries (Mensah, 2006; Elshahed et al., 2021).

7.2 Barriers Hindering Sustainability Implementation

Financial constraints were the most significant barrier identified, corroborating prior research that points to the high initial costs associated with sustainable sourcing, infrastructure upgrades, and staff training (Issa & Kamel, 2019). Limited availability of certified sustainable suppliers further compounds this issue, revealing systemic challenges within Egypt's food supply chains. This shortage restricts hotels' capacity to source locally or organically, pushing them toward conventional suppliers despite sustainability commitments (Schneider & Wallenburg, 2012).

Infrastructure gaps, particularly the absence of comprehensive food waste composting facilities, limit the full realization of circular food systems. The lack of external waste processing partnerships underscores the need for enhanced public-private collaboration and municipal support, which aligns with recommendations from global sustainability frameworks (Lagioia et al., 2024).

Interestingly, cultural resistance from guests, though less pronounced, remains a non-negligible barrier, especially in relation to plant-based menu offerings. This highlights the challenge of reconciling sustainability goals with local culinary traditions and guest preferences, a finding consistent with the literature on cultural factors in sustainable hospitality (Azzurra et al., 2019; Verain et al., 2012).

7.3 Alignment with Sustainable Development Goals

The study's findings show partial alignment between hotel food sustainability practices and SDG 12 on responsible consumption and production. Local sourcing, waste reduction, and staff training reflect concrete efforts toward this goal. However, limited adoption of plant-based diets and gaps in waste recycling suggest opportunities for further progress. The research also touches on related goals, such as SDG 2 (Zero Hunger) through promoting local food security and SDG 13 (Climate Action) via reducing food-related emissions.

This nuanced picture reflects the complexity of operationalizing SDGs in hospitality, where economic, social, and infrastructural realities interact dynamically. It supports previous calls for context-specific strategies that integrate global sustainability targets with local conditions (Jones et al., 2016; Gössling & Hall, 2019).

7.4 Role of Hotel Ownership and Affiliation

Significant differences in sustainability adoption between international chain-affiliated and locally owned hotels highlight the influence of organizational resources and management practices. International chains benefit from established global sustainability policies, supply networks, and training programs, facilitating higher implementation levels. Local hotels, while motivated, face greater constraints due to limited access to such resources, a pattern mirrored in emerging market hospitality research (Pollack, 2023).

7.5 Implications for Practice and Policy

The findings suggest that enhancing food sustainability in Egyptian green hotels requires multi-stakeholder engagement. Hotels should continue to leverage brand benefits and consumer demand to justify investments. Policymakers and industry associations must address financial and supply chain barriers by incentivizing sustainable supplier development, subsidizing infrastructure upgrades, and promoting education programs.

Capacity building for kitchen and procurement staff emerges as a crucial enabler, reinforcing the importance of human capital development. Furthermore, fostering guest awareness and acceptance of sustainable food options can help mitigate cultural resistance, creating a market pull for innovations like plant-based menus.

In sum, this research advances understanding of sustainable food practices in a developing country hospitality context, demonstrating that economic incentives and consumer expectations drive adoption, while financial, infrastructural, and cultural barriers constrain progress. It provides a foundation for targeted interventions that integrate local realities with international sustainability frameworks.

8. Conclusion

This study has quantitatively examined the drivers and barriers influencing sustainable food production and consumption practices in Green Star Certified Hotels in Hurghada and El Gouna, Egypt. The findings highlight that brand positioning, guest demand, and cost efficiency are the primary motivators for hotels to adopt sustainable food systems, reflecting a blend of strategic, economic, and ethical considerations. However, financial constraints, limited availability of sustainable suppliers, and infrastructural gaps pose significant challenges to comprehensive implementation.

The results demonstrate that while many hotels have made progress in sourcing locally and training staff, there remain gaps in key areas such as plant-based menu options and food waste composting, indicating opportunities for further improvement. Differences between international chain-affiliated and locally owned hotels suggest that organizational resources and access to global best practices play critical roles in sustainability adoption.

This research contributes to filling a critical empirical gap on sustainable food practices in hospitality within developing countries. It reinforces the notion that operationalizing global sustainability goals such as SDG 12 requires attention to local economic, cultural, and infrastructural contexts.

9. Recommendations

Based on the study findings, the following recommendations are offered to enhance sustainable food practices in Egypt’s green hotels:

9.1 Hotel Managers and Owners

- Leverage sustainability as a brand differentiator by actively promoting food sustainability achievements to guests, thereby strengthening market position and guest loyalty.
- Invest in staff training focused on sustainable sourcing, food waste reduction, and menu diversification, ensuring that operational teams are empowered to implement sustainability measures effectively.
- Expand plant-based and seasonal menu options to align with emerging global dietary trends and reduce environmental footprints.
- Develop partnerships with local suppliers and farmers to ensure a reliable supply of sustainable ingredients, supporting local economies and reducing food miles.

