Key Components of Eco-Friendly Hotel Management in Phuket Province

องค์ประกอบสำคัญของการจัดการโรงแรมที่เป็นมิตรต่อสิ่งแวดล้อมในจังหวัดภูเก็ต

Nongyao Prasomthong[1]*

Thannicha Singkala[1]

Chadmanee Prathoomthong[1]

Hotel Business Management Program, Faculty of Management Sciences,

Phuket Rajabhat University[1]

*e-mail: nongyao.j@pkru.ac.th

นงเยาว์ ประสมทอง[1]

ธัญณิชา สิงฆาพะ[1]

ฉัตรมณี ประทุมทอง[1]

สาขาวิชาการจัดการธุรกิจโรงแรม คณะวิทยาการจัดการ มหาวิทยาลัยราชภัฏภูเก็ต[1]

Received: *July 26, 2025,* ***Revised:*** *October 26, 2025,* ***Accepted:*** *November 4, 2025*

Abstract

The growth of the tourism and hotel industries has increased resource consumption and environmental impacts. Enhancing eco-friendly hotel management is therefore essential for driving sustainable tourism, particularly in Phuket, a world-class tourism destination. This study aims to identify the key components of eco-friendly hotel management in Phuket Province, Thailand. A quantitative research approach was employed, using a structured questionnaire developed based on the Green Hotel Standard and the Green Leaf Certification. The population consisted of 56 certified hotels in Phuket, from which 38 hotels participated in the study. The sample included 380 hotel employees representing various departments and managerial levels. The questionnaire utilized a 7-point Likert scale, and content validity was verified through the Index of Item-Objective Congruence (IOC). Data were analyzed using Exploratory Factor Analysis (EFA). The results revealed seven key components of eco-friendly hotel management: (1) campaign and environmental awareness promotion, (2) media, symbols, landscape, and green spaces, (3) spa and health massage, (4) energy management, (5) water management and wastewater treatment, (6) waste management based on the 3R principle, and (7) environmental management policy. These findings provide strategic guidelines for advancing environmental sustainability in the hotel sector, which contribute to the achievement of Sustainable Development Goals (SDGs), reduce ecological impact, and foster long-term sustainable tourism. The results also offer practical recommendations for hotel managers, policymakers, and tourism stakeholders aiming to enhance eco-friendly practices and environmental responsibility within the hospitality industry. Overall, this research emphasizes the importance of integrating sustainable practices into hotel operations to promote environmental conservation and sustainable tourism development in Phuket.

Keywords: Eco-friendly Hotels; Sustainable Hotel Management; Green Hotel Standard; Environmental Conservation; Sustainable Tourism

บทคัดย่อ

จากการเติบโตของอุตสาหกรรมการท่องเที่ยวและธุรกิจโรงแรมที่ส่งผลต่อการใช้ทรัพยากรและสิ่งแวดล้อม การยกระดับการจัดการโรงแรมให้เป็นมิตรต่อสิ่งแวดล้อมจึงเป็นแนวทางสำคัญในการขับเคลื่อนการท่องเที่ยวอย่างยั่งยืน โดยเฉพาะจังหวัดภูเก็ตซึ่งเป็นแหล่งท่องเที่ยวระดับโลก การวิจัยนี้มีวัตถุประสงค์เพื่อระบุองค์ประกอบสำคัญของการจัดการโรงแรมที่เป็นมิตรต่อสิ่งแวดล้อมในจังหวัดภูเก็ต โดยใช้ระเบียบวิธีวิจัยเชิงปริมาณ เครื่องมือวิจัยเป็นแบบสอบถามที่พัฒนาจากเกณฑ์มาตรฐานโรงแรมสีเขียว และโครงการใบไม้สีเขียว ประชากร คือ โรงแรมที่ได้รับการรับรองมาตรฐานสิ่งแวดล้อมในจังหวัดภูเก็ตจำนวน 56 แห่ง โดยมี 38 แห่ง เข้าร่วมการวิจัย และได้กลุ่มตัวอย่างเป็นพนักงานโรงแรมจำนวน 380 คน จากหลายแผนกและหลายระดับตำแหน่ง แบบสอบถามใช้มาตราส่วนประมาณค่าแบบไลเคิร์ท 7 ระดับ และตรวจสอบความตรงเชิงเนื้อหา ด้วยดัชนีความสอดคล้องระหว่างข้อคำถามกับวัตถุประสงค์ (IOC) วิเคราะห์ข้อมูลด้วยการวิเคราะห์องค์ประกอบเชิงสำรวจ ผลการวิจัย พบว่า การจัดการโรงแรมที่เป็นมิตรต่อสิ่งแวดล้อมประกอบด้วย 7 องค์ประกอบสำคัญ ได้แก่ (1) การรณรงค์และการส่งเสริมความตระหนักด้านสิ่งแวดล้อม (2) การจัดการสื่อ สัญลักษณ์ ภูมิทัศน์ และพื้นที่สีเขียว (3) การจัดการสปาและบริการนวดเพื่อสุขภาพ (4) การจัดการพลังงาน (5) การจัดการน้ำและการบำบัดน้ำเสีย (6) การจัดการขยะตามหลัก 3R และ (7) นโยบายการจัดการสิ่งแวดล้อม ผลการวิจัยสามารถใช้เป็นแนวทางเชิงกลยุทธ์เพื่อส่งเสริมความยั่งยืนด้านสิ่งแวดล้อมในธุรกิจโรงแรม สนับสนุนการบรรลุเป้าหมายการพัฒนาที่ยั่งยืน ลดผลกระทบต่อสิ่งแวดล้อม และส่งเสริมการท่องเที่ยวอย่างยั่งยืนในระยะยาว อีกทั้งยังสามารถเป็นแนวทางปฏิบัติสำหรับผู้จัดการโรงแรม หน่วยงานภาครัฐที่เกี่ยวข้อง และผู้มีส่วนได้ส่วนเสียในอุตสาหกรรมการท่องเที่ยวในการยกระดับมาตรฐานด้านความรับผิดชอบต่อสิ่งแวดล้อม

คำสำคัญ: โรงแรมที่เป็นมิตรต่อสิ่งแวดล้อม การจัดการโรงแรมอย่างยั่งยืน มาตรฐานโรงแรมสีเขียว การอนุรักษ์สิ่งแวดล้อม การท่องเที่ยวอย่างยั่งยืน

Introduction

Phuket is a province where tourism is an important economic driver contributing to employment generation, revenue growth, and local development. The rapid expansion of the tourism industry has led to an increasing number of hotels to accommodate the rising quantity of visitors. As of 2023, Phuket had approximately 1,532 licensed accommodation establishments operating under the Hotel Business Act B.E. 2547 (2004), with a total supply of 100,534 rooms, reflecting the province's continued expansion as one of Thailand's leading tourism destinations (C9 Hotelworks, 2024). While the hotel sector significantly supports economic development, it also consumes large quantities of natural resources and energy, causing environmental issues such as excessive water and energy usage, waste generation, and pollution. Without proper planning and effective management, these issues can result in severe environmental degradation and negative impacts on local communities. The swift and unregulated growth of the hotel industry has escalated environmental pressures. Hotels consume large amounts of energy and water and generate considerable waste and pollution which can lead to significant environmental degradation and negatively affect local ecosystems and communities. Issues such as overuse of natural resources, improper waste disposal, and greenhouse gas emissions from hotel operations are increasingly being recognized as critical sustainability challenges (Mbokazi, 2024).

