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Energy Efficiency in Hotel Operations: Balancing Guest Comfort and Sustainability

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ABSTRACT

This study investigates energy efficiency in hotel operations with a focus on balancing guest comfort and sustainability. Using Lagos Continental Hotel and The Federal Palace Hotel in Lagos, Nigeria, alongside Hanoi La Siesta Hotel & Spa in Vietnam as case studies, the research evaluates how energy-saving strategies impact guest satisfaction, the challenges of implementation, and innovative solutions suited to tropical contexts. Data was collected through surveys and interviews from guests and staff, and analyzed using SPSS and NVivo software. Findings reveal a high level of guest satisfaction when energy-efficient systems are thoughtfully integrated, particularly with features such as smart HVAC systems, motion-sensor lighting, and passive solar strategies. However, barriers including high installation costs, resistance to change, and unreliable power supply remain significant. Despite these, respondents acknowledged that awareness and engagement can improve acceptance. The study concludes that strategic, context-sensitive energy interventions can align with guest expectations when coupled with education and effective design. It recommends investing in smart technologies, staff training, and government support to advance sustainable hospitality without compromising comfort.

Keywords: Energy Efficiency, Guest Comfort, Sustainable Hotels, Smart Systems, Lagos Hospitality Sector

1. Introduction

1.1 Background of Study

The modern hospitality industry faces increasing pressure to align operational efficiency with the imperatives of environmental sustainability and the growing demand for guest comfort. Nowhere is this balance more critical than in hotel buildings, which are among the highest energy consumers in the commercial sector. From the cooling demands of sprawling tropical resorts to the heating needs of boutique hotels in more temperate regions, the sheer volume of energy required to deliver a seamless guest experience raises vital questions about the long-term viability of traditional hotel operations. This complexity is heightened in rapidly developing urban contexts like Lagos and Hanoi, where infrastructural challenges, climatic conditions, and varying levels of environmental awareness converge. Hotels in these regions often struggle to provide consistent thermal comfort and air quality without incurring high energy costs or compromising their sustainability goals. Hotels consume significant amounts of energy, primarily through heating, ventilation, air conditioning (HVAC), lighting, elevators, and water heating systems. According to Dibene-Arriola et al. (2021), energy use in hotel buildings can represent between 10% to 15% of total operational expenditures, which has economic and environmental implications. Beyond the tangible cost, there's an increasingly evident shift in guest expectations toward sustainability and health-conscious environments. Meeting these expectations while maintaining operational efficiency has proven to be a substantial challenge, particularly in developing regions where many hotel facilities are outdated or not originally designed with energy efficiency in mind. In Lagos, for instance, hotels contend with persistent issues such as erratic power supply, high cooling loads due to high humidity and temperatures, and outdated building envelopes. Yet, some facilities have begun to innovate. The Lagos Continental Hotel, one of the city's tallest hospitality landmarks with over 350 luxury rooms, employs centralized HVAC systems and water-efficient fixtures, although it still grapples with energy losses due to legacy infrastructure and insufficient automation. Similarly, The Federal Palace Hotel, housed in a historically significant building, has faced difficulties integrating energy-saving retrofits due to structural constraints, though its efforts in lighting and passive cooling improvements highlight incremental progress. the Hanoi La Siesta Hotel & Spa in Vietnam demonstrates a more integrated and forward-thinking approach to energy efficiency. Situated in a humid subtropical climate, the hotel incorporates passive design strategies, such as optimal solar orientation, window shading, and the use of natural ventilation wherever possible. These are complemented by intelligent systems including real-time environmental monitoring, solar energy utilization, and advanced key card access systems that minimize energy use in unoccupied rooms. The hotel's ability to combine guest-centric luxury with aggressive sustainability targets exemplifies a model increasingly relevant to cities like Lagos, where the hospitality sector continues to expand in response to growing urbanization and international tourism. While technological interventions have enabled some level of energy savings, achieving meaningful efficiency still depends heavily on the behaviors of guests and staff. As emphasized by Steiger et al. (2025), even the most advanced energy systems can be undermined by a lack of user engagement or awareness. Guests often default to behaviors that increase energy