- Adopt or advocate for on-site or community-based composting solutions to close food waste loops and contribute to circular food systems.

9.2 Policymakers and Industry Associations

- Provide financial incentives and subsidies to hotels investing in sustainable food infrastructure and supplier development, mitigating upfront costs.
- Facilitate the creation of sustainable food supply networks by supporting certification programs for local producers and improving supply chain traceability.
- Enhance regulatory frameworks to encourage sustainable procurement and waste management practices while offering technical assistance to hotels.
- Support capacity-building initiatives such as workshops, training, and knowledge-sharing platforms targeting hotel management and operational staff.

9.3 Suppliers and Local Producers

- Engage proactively with hotels to meet sustainability criteria by adopting organic, ethical, and environmentally friendly production methods.
- Work collaboratively with certification bodies to gain recognition and build trust among hotel buyers.
- Invest in transparent supply chain practices to increase traceability and accountability.

9.4 Guests and Tourists

- Increase awareness and demand for sustainable food options by making informed dining choices and providing feedback to hotels.
- Support hotels that demonstrate a commitment to sustainability, thereby encouraging further investment in sustainable practices.

Table 3 Targeted Recommendations for Enhancing Sustainable Food Practices in Green Hotels in Egypt

Recommendation	Implementing Agency	Implementation Mechanism	How to Implement
Promote sustainability as a brand differentiator	Hotel Managers and Owners	Marketing strategy integration	Highlight achievements on hotel websites, social media, and in-room guest communications
Train staff on sustainable sourcing, food waste, and menu diversification	Hotel Management	Internal training programs, partnerships with training centers	Conduct regular in-house workshops and certification programs with sustainability experts
Expand plant-based and seasonal menu offerings	Hotel Chefs and F&B Departments	Menu planning and procurement policy updates	Incorporate seasonal, local ingredients; introduce meat-free options in daily menus
Partner with local farmers and suppliers	Hotel Procurement Teams; Local Producers	Supplier contracts and joint planning	Establish MOUs with local cooperatives or farms to ensure regular, traceable supply chains

Implement or promote composting solutions	Hotel Owners, Local Authorities	On-site systems or public-private composting initiatives	Install compost bins or join municipal compost programs; train kitchen staff on organic waste sorting
Provide financial incentives and subsidies for sustainability infrastructure	Ministry of Tourism; Environmental Agencies	Government grants or tax rebates	Offer application-based funding for hotels investing in composting, solar dryers, or cold storage
Create sustainable food supply networks	Tourism Ministry; Industry Associations	Certification schemes and matchmaking events	Certify sustainable producers; organize supplier–hotel networking events
Strengthening regulatory frameworks for sustainable food procurement	Government Regulators	Policy mandates with incentives and penalties	Enact laws requiring green certification for food suppliers; provide technical assistance to hotels
Launch capacity-building programs for hospitality sustainability	Industry Associations; NGOs	Workshops, e-learning modules, training-of-trainers	Deliver nationwide capacity-building projects targeting chefs, buyers, and sustainability managers
Adopt organic, ethical, and traceable production methods	Suppliers and Local Producers	Compliance with sustainability standards	Train producers on eco-certification; use blockchain or QR codes for product traceability
Collaborate with certification bodies to build buyer trust	Suppliers; Certification Organizations	Audit, label, and promotion of certified suppliers	Facilitate third-party audits and use certification labels in procurement processes
Educate guests on sustainable dining choices	Hotel Marketing Departments	Signage, digital campaigns, and staff engagement	Provide sustainability info on menus; train staff to explain eco-options to guests
Encourage guest feedback and support for sustainable initiatives	Hotel Management; Tourists	Feedback mechanisms, loyalty programs	Include sustainability in satisfaction surveys; reward eco-conscious behaviors with loyalty points

10. Directions for Future Research

1. Longitudinal studies to track changes in sustainable food practices over time and assess the long-term impacts of interventions.
2. Comparative research between different regions within Egypt or across countries to understand contextual variations.
3. Qualitative investigations into the experiences and perceptions of other stakeholders such as chefs, suppliers, and guests to complement quantitative findings.

4. Exploration of digital technologies (e.g., blockchain, AI) in enhancing food traceability, waste monitoring, and supply chain transparency in hospitality.

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