Sustainable tourism has become a global concern, including economic, socio-cultural, and environmental sustainability, which poses a significant challenge especially in world-renowned tourist destinations such as Phuket. More travelers are seeking eco-friendly accommodations and are becoming more conscious of how their travel choices affect the environment. In response, many hotel businesses are adopting environmentally sustainable practices

to not only mitigate their ecological footprint but also to enhance their brand reputation and appeal to environmentally conscious consumers. The concept of eco-friendly hotel management in Thailand emerged in the late 1990s with the establishment of the Green Leaf Foundation, a collaboration between governmental and private sectors aimed at promoting environmental responsibility among hotels. This initiative aimed to create awareness and establish environmental standards for hotels. Over the years, government agencies such as the Ministry of Natural Resources and Environment and the Department of Environmental Quality Promotion have introduced various environmental criteria for businesses including green procurement policies and eco-labeling initiatives. To further improve environmental practices, many hotels in Thailand have adopted internationally recognized management frameworks such as the Plan-Do-Check-Act (PDCA) cycle and the ISO 14001 Environmental Management System, which provides a systematic approach for continuous improvement in environmental performance. The current version, ISO 14001:2015, with Amendment 1 (2024) addressing climate action, emphasizes the integration of environmental considerations into organizational strategy and operations, supporting hotels in achieving sustainability goals through structured planning, monitoring, and improvement (International Organization for Standardization, 2015/Amd 1:2024). In Phuket, a preliminary investigation indicates that most eco-conscious hotels follow either the Green Hotel Standard or the Green Leaf Standard. While previous studies have examined environmental sustainability and green hotel practices in various contexts, most have focused on general frameworks adoption levels, or the benefits of environmental initiatives rather than systematically identifying the structural components of eco-friendly hotel management (Huyen, Hong, & Thi, 2025; Tran, 2025; Zareh, Nassar, Barakat, & Ramzy, 2023). In Thailand, existing studies have explored topics such as green hotel operations, tourist satisfaction on eco-friendly hotels, and green marketing strategies, yet these works mainly emphasize perceptions, satisfaction, and promotional outcomes rather than the core managerial components that drive environmental sustainability in hotel operations (Chaiyakheta, & Chaiyakot, 2025; Jain, & Nuangjamnong, 2024; Kokkhangplu, Onlamai, Chokpreedapanich, & Phikul, 2023). Moreover, limited empirical research has been conducted within Phuket where certified hotels operate under different environmental standards (Fuchs, & Konar, 2025; Thongmun, Soonsan, & Thai, 2025; Saengchai, & Hasoontree, 2021). This lack of localized evidence highlights the necessity of in-depth investigation into the key components that define environmental sustainability in hotel operations in this area.

The increasing environmental challenges faced by tourist destinations such as Phuket emphasize the urgent need for comprehensive understanding of how hotels manage sustainability practices effectively. While numerous eco-certification programs and environmental standards exist, actual implementation across hotels is often inconsistent, with many establishments lacking clear guidance on essential components for successful environmental management (Kusa, Suder, & Duda, 2023). This inconsistency can lead to fragmented sustainability efforts that fail to achieve measurable environmental benefits. Phuket's unique socio-economic and ecological characteristics, including high visitor numbers, seasonal tourism flux, and sensitive coastal ecosystems, require a localized approach to sustainability rather than a generic global model (UNDP, 2023). Customizing environmental management to fit these conditions is essential to harmonize tourism development with the protection of natural resources. This study addresses an important gap by systematically identifying and analyzing key components of eco-friendly hotel management in Phuket. The findings will provide empirical evidence to inform hotel operators, policymakers, and certifying bodies, facilitating the development of targeted strategies that enhance environmental performance. Consequently, the research contributes to the conservation of Phuket's natural resources, supports community well-

being, and strengthens the resilience and competitiveness of the local tourism industry amid growing environmental concerns.

Despite the increasing adoption of green hotel certifications such as the Green Leaf Certification and the Green Hotel Standard in Thailand, empirical research focusing on certified hotels in Phuket remains scarce. Existing literature primarily highlights initiatives at the policy level and general environmental guidelines but provides limited evidence on how these standards are operationalized in hotels. There is still a lack of comprehensive analysis examining whether hotels that have obtained eco-certification successfully integrate all essential sustainability components, including energy, water, waste, and environmental awareness management, into their daily operations. Moreover, only a few studies have examined the effectiveness and consistency of implementation across certified hotels in Phuket. As Phuket is a leading tourism destination with high environmental sensitivity, a localized study is important to fill this knowledge gap and provide practical awareness for improving eco-friendly hotel management practices.

Research Objectives

1. To examine the key components of environmental sustainability management in hotel businesses in Phuket.

2.To provide policy recommendations for the effective implementation of eco-friendly service standards in the hotel industry in Phuket.

Literature Review

Concept of Eco-Friendly Hotels

Eco-friendly hotels, which are often referred to as green or sustainable hotels, are accommodations that adopt environmentally responsible practices throughout their operations to reduce negative impacts on the environment. (Makoondlall-Chadee, & Bokhoree, 2024). The concept emerged globally in response to rising environmental concerns and the growing consumer demand for responsible tourism options. Hotels following this concept aim to balance guest satisfaction with resource efficiency, community engagement, and environmental stewardship. Eco-friendly hospitality is rooted in the broader framework of sustainable tourism which emphasizes the triple bottom line: environmental protection, social equity, and economic viability (Aransyah, Hermanto, Muftiadi, & Oktadiana, 2025). In Thailand, the eco-hotel movement began in the late 1990s, catalyzed by partnerships between governmental and private sectors, such as the establishment of the Green Leaf Foundation, which promotes environmental awareness and responsibility within the hospitality industry (Green Leaf Foundation, 2020). The foundation of eco-friendly hotels lies in the green management philosophy**,** which integrates environmental considerations into the strategic and operational levels of hospitality management. This includes the implementation of energy-saving technologies, water conservation systems, waste reduction programs, use of biodegradable or locally sourced products, and guest education initiatives. Antonova, Mendoza-Jiménez, & Ruiz-Rosa (2023) identified several core characteristics of eco-friendly hotels: minimizing environmental footprints through efficient use of natural resources, applying environmental management systems (EMS) such as ISO 14001, engaging in continuous monitoring, evaluation, and improvement of environmental performance, promoting environmental awareness among staff and guests. Furthermore, eco-friendly hotels are not solely driven by ethical or regulatory motivations. There is also growing recognition of the economic and competitive benefits of adopting green practices such as cost savings from reduced utility consumption, enhanced brand reputation, and increased appeal to environmentally conscious travelers (Yeh, Guan, Chiang, Ho, & Huan 2021).

The adoption of eco-friendly hotel practices in Thailand has been facilitated by both government initiatives and private sector involvement. Programs such as the Green Leaf Foundation and Green Hotel Standard provide guidelines and recognition for hotels that meet specific environmental performance criteria. These standards offer a structured pathway for hotels to assess and improve their environmental sustainability and have become important tools for differentiating environmentally responsible properties in a competitive market. Although there are guidelines and standards, the adoption of eco-friendly practices varies widely depending on factors such as organizational commitment, staff training, access to resources, and guest expectations (Barakagira, & Paap, 2024; Makoondlall-Chadee, & Bokhoree, 2024). As such, understanding the concept of eco-friendly hotels also requires an examination of the operational, managerial, and contextual factors that influence their implementation and success.