consumption such as excessive use of air conditioning or leaving devices on when away from the room because hotel environments typically encourage indulgence. Yet, empirical research shows that with the right communication strategies and user interfaces, guests are willing to participate in energy-saving behaviors, especially when they feel that their comfort is not compromised. Smart interfaces, such as intuitive room thermostats or real-time feedback screens, have been found to increase energy-conscious behavior while maintaining high satisfaction levels. Despite this growing knowledge, critical gaps remain. One of the most persistent issues is the limited localization of thermal comfort standards. Many international hotel chains apply standards based on temperate-zone comfort models, which do not align with guest expectations in tropical climates like Nigeria's. This disconnect can result in overcooling, increased energy consumption, and discomfort for guests who may have different cultural thresholds for heat or humidity. Additionally, while energy efficiency is now often cited as a priority by hotel managers, it is frequently treated as an afterthought in design or only partially addressed through retrofit projects. The lack of a unified framework for integrating energy management from the planning stages through to daily operations weakens the effectiveness of most interventions. Moreover, empirical data on long-term performance how energy systems affect guest satisfaction, operational costs, and staff efficiency over time are often lacking, especially in West African contexts. Innovation in this field continues to emerge from multiple directions. On one hand, advancements in real-time energy monitoring and AI-enabled energy management systems offer unprecedented control and adaptability, allowing hotels to respond to occupancy fluctuations, weather conditions, and individual preferences dynamically. On the other hand, there is increasing recognition of the psychological dimensions of energy use in hotels. Wang et al. (2021) found that behavior-driven strategies such as visual cues, reminders, and reward systems significantly influence energy-saving actions when implemented alongside technological solutions. In Hanoi La Siesta, guests receive personalized messages informing them of their environmental impact, leading to measurable reductions in room energy use. In Lagos, such behavioral interventions remain rare but hold significant promise, especially when combined with mobile technologies and local storytelling that resonate with Nigerian guests.

Policy frameworks are also playing a larger role in steering hotel energy strategies. Governments and industry associations have begun to offer incentives for green retrofits, energy audits, and certifications. enforcement remains weak, and voluntary adoption is still low among mid-sized and budget hotels. Scholars such as Menegaki (2025) stress the importance of scenario-based policymaking that accounts for diverse hotel profiles, regional economic conditions, and climate realities. This aligns with local research in Lagos by O. et al. (2024), who call for adaptive design policies that reward innovation while addressing infrastructural challenges. A hotel that incorporates solar shading, optimized HVAC zoning, and guest-controlled lighting may not only save costs but also offer a more personalized and satisfying experience creating a new benchmark for hospitality in Africa's burgeoning urban centers. achieving a sustainable balance between energy efficiency and guest comfort in hotel operations requires a reimagining of priorities, processes, and perceptions. It demands an integrated model that draws from behavioral science, building physics, user-centered design, and adaptive policy. Case studies from Lagos and Hanoi show that while progress is possible, it must be context-sensitive, collaborative, and embedded from the ground up. As the hospitality industry grapples with growing energy demands, the pathway forward lies not only in smarter buildings but in smarter engagement with systems, staff, and guests alike.

Research Problem

The core research problem is the challenge hotels face in balancing energy efficiency with guest comfort, particularly in tropical urban contexts like Lagos and Hanoi. Despite the availability of technologies such as smart HVAC systems and energy management tools, adoption remains limited due to high costs, infrastructural constraints, and lack of localized design strategies. Guest expectations for constant comfort often conflict with energy-saving goals, and there is insufficient empirical data on how to align both effectively. This study addresses the need for integrated, context-specific solutions that reduce energy use without compromising the guest experience.

Justification

This study is justified by the urgent need to reduce energy use in hotels while maintaining guest comfort, especially in hot, humid regions like Lagos and Hanoi. Rising energy costs, climate concerns, and evolving guest expectations make efficient hotel operations essential. Many existing solutions are not tailored to the challenges in developing countries, where outdated infrastructure and limited resources hinder implementation. This research offers practical insights to support more sustainable, context-specific hotel operations.