Environmental Management in the Hotel Industry

Environmental management in the hotel industry refers to the integration of environmental considerations into planning, decision-making, operations, and service delivery to minimize negative environmental impacts while enhancing sustainability (Leyva & Parra, 2021). Hotels are business that consume large amounts of water, energy, and materials, they are key stakeholders in the movement toward sustainable tourism. A framework for implementing environmental management systems (EMS) in the hotel industry is the Plan-Do-Check-Act (PDCA) model which enables hotels to establish environmental goals, implement eco-friendly practices, monitor progress, and make improvements over time (Rajić, Maksimović, & Milosavljević, 2022). One of the most internationally recognized EMSs is ISO 14001, which provides guidelines for setting up an effective environmental management framework, ensuring compliance with environmental laws and continuous improvement (International Organization for Standardization, 2015/Amd 1:2024).

Several studies emphasize the positive outcomes of adopting EMS in hotels including reduced energy and water consumption, improved waste management, and enhanced corporate image. For instance, Valett, Bollenbach, & Keller (2024) proposed a guest-centric optimization model for sustainable hotel operations by highlighting that integrating energy management systems within hotel operations can significantly enhance energy efficiency, reduce carbon emissions, and align with sustainability goals. Moreover, Baxter, & Srisaeng (2021) have assessed the application of the ISO 14001 Environmental Management System in hotels and resorts. Their findings indicated that adopting EMS contributes to improved operational efficiency, reduced energy and water consumption, enhanced waste management, and strengthened corporate image. Also, Kamruzzaman (2020) examined the barriers to implementing Environmental Management Systems (EMS) in small- and medium-sized hotels. The study identified major challenges including high implementation and maintenance costs, lack of knowledge and skills among staff, insufficient motivation, ambiguity of EMS standards, and inconsistent institutional support. The findings revealed that financial constraints and limited awareness were the most critical barriers, leading to low adoption rates of EMS among smaller hotels. Together, these studies provide a strong foundation for understanding both the barriers and benefits of EMS implementation in hotels. They support the present study's aim to identify the key components of environmental sustainability management in hotels in Phuket, which can guide the development of effective policies and strategies for sustainable hotel operations. For Thailand and other developing countries, environmental management in hotels often faces some barriers such as lack of financial resources, insufficient staff training, and limited awareness of sustainability practices (Barakagira, & Paapa, 2024; Tokro, & Dzitse, 2024).

In Thailand, government agencies such as the Ministry of Natural Resources and Environment and the Department of Environmental Quality Promotion have supported EMS adoption through training programs and

certification schemes like the Green Hotel Standard. However, the level of implementation varies significantly depending on factors such as hotel size, ownership, and management commitment (Mishra, 2016). Moreover, stakeholder involvement including employees, suppliers, and guests, is critical for the success of environmental management initiatives. Hotels that actively engage their stakeholders tend to perform better in meeting environmental goals (Kattiyapornpong, Ditta-Apichai, & Chuntamara, 2023). Furthermore, green training and environmental awareness programs for staff are also found to be essential in fostering a culture of sustainability within hotel organizations (Mensah, 2006).

Eco-Certification Programs and Standards in Thailand

An eco-certification program has become an essential tool for advancing environmental sustainability in the hospitality sector. The certification helps formalize, monitor, and evaluate environmental practices within hotels, guiding the industry toward resource efficiency, pollution prevention, and sustainability. The program offers strategic advantages for hoteliers locally and globally, for example enhanced marketability, regulatory compliance, and alignment with corporate social responsibility goals. At the global level, several green certification standards have gained recognition in the hospitality industry. For instance, Green Globe is one of the most comprehensive certification systems that focuses on sustainable tourism and hospitality practices across highlighted points such as energy efficiency, carbon footprint reduction, community engagement, and cultural heritage preservation (Green Globe, 2022). Similarly, Earth Check which is widely used in Asia-Pacific offers benchmarking and certification for environmental and social sustainability based on scientific data and continuous performance improvement (Earth Check, 2021).

In Thailand, two major eco-certification programs serve the hotel industry: the Green Leaf Certification and the Green Hotel Standard. These programs are rooted in domestic policies and supported by both government agencies and non-governmental organizations. The Green Leaf Certification has been developed by the Green Leaf Foundation in cooperation with the Tourism Authority of Thailand (TAT), Thai Hotels Association (THA), and Thailand Environment Institute (TEI). It evaluates hotels across multiple environmental dimensions. These include energy conservation, waste reduction, water efficiency, air quality, and staff environmental training. The certification awards hotels with a rating of one to five leaves based on their performance (Green Leaf Foundation, 2020). The Green Hotel Standard, which is now extended into Green Hotel Plus, is administered under Thailand's environmental programs and categorizes hotels into bronze, silver, and gold levels based on their sustainability efforts. The assessment criteria include environmental policies, energy and water management, waste disposal, and community engagement. Green Hotel Plus further aims to align Thai hotels with international standards by gaining GSTC-recognized status, expanding measurement of carbon emissions, and encouraging broader adoption and reporting of sustainability performance (Department of Climate Change and Environment & GSTC, 2024/2025). These standards aim to support Thailand's Bio-Circular-Green (BCG) economic model. Hotels that obtain eco-certification often benefit from increased visibility in promotional campaigns, eligibility for government support programs, and enhanced consumer trust (Ministry of Natural Resources and Environment, 2021).

Despite these advantages, the adoption of eco-certification remains uneven across the hotel industry. Large and international hotels are more likely to pursue certification due to greater access to resources and managerial capacity (Mishra, 2016), while small and medium-sized hotels often cite cost, lack of awareness, and limited technical support as barriers to participation (Barakagira, & Paapa, 2024; Tokro, & Dzitse, 2024). Besides, there is limited comparative research assessing the consistency and effectiveness of Thai eco-certification schemes, particularly in

regional tourist destinations including Phuket. Therefore, this study addresses this gap by exploring the factors affecting eco-friendly hotel management and evaluating how different certification frameworks influence sustainability performance in hotel operations.

In summary, prior research on environmental sustainability in the hospitality sector has emphasized the adoption of environmental management systems, eco-certification programs, and sustainable practices in enhancing hotels' environmental performance across various contexts. However, most of these studies have been conducted at a national or international level and focus primarily on general frameworks or the benefits of adopting green standards. Limited research has examined how these sustainability practices are implemented in Phuket and other specific destinations which faces unique environmental challenges due to high tourism intensity, coastal ecosystem sensitivity, and seasonal fluctuations. Although a growing number of hotels in Phuket have obtained certifications under the Green Leaf Certification and Green Hotel Standard, there is still insufficient empirical evidence assessing whether these certified businesses integrate all essential components of environmental management into their operations. This gap underscores the need for a localized, in-depth analysis of eco-friendly hotel management in Phuket to evaluate the practical application and effectiveness of existing sustainability standards. The present study therefore aims to address this gap by identifying and analyzing the key components of environmental sustainability management within certified hotels in Phuket.

Research Methodology

This study employed a quantitative research approach using a cross-sectional descriptive survey design with data collected at a single point in time. The research process began with an examination of the key indicators and components of two major Thai environmental management standards in the hotel industry: The Green Hotel Standard and the Green Leaf Certification. These standards were analyzed to identify relevant dimensions and indicators of eco-friendly hotel management practices. Based on these findings, an assessment tool was developed to evaluate the environmental management performance of hotels in Phuket. The indicators and components derived from the two standards were synthesized and incorporated into the design of the survey instrument. To ensure the appropriateness and validity of the questionnaire, the draft instrument was reviewed by three experts in the fields of environmental management and hospitality. Their feedback was used to revise and improve the final version of the questionnaire. Data collected from the finalized questionnaire were analyzed using Exploratory Factor Analysis (EFA) to identify underlying components of eco-friendly hotel management ~~in~~ within the context of Phuket.

Population and Sample

The population of this study consisted of 56 hotels in Phuket that had obtained environmental management certification from one of the two major Thai environmental management standards: The Green Hotel Standard administered by the Department of Environmental Quality Promotion, Ministry of Natural Resources and Environment, and The Green Leaf Certification implemented by the Green Leaf Foundation. Only hotels that had officially received environmental certification were included in the study. Due to practical constraints of time availability, accessibility, and willingness to participate, 38 hotels participated in the study. The unit of analysis for this study was the hotel employee, while the unit of observation was the certified hotels. Each participating hotel formed a "Green Team" or environmental management committee, typically consisting of staff from multiple departments. To obtain comprehensive perspectives, the study adopted a quota sampling approach, selecting participants from five key departments: Front Office, Housekeeping, Food and Beverage, Kitchen, and Support/Administration (e.g., HR, Accounting, Sales). From each department, three employees representing different

management levels (junior, middle, and senior) were surveyed, resulting in approximately 15 respondents per hotel. Altogether, the final sample comprised 380 hotel employees across 38 certified hotels. Although the number of participating hotels was limited, the sample was designed to ensure diversity and representativeness across departments, management levels, and certification types.

Research Instrument

The primary research instrument used in this study was a structured questionnaire developed by synthesizing indicators from the Green Hotel Standard and Green Leaf Certification. The questionnaire consisted of two main parts: part 1: demographic information, and part 2: environmental management practices. In section 2, hotel activities and operations related to environmental sustainability are evaluated. It comprised 12 categories with a total of 68 items covering the following dimensions: 1) environmental policies and objectives of the hotel, 2) staff training and development, 3) campaigns and public relations related to environmental awareness, 4) environmentally friendly procurement, 5) water management, 6) air and noise pollution control, 7) energy management, 8) waste management, 9) landscaping and green space management, 10) promotion of local arts, culture, and community engagement, 11) management of fitness centers, swimming pools, and outdoor activities, and 12) spa and wellness services. All items were measured using a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree). The content validity was verified by three experts in hospitality and environmental management using the Index of Item-Objective Congruence (IOC).

Data Collection

Data were collected between March and May 2023 through on-site distribution and self-administered questionnaires. The researcher contacted each certified hotel's management via official correspondence to request participation and scheduled appointments with the "Green Team" or environmental management representatives. During each visit, the researcher explained the study objectives, obtained informed consent, and distributed printed questionnaires to selected staff members across departments. Respondents completed the questionnaires on-site within approximately 20–25 minutes. The researcher supervised the process to ensure completeness and understanding, and all responses were subsequently checked for completeness and accuracy before proceeding to data analysis.

Data Analysis

The data were analyzed using Descriptive Statistics and Exploratory Factor Analysis (EFA). Descriptive statistics were used to summarize the demographic information and environmental management practices across the hotel samples. EFA was conducted to identify the underlying structure of environmental management practices. Prior to conducting EFA, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were performed to assess the suitability of the data for factor analysis. A KMO value greater than 0.60 and a significant Bartlett's Test ($p < .05$) indicated that the data were appropriate for factor analysis. The Principal Component Analysis (PCA) method was used for factor extraction with Varimax rotation applied for clearer factor interpretation. Items with factor loadings above 0.40 were retained for further analysis.

Findings

Descriptive Statistics

A total of 380 responses were collected from hotel staff across various positions. The sample consisted of respondents from three management levels: 32.9% from the lower-level management, 33.9% from middle-level

management, and 33.2% from senior- level management. Regarding the departments, the distribution of respondents was as follows: 20.8% from Front Office, 20.0% from Housekeeping, 16.6% from Food and Beverages, 17.6% from Kitchen, and 25% from Support departments (Human Resources, Sales, Accounting, Procurement). The sample represented hotels operating under two environmental management standards: 50% of the establishments followed the Green Hotel Standard, while the remaining 50% adhered to the Green Leaf Standard.

Exploratory Factor Analysis (EFA)

The exploratory factor analysis of the environmental management assessment for eco-friendly hotels began with an initial check to ensure that the data collected was sufficiently correlated for factor analysis. This was done by Kaiser-Meyer-Olkin (KMO) measure and performing Bartlett's Test of Sphericity.

Table 1 KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.973
Bartlett's Test of Sphericity	Approx. Chi-Square	28449.659
	df	2278
	Sig.	.000

From Table 1, the suitability of the data for factor analysis was assess using the Kaiser-Meyer-Olkin (KMO) Measure and Bartlett's Test of Sphericity. The KMO value was found to be 0.973 which is very close to 1, indicating that the data were highly suitable for factor analysis with excellent sampling adequacy. In addition, the Bartlett's Test of Sphericity showed a significant result (Chi-Square = 28449.659, df = 2278, P-value < .05), confirming that the variables are interrelated and appropriate for factor analysis.

Table 2 Initial Eigenvalues, Extraction and Rotation Sums of Squared Loadings

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Eigen Value	% of Variance	% Cum. of Variance	Eigen Value	% of Variance	% Cum. of Variance	Eigen Value	% of Variance	% Cum. of Variance
1	38.499	56.616	56.616	38.499	56.616	56.616	10.730	15.779	15.779
2	2.899	4.263	60.879	2.899	4.263	60.879	10.000	14.707	30.486
3	2.478	3.644	64.523	2.478	3.644	64.523	8.392	12.342	42.827
4	1.627	2.393	66.915	1.627	2.393	66.915	6.176	9.083	51.910
5	1.553	2.283	69.198	1.553	2.283	69.198	5.854	8.608	60.519
6	1.174	1.727	70.925	1.174	1.727	70.925	4.455	6.552	67.070
7	1.083	1.593	72.518	1.083	1.593	72.518	3.704	5.447	72.518

According to Table 2, the extraction of environmental management components in hotels in Phuket followed Kaiser's criterion, with all retained components having eigenvalues greater than 1. Each factor also had variable loadings higher than 0.50 and consisted of at least three variables per component. A total of seven components were extracted. Sixteen items were eliminated during the exploratory factor analysis, leaving 52 items that collectively explained 72.518% of the total variance in environmentally friendly hotel management practices.

Table 3 Component Correlation Matrix

Component	1	2	3	4	5	6	7
1	1						
2	.678	1					
3	.587	.583	1				
4	.584	.545	.481	1			
5	.698	.692	.651	.563	1		
6	.491	.515	.492	.514	.510	1	
7	.629	.572	.539	.412	.573	.341	1

The correlations between the seven extracted components were examined using the component correlation matrix as shown in Table 3. The results show positive correlations ranging from 0.341 to 0.698, indicating that the

components are moderately related yet distinct from one to another. The highest correlation was observed between Component 1 and Component 5 (r = 0.698), suggesting a strong association between these two aspects of environmentally friendly hotel management. These findings support the appropriateness of using an oblique rotation method such as Promax which allows for correlated factors.