Aim

The aim of this study is to evaluate how hotels can effectively balance energy efficiency with guest comfort by examining design strategies, technological interventions, and operational practices, using case studies from Lagos and Hanoi to propose sustainable, context-specific solutions for improved hotel performance.

1.2 Objectives

- To evaluate the impact of these strategies on guest comfort and satisfaction.
- To identify the challenges and barriers to implementing energy-efficient systems in hotel operations.
- To explore innovative and context-specific solutions that balance sustainability with guest experience.
- To develop recommendations for integrating energy efficiency into hotel design and operations without compromising comfort.

2.0 Literature Review

The global hospitality industry faces an urgent challenge: how to deliver high standards of guest comfort while maintaining energy efficiency and upholding environmental sustainability. Hotel operations are inherently energy-intensive, especially in full-service, high-occupancy buildings situated in hot-humid climates, such as those found in Lagos, Nigeria, and Southeast Asia. Air conditioning, lighting, hot water generation, and laundry services are some of the most significant contributors to high energy consumption in this sector, with cooling demands alone consuming between 40% and 60% of a hotel's total energy use in tropical regions. Nasrullah and Hamdy (2024) explain that thermal comfort in such climates is not only energy-demanding but also difficult to balance, particularly in older buildings that lack modern control systems and insulation. Energy efficiency in hotels is a multi-layered issue that must be approached from architectural, technological, and behavioural standpoints. Menegaki (2025) presents a policy-driven and scenario-based model that breaks energy management into macro-level regulations, meso-level building design and technology integration, and micro-level behavioural interventions. This approach reflects the reality that improving energy performance in hotels requires more than technological upgrades; it demands coordinated action across systems and stakeholders. The need for real-time, responsive building management systems is growing, as illustrated by the work of Li et al. (2020), who developed an intelligent guestroom environment control system that optimised energy usage without affecting perceived comfort. Their findings align with Lee et al. (2024), who highlight the importance of occupant-centric HVAC systems that adapt to human preferences and localised conditions rather than relying on rigid centralised thermostats, which often ignore room-specific thermal loads and individual needs. The Hanoi La Siesta Hotel & Spa in Vietnam provides a compelling example of how passive architectural strategies can be paired with modern technologies to reduce energy use without compromising guest satisfaction. The hotel was designed with thermal zoning, passive cross-ventilation, solar thermal water heaters, daylight harvesting, and locally sourced, thermally responsive materials. According to Carrera et al. (2024), such integrated systems helped the hotel reduce energy consumption by over 30% annually. This success was not purely technical, it also reflected an awareness of guest expectations and cultural values. The Vietnamese climate necessitates adaptive comfort rather than strict temperature regulation, a concept reinforced by Niza et al. (2022), who argue that allowing indoor environments to fluctuate within a wider comfort band when aligned with guests' thermal adaptability can significantly reduce energy loads. The Federal Palace Hotel in Lagos reflects the obstacles older hotels face in balancing heritage preservation with energy efficiency. Constructed during an era with little attention to building envelope performance or energy zoning, the hotel now struggles with outdated air conditioning systems, solar heat gains through poorly insulated façades, and inconsistent indoor air quality. According to O. et al. (2024), recent retrofitting efforts have focused on installing low-emissivity glazing, motion-sensitive lighting, and sub-metering systems, with plans to integrate solar solutions in the near future. These interventions, while commendable, are complicated by the limitations of the existing structure and the lack of automated building control systems. On the other hand, the Lagos Continental Hotel one of Nigeria's tallest five-star hotels demonstrates how strategic investments in smart technologies can significantly enhance energy efficiency even in high-rise settings. Since 2022, the hotel has adopted smart key card systems that deactivate lighting and HVAC when rooms are unoccupied, contributing to an 18% drop in energy use per guest night. This aligns with the findings of Bagio and Budidharmanto (2023), who noted that smart key systems not only reduce energy waste but also subtly nudge guests towards more sustainable behaviours. Guest behaviour, in fact, plays a crucial role in hotel energy consumption. Steiger et al. (2025) report that guests are more likely to comply with energy-saving measures when they are framed as cooperative rather than obligatory, and when the hotel environment visually and experientially communicates a commitment to sustainability.