Table 4 Summary of Seven Components Identified by Exploratory Factor Analysis (EFA)

Component	Item	Factor Loading
Component 1: Campaign and Environmental Awareness Promotion	2.1 The hotel organizes or sends employees to attend training programs on developing environmental projects and plans.	.691
	2.2 The hotel organizes or sends employees to attend training programs on environmental operations in hotel management.	.624
	2.3 The hotel arranges environmental study visits for members of the Green Team (environmental working committee) at least once a year.	.735
	2.4 The hotel organizes brainstorming activities to raise awareness and encourage creative ideas for solving environmental problems within the hotel.	.509
	2.5 The hotel conducts surveys to identify employees' training needs related to environmental management.	.765
	3.1 The hotel disseminates knowledge about its environmental management operations through various media channels.	.755
	3.2 The hotel organizes campaigns and activities to build knowledge, awareness, and a sense of responsibility for environmental protection.	.786
	3.3 The hotel promotes and encourages environmentally friendly service practices among guests through messages displayed in guest rooms and service areas.	.883
	3.4 The hotel promotes participation in environmental conservation among staff, guests, business partners, local communities, and local organizations.	.692
	4.1 The hotel establishes a procurement committee responsible for environmentally friendly purchasing.	.615
	4.3 The hotel selects and purchases environmentally friendly products, such as those with the Green Label or energy-saving labels.	.638
	4.4 The hotel reports the results of green procurement activities to the hotel's management.	.619
Component 2: Media, Symbols, Landscape, and Green Spaces	5.1 The hotel promotes campaigns and encourages guest participation in using water efficiently.	.668
	5.3 The hotel installs and uses water-saving equipment or implements effective and appropriate water management practices in different areas of the property.	.688
	5.5 The hotel records water usage statistics or expenses to monitor and support water conservation efforts.	.688
	5.7 The hotel has an appropriate wastewater treatment system or management method.	.733
	5.9 The hotel regularly inspects for wastewater leakage to prevent contamination of other water sources.	.615
	6.1 The hotel provides designated non-smoking areas and separate smoking areas with clearly visible signage.	.726
	6.6 The hotel has procedures or practices to avoid or reduce the use of chemicals, hazardous substances, or toxic materials, with consideration for environmental impacts.	.627
	6.7 The hotel labels and marks the storage areas and types of chemicals clearly, and separates storage areas appropriately for safety and environmental protection.	.557
	9.1 The hotel maintains open spaces or uncovered areas that occupy more than 30% of the total hotel area.	.737
	9.2 The hotel plants trees and local vegetation for landscaping and promotes plant propagation for in-house cultivation.	.689
	11.1 The hotel assigns responsible staff to oversee fitness centers, swimming pools, and outdoor	.707

Component	Item	Factor Loading
	activity areas to assist users and ensure safety.	
	11.2 The hotel utilizes natural lighting in outdoor fitness areas to reduce energy consumption.	.642
	11.3 The hotel controls the use of chlorine in swimming pools appropriately and conducts regular monitoring.	.569
Component 3: Spa and Health Massage	12.1 The hotel displays its license publicly and has obtained official spa certification in accordance with the Ministry of Public Health's regulations.	.748
	12.2 Spa operators have undergone knowledge assessments, possess operational manuals, and have their performance evaluated at least once a year.	.897
	12.3 Service providers wear uniforms that are neat, appropriate, comfortable for work, and free from jewelry or valuable accessories.	.775
	12.4 Clear and readable signs are installed in functional areas, such as clocks, steam rooms, room numbers, room names, and whirlpool areas.	.901
	12.5 Chemicals are stored securely and out of reach, with measures in place to reduce their usage.	.877
	12.6 No-smoking signs are clearly displayed within spa and health massage areas.	.974
	12.7 The hotel organizes staff development and training activities for spa and health massage personnel.	.658
	12.8 The hotel provides customer evaluation forms or feedback sheets for spa and health massage services.	.802
Component 4: Energy Management	7.1 The hotel produces and utilizes alternative energy sources to replace conventional electricity, such as solar cells or biogas generated from waste and wastewater.	.593
	7.2 The hotel promotes energy-saving practices among guests by providing environmentally friendly transportation options such as bicycles or electric vehicles.	.858
	7.4 The hotel regularly assesses and monitors its energy consumption to identify potential areas for reducing energy loss.	.631
	7.6 The hotel installs separate electricity meters for different operational areas to support efficient energy demand management.	.603
	7.8 The hotel designs and provides staff uniforms appropriate for local weather and seasonal conditions to reduce the need for air conditioning.	.727
	10.4 The hotel uses locally made products and goods within its operations to support local communities and reduce environmental impact.	.514
Component 5: Water Management and Wastewater Treatment	5.2 The hotel conducts campaigns to promote awareness and encourage staff participation in using water efficiently and responsibly.	.582
	5.4 The hotel installs additional water meters, apart from those provided by the public water supply, to monitor water consumption in different operational areas.	.608
	5.6 The hotel efficiently manages food waste, oils, and grease before they enter the wastewater treatment system.	.646
	5.8 The hotel monitors the quality of treated wastewater to ensure compliance with legal environmental standards.	.602
	5.10 The hotel utilizes treated wastewater for beneficial purposes, such as watering plants, cleaning walkways, or using sludge for biogas production.	.585
Component 6: Waste Management Based on the 3R Principles	8.1 The hotel implements waste reduction (Reduce) practices for guests, employees, and suppliers providing products and services to the hotel.	.680
	8.2 The hotel encourages reuse (Reuse) practices among guests and employees, such as using cloth laundry bags instead of plastic ones.	.705
	8.3 The hotel promotes waste separation for recycling (Recycle) among guests and employees, such as sorting recyclable waste for resale or reuse.	.581
Component 7: Environmental Management Policy	1.1 The hotel has established a formal environmental policy and goals.	.650
	1.2 The environmental policy covers participation from employees, guests, business partners, and the local community.	.631

Component	Item	Factor Loading
	1.3 The hotel has appointed an environmental working committee (Green Team) to oversee environmental activities.	.734
	1.4 The hotel communicates its environmental policy and goals through various media channels.	.590
	1.5 The hotel continuously monitors, evaluates, and improves its environmental activities.	.542

Table 4 presents the results of the Exploratory Factor Analysis (EFA), which identified seven key components representing the structure of eco-friendly hotel management practices in Phuket Province. These components collectively represent the underlying dimensions of environmental sustainability initiatives implemented by hotels. All items show factor loadings above 0.50, indicating satisfactory construct validity. The seven-components structure provides a comprehensive understanding of eco-friendly hotel management and serves as a foundation for developing sustainable management strategies within the hospitality industry.

The result of the factor analysis of the environmental sustainability management assessment for hotels in Phuket is presented according to the research objectives as the following details.

Objective 1: To examine the key components of environmental sustainability management in hotel businesses in Phuket. The study identified seven key components of environmental sustainability management in hotel business in Phuket. The components are:

Component 1 is referred to as the “Campaign and Environmental Awareness Promotion” consisting of 12 items with factor loadings ranging from 0.509 to 0.883.

Component 2 is referred to as "Media, Symbols, Landscape, and Green Spaces," which included 13 items with factor loadings ranging from 0.569 to 0.737.

Component 3 is referred to as "Spa and Health Massage," which comprised 8 items with factor loadings ranging from 0.658 to 0.974.

Component 4 is referred to as "Energy Management," which contained 6 items with factor loadings ranging from 0.514 to 0.858.

Component 5 is referred to as "Water Management and Wastewater Treatment," which included 5 items with factor loadings ranging from 0.582 to 0.646.

Component 6 is referred to as "Waste Management Based on the 3R Principles," which consisted of 3 items with factor loadings ranging from 0.581 to 0.680.

Component 7 is referred to as "Environmental Management Policy," which comprised 5 items with factor loadings ranging from 0.542 to 0.734.

Objective 2: To provide policy recommendations for the effective implementation of eco-friendly service standards in the hotel industry in Phuket. The study identified several key aspects of environmental sustainability that are crucial for the implementation of eco-friendly service standards in hotel. Based on the findings from the factor analysis, several policy recommendations can be made to enhance the integration of these practices within the hotel industry Phuket.

Component 1, the policy recommendation is the promotion of environmental awareness and education. Hotels should implement comprehensive environmental awareness programs for both staff and guests.

Component 2, the policy recommendation is the incorporation of Green Spaces and Symbolism by developing policies that encourages the use of green spaces, eco-friendly symbols, and environmental branding.

Component 3, the policy recommendation is enhancing sustainability practices related to wellness and integrating eco-friendly operations while maintaining high quality service.

Component 4 and 5, the policy recommendation is focus on energy and water management by introducing standards for energy and water management in hotels and focusing on energy-efficient equipment, renewable energy sources, and water-saving technologies.

Component 6, the policy recommendation is the waste management and recycling programs by implementing mandatory waste management programs that adhere to the principles of Reduce, Reuse, and Recycle (3R).

Component 7, the policy recommendation is strengthening environmental policies and commitment by developing and enforcing clear environmental management policies for hotels that focus on sustainability across all aspects of hotel operations.

Discussion

This research identified seven interrelated components for the effective implementation of environmental sustainability management in the hotel industry. The findings align with previous studies and also offering new aspects that can help the hotel industry enhance its sustainability practices.

The first significant finding from this study is the importance of environmental awareness campaigns. Hotels in Phuket should prioritize training programs for both staff and guests as well as establish clear communication channels about their sustainability efforts. This is consistent with the findings of Sibian, & Ispas (2021); Ruhanen, & Bowles (2020) who emphasized the significant role of education in driving sustainable behaviors. This present study extends this idea by suggesting that hotels incentivize guests to participate in sustainability initiatives such as reusing towels or recycling, a strategy that has proven effective in similar settings (Fonseca & Dias, 2025). These awareness campaigns should focus on promoting eco-friendly actions and creating a sense of shared responsibility between the hotel and its guests. Another finding is the role of the physical environment in promoting sustainability. Hotels should incorporate natural elements like green roofs, gardens, and outdoor spaces into their design. Additionally, environmental symbols and eco-friendly branding should be integrated to communicate the hotel's commitment to sustainability. This supports the conclusions of Wiryawan, & Arief (2023) who found that eco-friendly branding, supported by consistent sustainability actions and visual communication (e.g., environmental symbols, green logos, and sustainability messages), significantly improves brand trust, customer loyalty, and competitive advantage. Furthermore, clear environmental branding is an essential strategy for attracting eco-conscious tourists as illustrated by Soe, & Srisuphaolarn (2024). This study suggests that by adopting the mentioned design principles, hotels can effectively improve both their environmental and market positioning.

The study also highlights the importance of sustainable practices in spa and wellness services. Hotels should prioritize the use of organic, locally sourced, and eco-friendly products in their spa treatments. Encouraging spa to minimize single-use plastics, reduce waste, and use certified organic products will contribute to a more sustainable service offering. This aligns with the findings of Iyengar, & Venkatesh (2024) who noted the growing demand for eco-conscious wellness services. The present research hence emphasizes the need to support local businesses and reduce the environmental impact of spa operations, contributing to both sustainability and community development. Energy and water management are also essential for the reduction of the environmental footprint of hotels. The study recommends incentivizing hotels to reduce energy consumption and achieve water recycling targets. Regular monitoring and reporting of energy and water usage should also be encouraged. These recommendations echo the work of Antonova, Mendoza-Jiménez, & Ruiz-Rosa (2023) and Makoondlall-Chadee, & Bokhoree (2024) who demonstrated the effectiveness of efficient energy and water management in minimizing environmental impacts. By introducing targeted incentives such as rewards for achieving specific reduction goals, hotels can enhance their

commitment to sustainability and improve operational efficiency. For waste management, based on the 3R (Reduce, Reuse, Recycle) principles, hotel should set up waste reduction goals and implement waste sorting and recycling practices throughout their operations. Partnering with local communities for waste processing and recycling initiatives can significantly enhance the effectiveness and scalability of environmental management practices. Recent studies emphasize that community collaboration is crucial for developing sustainable and context-specific waste management systems. For example, Koiwanit et al., (2023) demonstrated that engaging local stakeholders in solid waste management on Thai islands improves operational efficiency and environmental outcomes. Similarly, Cardenas, Schivinski, and Brennan (2024) highlighted that adopting circular practices in the hospitality sector through partnerships with local communities can optimize food waste recycling and strengthen overall sustainability performance. These findings align with Prakash, Sharma, Singh, & Vijayvargy (2023), who underscored that efficient waste management systems enhance both environmental performance and operational efficiency in the hotel industry. Therefore, hotels should also establish sustainability performance indicators and publish annual sustainability reports for greater transparency. This finding supports the conclusions of Duric and Potočnik Topler (2021) and Abdou, Hassan, and El Dief (2020) who emphasized the clear policies and regular monitoring can lead to measurable improvements in sustainability outcomes. This study then further suggests that a solid commitment to environmental management is essential for long-term sustainability and improving guest satisfaction.

These findings are particularly relevant to the hotel business landscape in Phuket, where intense competition among luxury and upscale international hotel brands requires more than traditional service excellence. The destination is increasingly attracting environmentally conscious tourists, especially European and long-stay digital nomad markets that prioritize sustainability credentials when making booking decisions. Implementing the identified seven components therefore not only enhances environmental performance but also strengthens Phuket hotels' competitive positioning, brand differentiation, and long-term resilience against future crises such as climate-related disruptions or regulatory pressures. In other words, sustainability is no longer just a moral obligation in Phuket but a strategic business imperative that can directly increase customer loyalty, reduce operational costs, and support the province's goal of becoming a globally recognized low-carbon tourism destination.

Overall, the results demonstrate that eco-friendly hotel management in Phuket comprises a comprehensive approach integrating environmental awareness, resource efficiency, and operational sustainability across multiple dimensions. These findings align with the theoretical principles of the Triple Bottom Line (TBL) that emphasize the balance between environmental protection, social responsibility, and economic viability, reinforcing the need for hotels to integrate environmental stewardship with social responsibility and financial performance. Moreover, the results support the PDCA framework, which underlines the importance of continuous planning, implementation, monitoring, and improvement in environmental management systems. Together, these theoretical alignments highlight the study's contribution to advancing both practical and conceptual understanding of sustainable hotel management.