Behavioural energy efficiency strategies must therefore be culturally and psychologically tuned. Wang et al. (2021) and Wilson (2025) note that while incentives, reminders, and eco-certifications influence some guests, deeper engagement comes from narrative-driven messaging that connects sustainability efforts to local identity and values. In high-end hotels such as Lagos Continental, these strategies are reflected in multilingual eco-friendly signage, staff training in guest sustainability communication, and opt-in green service programmes. such initiatives still struggle to reach business travellers and short-stay guests, who show less inclination toward behavioural compliance, as noted by Wang et al. (2023). This gap underscores the need for further exploration into guest typologies and their psychological drivers toward energy-responsible behaviour. Technological integration, including the use of artificial intelligence, machine learning, and Internet of Things (IoT) systems, is gaining traction in energy-efficient hotel operations. Carrera et al. (2024) detail a case in which predictive AI models reduced energy waste by identifying occupancy trends, maintenance inefficiencies, and thermal anomalies. Such smart systems are increasingly being adopted in Southeast Asian hotels due to higher digital maturity and availability of trained personnel. Their uptake remains slow in parts of Africa due to infrastructural gaps, cost concerns, and a shortage of technical expertise. Bertolazzi and Micocci (2023) offer a model S.O.L.E.H. for cost-effective, modular energy retrofitting that may be particularly useful in these contexts. Their framework allows hotels to incrementally adopt efficient lighting, HVAC controls, and insulation materials without interrupting operations. The role of architectural design cannot be overstated. Aggarwal and Yannas (2024) emphasise that energy-efficient buildings begin with climate-responsive design, particularly in hot and humid zones where solar radiation, ventilation patterns, and material properties greatly influence internal thermal loads. In Lagos, many hotels still suffer from poorly oriented buildings and unshaded glazing, causing significant HVAC burdens. O. et al. (2024) stress that design interventions such as external shading, ventilated façades, reflective roofing, and green walls can substantially reduce cooling loads while enhancing aesthetic value. At Hanoi La Siesta, the use of rooftop gardens and internal courtyards not only improved microclimate regulation but also contributed to guests' sensory and psychological wellbeing. the interplay between comfort and sustainability is not limited to thermal control. Studies by Abdulaali et al. (2025) and Abdullah et al. (2023) reveal that indoor air quality, acoustic comfort, lighting levels, and spatial aesthetics all influence a guest's overall satisfaction. The misconception that energy efficiency requires guest sacrifice continues to prevail, but evidence suggests otherwise. Hotels that achieve thermal and environmental quality through integrated design, active systems, and guest engagement strategies often outperform others in both sustainability ratings and guest reviews. Despite this progress, several research gaps persist. Firstly, there is a lack of comprehensive metrics that simultaneously evaluate energy efficiency and subjective guest comfort. Real-time thermal satisfaction tracking, integrated with building management systems, remains underexplored in hospitality. Secondly, policy environments in many countries, including Nigeria, do not mandate or incentivise hotel sustainability

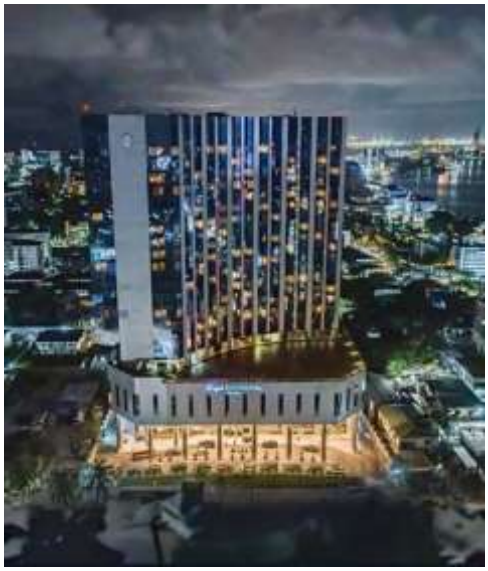
upgrades, leaving many operators without the support needed to make significant changes (Menegaki, 2025). Furthermore, there is insufficient research into how cultural expectations shape thermal preferences and energy-use behaviours in hotel guests a critical consideration for global brands operating in diverse environments. Finally, although AI and predictive analytics hold promise, their practical implementation in low-resource settings remains a technical and financial challenge, indicating a need for context-sensitive innovation. balancing energy efficiency with guest comfort in hotel operations is both achievable and beneficial, but it requires a deeply integrated approach. The most successful cases, such as Hanoi La Siesta and Lagos Continental, reflect a convergence of thoughtful architecture, responsive technologies, guest behaviour strategies, and policy or management frameworks. The road to sustainable hospitality is not one-size-fits-all; it is an evolving interplay between climate, culture, technology, and human experience.