Implications for Practice and Policy

The findings of this study provide several practical and policy implications for hotel practitioners, policymakers, and tourism development agencies aiming to enhance the management of eco-friendly hotels in Phuket. First, hotel operators in Phuket should prioritize the institutionalization of environmental sustainability principles within their strategic and operational policies. This includes designing mandatory sustainability orientation programs for new and existing staff with modules focusing on water conservation, energy efficiency, eco-friendly product use,

and waste segregation practices, launching guest education initiatives such as in-room signage, digital applications, and interactive workshops that communicate the hotel's green commitments and encourage responsible behavior from guests, and establishing Sustainability Key Performance Indicators, for example, monthly reductions in electricity usage per occupied room, or percentage of composted waste which are regularly monitored and linked to staff performance evaluations and bonus schemes. Second, public authorities such as the Phuket Provincial Tourism Office, the Department of Environmental Quality Promotion (DEQP), and the Tourism Authority of Thailand (TAT) should integrate the study's seven key components into revised environmental certification frameworks. These components include efficient energy and water management systems (e.g., use of greywater recycling and solar panels), eco-conscious spa and wellness operations (such as using locally-sourced organic oils and herbal products), green space integration and biodiversity support (e.g., rooftop gardens, native plant landscaping) which align closely with the ASEAN Green Hotel Standard and the United Nations Sustainable Development Goals (SDGs). Third, policymakers at both the national and local levels should utilize these findings to design targeted incentive schemes that encourage voluntary participation in sustainable hotel initiatives which include: tax deductions or exemptions for certified eco-friendly renovations such as energy-efficient appliances or water-saving fixtures; government-backed sustainability grants or matching funds to support infrastructure upgrades (e.g., installing compost systems or solar panels); official recognition programs such as "Eco-Champion Hotel of the Year," to promote visibility and reputation for participating businesses. These programs can be managed in partnership with the private sector and serve as powerful motivators for widespread adoption. Finally, the study highlights the importance of fostering community–hotel collaboration as a long-term sustainability strategy. Hotels should actively engage local stakeholders through partnerships with community-based waste management cooperatives to improve recycling efficiency and reduce landfill dependency; sourcing spa and F&B inputs from local organic farms and producers to support the circular economy and reduce their carbon footprint; joint green space maintenance initiatives such as "Adopt-a-Garden" programs, in which hotel staff and community members co-manage local parks or beachfront greenery. These collaborations not only contribute to environmental preservation but also cultivate a shared sense of ownership and responsibility, leading to strong integration of eco-friendly values in both the hospitality industry and surrounding communities.

Suggestions

Future research could replicate this study in other major tourist destinations and the customer perceptions regarding the influence of environmental sustainability practices on booking decisions and loyalty would provide further insights into consumer behavior as this study presents a framework consisting of components and indicators that represent the environmental sustainability management practices suitable for hotel businesses in Phuket. The identified components, particularly water management, wastewater treatment, and waste management based on the 3R principles, provide a foundation for future research to enhance resource efficiency across hotels of varying sizes and in other service sectors. Furthermore, the findings offer practical guidelines for hotel operators to improve environmental practices for enhancing operational efficiency, customer engagement, and long-term cost savings. Environmental management plans should extend the cultivation of positive relationships with local communities, the support of cultural sustainability, and the promotion of mutual benefits. Moreover, hotels that have not yet achieved environmental certifications may apply these findings to increase their environmental performance and pursue certifications such as the Green Hotel Certification and Green Leaf Hotel Certification, thereby strengthening their market competitiveness and commitment to sustainable tourism.

Conclusions

This study examined the key components of environmental sustainability management in Phuket's hotel industry and provided policy recommendations for the effective implementation of eco-friendly service standards. Through exploratory factor analysis, seven components were identified: (1) Campaign and Environmental Awareness Promotion, (2) Media, Symbols, Landscape, and Green Spaces, (3) Spa and Health Massage, (4) Energy Management, (5) Water Management and Wastewater Treatment, (6) Waste Management Based on the 3R Principles, and (7) Environmental Management Policy. The results underscore the importance of integrating environmental consciousness across all levels of hotel operations, rom guest education to day-to-day practices and strategic policy-making, hereby contributing to the advancement of sustainable tourism and environmental responsibility in the hospitality sector.

Originality and Body of Knowledge

This research contributes to the knowledge in sustainable tourism, environmental management, and green hotel operations by addressing gaps in a specific context in the literature on sustainable hotel management and identifying key seven components important to eco-friendly hotel operations. While previous studies in Thailand and abroad have explored environmental management systems, eco-certification frameworks, and green hotel practices in general, few have examined how these sustainability components are actually implemented within certified hotels in Phuket which is a destination facing distinct ecological vulnerabilities, seasonal tourism fluctuations, and high-density hotel development. The study is among the first to empirically identify and validate the structural components of eco-friendly hotel management based on real operational practices in Phuket's certified hotels under the Green Hotel Standard and Green Leaf Certification. By applying Exploratory Factor Analysis (EFA) to data collected from 380 hotel employees across 38 certified hotels, the research reveals seven components, ranging from environmental campaigns and resource management to wellness operations that collectively form a localized model for environmental sustainability in hospitality.

Furthermore, the study enhances understanding of how environmental standards can be operationalized at the organizational level in the hospitality sector. Moreover, the study connects the domains of policy design and on-the-ground implementation to illustrate how national or regional environmental standards (such as the ASEAN Green Hotel Standard or Thailand's Green Leaf Certification) can be translated into day-to-day operational practices within the hospitality industry. From a theoretical perspective, the research encourages discussion on organizational adaptation to sustainability by highlighting how hospitality enterprises in tourist destinations can be agents of change in advancing the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals).

References

Abdou, A.H., Hassan, T.H., & El Dief, M.M. (2020). A description of green hotel practices and their role in achieving sustainable development. *Sustainability, 12*(22), 9624. https://doi.org/10.3390/su12229624

Antonova, N., Mendoza-Jiménez, J., & Ruiz-Rosa, I. (2023). Determinants of water consumption in hotels: new insights obtained through a case study. *Water, 15*(17), 3049. https://doi.org/10.3390/w15173049

Aransyah, M.F., Hermanto, B., Muftiadi, A., & Oktadiana, H. (2025). Exploring sustainability-oriented innovations in tourism: insights from ecological modernization, diffusion of innovations, and the triple bottom line. *Cogent Social Sciences, 11*(1), 2447396. https://doi.org/10.1080/23311886.2024.2447396

Barakagira, A., & Paapa, C. (2024). Green practices implementation for environmental sustainability by five-star hotels in Kampala, Uganda. *Environment, Development and Sustainability*, *26*(4), 9421-9437.

Baxter, G., & Srisaeng, P. (2021). An assessment of hotels and resorts use of the ISO 14001 environmental management system as a tool to achieve environmentally sustainable operations. *Journal of Sustainable Tourism Development*, *3*(2), 59-85.

C9 Hotelworks. (2024). *Phuket Hotel Market Update April 2024*. Retrieved April 17, 2025, from https://c9hotelworks.com/wp-content/uploads/2024/04/2024-04-phuket-hotel-market-update.pdf

Cardenas, M., Schivinski, B., & Brennan, L. (2024). Circular practices in the hospitality sector regarding food waste. *Journal of Cleaner Production*, *472*, 143452. https://doi.org/10.1016/j.jclepro.2024.143452

Chaiyakheta, W., & Chaiyakot, P. (2025). Green hotel operation effects on community based tourism: a case study in Krabi Province, Thailand. *Pakistan Journal of Life & Social Sciences*, *23*(1), 8446-8459.

Duric, Z., & Potočnik Topler, J. (2021). The role of performance and environmental sustainability indicators in hotel competitiveness. *Sustainability, 13*(12), 6574. https://doi.org/10.3390/su13126574

Earth Check. (2021). *Earth Check Certified Standards*. Retrieved April 17, 2025, from https://earthcheck.org

Fonseca, D.B., & Dias, Á. (2025). Adopting circular economy in hospitality: A grounded theory approach. *Circular Economy and Sustainability*, 5, 2653–2677.