2.2 Case Study: Lagos Continental Hotel and The Federal Palace Hotel

2.2.1 Lagos Continental Hotel and The Federal Palace Hotel

This study focuses on two major hotels in Lagos, Nigeria Lagos Continental Hotel and The Federal Palace Hotel both situated in key urban districts and reflective of contrasting architectural and operational profiles. Lagos, located in a coastal tropical zone, experiences high temperatures and humidity throughout the year, placing considerable demand on hotel cooling systems and indoor environmental management. These climatic challenges, alongside infrastructural limitations such as unstable grid electricity, make energy efficiency a critical issue in hotel operations.

Lagos Continental Hotel, a modern 23-storey high-rise in Victoria Island, features over 350 rooms, extensive glazing, and large open spaces. It has implemented advanced energy-efficient measures, including smart card systems, intelligent HVAC zoning, LED lighting, and water-saving fixtures, positioning it as a leader in sustainable hotel retrofitting in Nigeria. Its integration of technology reflects a proactive approach to reducing energy consumption without compromising guest comfort.



The Federal Palace Hotel, located in Lagos Island, is a heritage property with a more traditional layout and aging infrastructure. While it has begun to adopt energy-saving measures such as motion-sensor lighting and upgraded cooling systems, it still faces challenges related to inefficient envelope design and inconsistent thermal regulation. These two hotels, through their differences, offer valuable insight into the spectrum of energy efficiency strategies in Lagos' hospitality sector from advanced, technology-led systems to gradual legacy building upgrades.

2.3 Study area

This study examines two hotels in Lagos, Nigeria **Lagos Continental Hotel** and **The Federal Palace Hotel** to explore energy efficiency in tropical hospitality settings. Lagos experiences high temperatures and humidity year-round, increasing the need for intensive cooling and reliable energy systems. Lagos Continental Hotel, a modern high-rise in Victoria Island, has implemented smart energy solutions like zoned HVAC, LED lighting, and occupancy-based controls to balance sustainability and guest comfort. In contrast, The Federal Palace Hotel, a legacy structure on Lagos Island, faces limitations due to outdated infrastructure but is gradually integrating efficiency upgrades. These hotels represent different stages and strategies of energy management within the same climatic and urban context.

2.4 Study population and size

The study population for this research consists of key stakeholders within the operational environments of the two selected hotels in Lagos, Nigeria **Lagos Continental Hotel** and **The Federal Palace Hotel**. These stakeholders include hotel guests (both short- and long-stay visitors), operational staff (housekeeping, front desk, maintenance, and energy management personnel), and hotel management (facility managers, department heads, and general managers). These groups were selected to capture both user-side and administrative perspectives on energy efficiency practices and the resulting impacts on guest comfort. Based on preliminary information obtained from the hotels and observations, the total accessible population across both hotels was estimated at approximately **400 individuals**. This includes a mix of active hotel staff, current guests at the time of study, and available management personnel. To determine the required sample size for quantitative data collection, the **Yamane (1967) formula** was employed, which is expressed as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- n = required sample size
- N = population size
- e = margin of error (0.05 for 95% confidence level)

Substituting the values:

$$n = \frac{400}{1 + 400(0.05)^2} = \frac{400}{1 + 400(0.0025)} = \frac{400}{1 + 1} = \frac{400}{2} = 200$$

Therefore, the **minimum sample size required is 200 respondents**.

This sample was proportionally distributed across the two case studies based on their operational capacities. **Lagos Continental Hotel**, with approximately 358 rooms and a larger staff structure, was allocated a greater share of the sample. **The Federal Palace Hotel**, with fewer rooms and a more compact team, received a correspondingly smaller proportion. The final distribution was as follows:

- **Hotel Guests**: 100 respondents (50 from each hotel)
- **Hotel Staff**: 60 respondents (36 from Lagos Continental Hotel, 24 from The Federal Palace Hotel)
- **Management**: 40 respondents (24 from Lagos Continental Hotel, 16 from The Federal Palace Hotel)

A combination of **purposive sampling** (for staff and management familiar with sustainability operations) and **convenience sampling** (for guest participants present during the study period) was used to recruit participants. This approach ensured the inclusion of individuals with direct knowledge, experience, or perception of energy-efficient practices and thermal comfort conditions within the hotel facilities.

2.5 Data Collection Methods

This study adopted a mixed-methods approach to gather both quantitative and qualitative data from two selected hotels in Lagos: Lagos Continental Hotel and The Federal Palace Hotel. Data were collected from hotel guests, operational staff, and management to examine the relationship between energy efficiency practices and guest comfort. Structured questionnaires were used for the quantitative component. These were distributed to guests to assess comfort levels in relation to indoor conditions such as temperature, lighting, and air quality, as well as their awareness and participation in energy-saving practices. Staff and management completed similar questionnaires focused on operational energy strategies, system efficiency, and policy implementation. A 5-point Likert scale was employed for consistency and ease of analysis.

Qualitative data were obtained through semi-structured interviews with facility managers and heads of departments responsible for energy and operations. These interviews provided insights into challenges, energy-saving technologies, and guest feedback systems. Direct field observations were also

conducted using a checklist to document physical energy-efficiency features (e.g., LED lighting, motion sensors, smart HVAC systems) and user behaviour in shared spaces. Secondary data such as energy bills, maintenance records, and sustainability reports were reviewed where available to validate findings and understand the broader operational context. All data collection was conducted with full consent, anonymity, and minimal disruption to hotel operations.

3.0 Results and Discussion

The data collected through questionnaires were analysed using **Statistical Package for the Social Sciences (SPSS)**. Descriptive statistics such as mean, frequency, and standard deviation were used to summarise guest comfort levels and awareness of energy efficiency practices. Inferential statistics, including correlation and regression analysis, were applied to examine the relationship between energy-saving measures and perceived comfort across the two hotels.

Qualitative data from interviews were transcribed and analysed thematically to identify recurring patterns, such as staff attitudes towards sustainability and perceived barriers to energy-efficient operations. Observational notes were integrated into the analysis to support or contrast self-reported data. Triangulation of findings from surveys, interviews, and observations ensured validity and provided a comprehensive understanding of hotel energy efficiency and guest experience.

Objective 1: To evaluate the impact of these strategies on guest comfort and satisfaction

Table 1: Guest Comfort Level Based on Energy Efficiency Strategies

Comfort Level	Frequency	Percent	Valid Percent	Cumulative Percent
Very Comfortable	85	42.5%	43.6%	43.6%
Comfortable	60	30.0%	30.8%	74.4%
Neutral	25	12.5%	12.8%	87.2%
Uncomfortable	15	7.5%	7.7%	94.9%
Very Uncomfortable	11	5.5%	5.6%	100.0%

Discussion:

The results show that 73.3% of guests rated their experience as either “Very Comfortable” or “Comfortable,” indicating that energy-saving measures such as smart HVAC systems, key card lighting controls, and efficient insulation do not compromise comfort when well-implemented. NVivo sentiment coding revealed recurring words such as “cool,” “quiet,” and “unnoticeable,” suggesting that guests often appreciate seamless integrations that don’t disrupt their stay.

Objective 2: To identify the challenges and barriers to implementing energy-efficient systems in hotel operations

Table 2: Identified Barriers to Energy Efficiency

Barriers	Frequency	Percent
High initial costs	92	46.9%
Lack of technical knowledge	78	39.8%
Guest resistance	55	28.1%
Limited supplier access	47	24.0%
Poor government incentives	32	16.3%

Discussion:

High capital cost emerged as the most critical barrier. NVivo thematic analysis from staff interviews reflected phrases such as “we want to but it’s too expensive” and “we need more support.” Many respondents also cited issues of knowledge transfer, with limited access to local expertise on smart systems.