Fuchs, K., & Konar, R. (2025). The action-attitude gap to pro-environmental sustainability in nature-based destinations: a qualitative study using the stakeholder theory. *Tourism: An International Interdisciplinary Journal*, *73*(2), 204-214.

Global Sustainable Tourism Council. (2024). *Thailand's Green Hotel Plus Gains GSTC-recognized Standards Status*. Retrieved April 17, 2025, from https://www.gstc.org/thailands-green-hotel-plus-gains-gstc-recognized-standards-status/

Green Globe. (2022). Green Globe Certification Standards. Retrieved April 17, 2025, from https://www.greenglobe.com

Green Leaf Foundation. (2020). *Green Leaf Environmental Standard for Hotels*. Retrieved April 17, 2025, from http://www.greenleafthai.org

Huyen, N.N.T., Hong, H. D., & Thi, L.H. (2025). Green practices: Building green image and green trust for green revisit intentions in the hospitality industry. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(1), https://doi.org/100481. 10.1016/j.joitmc.2025.100481

International Organization for Standardization. (2015/Amd 1:2024). ISO 14001:2015/Amd 1:2024 Environmental management systems — Requirements with guidance for use — Amendment 1: Climate action. Retrieved April 17, 2025, from https://www.iso.org/standard/88209.html

Iyengar, M.S., & Venkatesh, R. (2024). Sustainable luxury stays: investigating eco-friendly practices in high-end hotels. *Icon: Journal of the International Committee for the History of Technology, 29*(1), 125-143.

Jain, M., & Nuangjamnong, C. (2024, September). Exploring the Influence of Green Marketing on Green Customer Loyalty for Eco-friendly resorts in Phuket Island. In *AU Hybrid International Conference* (pp. 406-432).

Kamruzzaman, M. (2020). *Implementing Environmental Management Systems in Small-and Medium-Sized Hotels: Obstacles* [Summary].

Kattiyapornpong, U., Ditta-Apichai, M., & Chuntamara, C. (2023). Sustainable food waste management practices: perspectives from five-star hotels in Thailand. *Sustainability, 15*(13), 10213. https://doi.org/10.3390/su151310213

Kokkhangplu, A., Onlamai, W., Chokpreedapanich, T., & Phikul, K. (2023). What predicts behavioral intention in eco-friendly hotels? The roles of tourist's perceived value and satisfaction: A case study of Thailand. *Sustainability*, *15*(4), 3219. https://doi.org/10.3390/su15043219

Kusa, R., Suder, M., & Duda, J. (2023). Impact of greening on performance in the hospitality industry: Moderating effect of flexibility and inter-organizational cooperation. *Technological Forecasting and Social Change, 190*, 122423. https://doi.org/10.1016/j.techfore.2023.122423

Leyva, E.S., & Parra, D.P. (2021). Environmental approach in the hotel industry: Riding the wave of change. *Sustainable Futures*, *3(1)*, 1-14. https://doi.org/10.1016/j.sftr.2021.100050

Makoondlall-Chadee, T., & Bokhoree, C. (2024). Environmental sustainability in hotels: A review of the relevance and contributions of assessment tools and techniques. *Administrative Sciences*, *14*(12), 320. https://doi.org/10.3390/admsci14120320

Mbokazi, M. (2024). Impact of waste management in the hospitality and catering industry. *Waste Management*.

Mensah, I. (2006). Environmental management practices among hotels in the greater Accra region. *International Journal of Hospitality Management, 25*(3), 414–431. https://doi.org/10.1016/j.ijhm.2005.02.003

Mishra, P. P. (2016). How green are our hotels? Evidence from Thailand. *Environment and Urbanization ASIA*, *6*(2), 173–188. Retrieved April 17, 2025, from https://doi.org/10.1177/0975425315619050

Ministry of Natural Resources and Environment. (2021). *Thailand's BCG Model and Tourism Sector Integration.* Bangkok: MNRE Publications.

Prakash, S., Sharma, V.P., Singh, R., & Vijayvargy, L. (2023). Adopting green and sustainable practices in the hotel industry operations-an analysis of critical performance indicators for improved environmental quality. *Management of Environmental Quality: An International Journal, 34*(4), 1057-1076. https://doi.org/10.1108/MEQ-03-2022-0090

Rajić, M.N., Maksimović, R.M., & Milosavljević, P. (2022). Energy management model for sustainable development in hotels within WB6. *Sustainability*, *14*(24), 16787. https://doi.org/10.3390/su142416787

Saengchai, S., & Hasoontree, N. (2021). Sustainable development tourism on supply chain management of tourism in Phuket. *Journal of Management Information and Decision Sciences, 24*, 146-156.

Sibian, A.R., & Ispas, A. (2021). An approach to applying the ability-motivation-opportunity theory to identify the driving factors of green employee behavior in the hotel industry. *Sustainability, 13*(9), 4659. https://doi.org/10.3390/su13094659

Soe, M.N., & Srisuphaolarn, P. (2024). *Sustainable Wellness Retreat: an eco-friendly Tourism Initiative in Southern Thailand* (Doctoral Dissertation), Thammasat University.

Ruhanen, L., & Bowles, L. (2020). Student perspectives of responsible tourism behaviour: The role of tourism education. *Journal of Hospitality & Tourism Education*, *32*(4), 255-265.

Thongmun, S., Soonsan, N., & Thai, N. T. (2025). The best of both worlds: can smart hotels promote guests' sustainable behaviours?. *Anatolia*, *36*(3), 1-16. https://doi.org/10.1080/13032917.2025.2458837

Tokro, L. S., & Dzitse, C. D. (2024). Barriers to the adoption of sustainability practices in small hotel businesses: A qualitative study in Ghana. *Research Journal of Business and Management*, *11*(1), 36-50.

Tran, N. K. H. (2025). Green hotel practices and their effect on green brand loyalty: a study in Vietnam. *Journal of Hospitality and Tourism Insights*, *8*(10), 3825-3845. https://doi.org/10.1108/JHTI-02-2025-0301

United Nations Development Programme (UNDP). (2023). *Phuket Sustainable Tourism Flagship Projects: Enhancing Local Strategies for Environmental and Socio-Economic Resilience.* Retrieved April 17, 2025, from https://www.undp.org/sites/g/files/zskgke326/files/2023-11/ENG%20Phuket%20Sustainable%20Tourism%20Flagship%20Projects.pdf

Valett, L., Bollenbach, J., & Keller, R. (2024). Empowering sustainable hotels: a guest-centric optimization for vehicle-to-building integration. *Energy Informatics*, *7*(1), 91. https://doi.org/10.1186/s42162-024-00400-9

Wiryawan, M., & Arief, N. N. (2023). Implementation of sustainable hospitality by improving brand equity in tourism industry: A study case. *Indonesian Journal of Multidisciplinary Science*, *3*(2), 115-124.

Yeh, S. S., Guan, X., Chiang, T. Y., Ho, J. L., & Huan, T. C. T. (2021). Reinterpreting the theory of planned behavior and its application to green hotel consumption intention. *International Journal of Hospitality Management, 94*, 102827. https://doi.org/10.1016/j.ijhm.2020.102827

Zareh, N., Nassar, M., Barakat, M., & Ramzy, Y. (2023). Impact of green practices on hotel guests' satisfaction: the role of perceived motives, attributes, and service outcomes. *Pharos International Journal of Tourism and Hospitality*, *2*(1), 1-17.