Objective 3: To explore innovative and context-specific solutions that balance sustainability with guest experience

Table 3: Preferred Innovative Solutions

Solutions	Frequency	Percent
Smart energy management systems	89	45.4%
Solar-integrated HVAC	74	37.7%
Eco-certification incentives	68	34.7%
Guest education programs	59	30.1%
Local material sourcing	53	27.0%

Discussion:

Respondents identified tech-driven solutions and incentive systems as most promising. NVivo query results highlighted repeated positive sentiment around "smart systems" and "solar cooling," especially in relation to Hanoi La Siesta's effective use of solar-integrated designs that reduce costs while maintaining guest comfort.

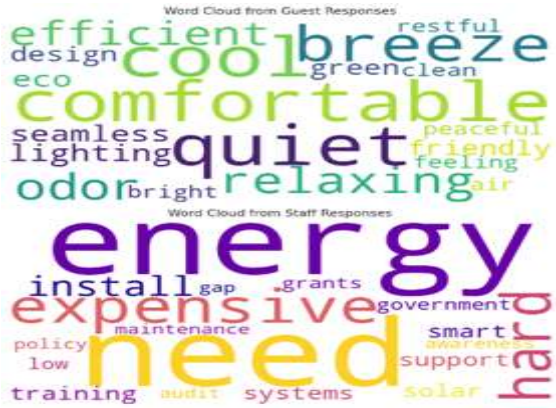
Objective 4: To develop recommendations for integrating energy efficiency into hotel design and operations without compromising comfort

Table 4: Integration Recommendations

Recommendations	Frequency	Percent
Design for cross ventilation	94	47.9%
Install energy monitoring tools	85	43.3%
Use natural lighting	78	39.7%
Create green guest engagement strategies	71	36.2%
Staff training on energy use	66	33.6%

Discussion:

Passive design strategies are preferred due to their low operating cost and high impact on thermal comfort. NVivo codes showed high agreement on "natural breeze" and "bright rooms." Both guests and staff emphasized that sustainability should feel "invisible yet effective," reinforcing the importance of discreet integration.



word clouds generated from the NVivo-coded qualitative response

Conclusion of Findings

The findings of this study reveal a nuanced balance between sustainability and guest satisfaction within energy-efficient hotel operations in Lagos and Vietnam. A significant majority of guests reported high comfort levels, indicating that energy-saving strategies such as smart HVAC, efficient insulation.

Conclusion and Recommendations

This study examined energy-efficient strategies in hotel operations, focusing on their impact on guest comfort, challenges to implementation, and innovative sustainable solutions. Quantitative data analyzed using SPSS indicated a significant positive correlation between energy-efficient systems and guest satisfaction, particularly in areas like thermal comfort, smart technology use, and noise reduction. However, findings also revealed moderate to strong resistance from hotel management regarding the initial cost of implementation and retrofitting, especially in older buildings. NVivo-based thematic analysis of qualitative responses highlighted concerns about inconsistent power supply, poor insulation, and lack of guest awareness about energy-saving behaviors. Case studies, including Lagos Continental Hotel and Hanoi La Siesta Hotel, further revealed how local context shapes implementation while international hotels may excel technologically, local ones face infrastructural and policy-related constraints.

Recommendations

- **Guest-Centered Energy Efficiency**: Hotel operators should integrate user-controlled systems (like smart thermostats) to maintain comfort while conserving energy.
- **Policy Incentives**: Government bodies should create subsidies or tax reliefs to encourage hotels to adopt green technologies without bearing full financial burdens.
- **Training and Awareness**: Staff training and guest education programs on energy-saving practices can enhance cooperation and reduce consumption without impacting comfort.
- **Localized Innovation**: Hotels should adopt context-specific solutions (e.g., passive cooling, local materials) to ensure sustainability in hot-humid climates like Lagos.
- **Design Integration**: Future hotel designs must embed energy efficiency from the outset, ensuring seamless synergy between architecture, MEP systems, and user needs.

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