Environment-Friendly Methods Used by Major Hotel Chains in Lucknow for Conserving Water and Energy

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ABSTRACT

The hospitality sector relies heavily on natural resources, with large hotel chains contributing significantly to water and energy consumption. As sustainability becomes increasingly important, adopting eco-friendly methods to conserve water and energy has become essential for reducing environmental impact while maintaining efficient operations. This study explores how leading hotel chains implement sustainable practices, including water-saving measures such as low-flow devices, rainwater collection systems, and greywater reuse, along with energy-efficient solutions like LED lighting, intelligent HVAC systems, and renewable energy sources. It also examines the challenges and benefits of these initiatives, focusing on aspects such as cost-efficiency, guest experience, and regulatory compliance. The findings aim to provide insights into how hotels can enhance their conservation efforts without affecting service quality, supporting the industry's transition to more sustainable operations.

***Keywords**: sustainable practices, water saving, energy efficiency, guest experience, hotel chains.*

INTRODUCTION

India's hospitality sector significantly contributes to the country's economy by serving both local and international travelers. As a key tourist hub, Lucknow is home to several chain hotels that depend heavily on water and energy to operate efficiently. Growing concerns about environmental damage and the need for sustainability have driven these hotels to embrace eco-friendly solutions. Common practices now include the installation of low-flow showerheads, sensor-operated faucets, dual-flush toilets, and solar power systems. This study focuses on evaluating how effective these sustainable practices are in conserving water and energy, and how they influence guest perceptions and satisfaction.

REVIEW OF LITERATURE

Tsoutsos et al. (2005) emphasized that solar energy is among the most effective energy sources, offering more advantages over conventional methods, making it a dependable option for promoting sustainable human development. According to Ali et al. (2008), key areas in hotels—such as the main building lighting (including entrances and exits), HVAC systems, and public area illumination—are responsible for the majority of energy consumption, highlighting the urgent need for energy-saving measures.

Garg and Bansal (2000) found that hotels could reduce electricity costs by up to 30% by installing and maintaining occupancy sensors. Similarly, Tiwari et al. (2020) observed that eco-conscious practices such as

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maximizing natural lighting, using electronic key cards, and installing energy-efficient lighting are commonly adopted by star-rated hotels. Subbiah and Kannan (2011) recommended technologies like sensor-based lighting, HVAC systems, variable-speed drives, and energy management systems. For water conservation, they suggested the use of low-flow showerheads, sensor-operated taps, pool drainage barriers, ultra-low-flow toilets, efficient washing machines, and alternative irrigation methods such as rainwater reuse and collecting condensate from air conditioners.

Waris and Hameed (2020) noted that energy-efficient appliances not only help reduce energy consumption but are also preferred by guests for their practicality. Li et al. (2019) highlighted that guests are more likely to choose energy-saving products if they are environmentally aware and have positive attitudes towards sustainability.

Dimara et al. (2017) found that many tourists, especially younger guests or those staying for longer durations, support towel reuse programs—even willing to pay extra to participate—viewing them as meaningful contributions to environmental conservation. Yi et al. (2020) reported that guests appreciate green practices like reflective roofing, rainwater harvesting, and sustainability training for staff and guests, although some believe hotels may use "eco-friendly" labels merely for marketing or government incentives.

Wyngaard and Lange (2013) supported rainwater harvesting, citing it as a valuable alternative to groundwater use, while Farsani et al. (2021) regarded it as a one-time investment that requires long-term planning. They added that local financial institutions often support such water-saving initiatives, with associated costs passed on to guests as a "green fee."

Subbiah et al. (2011) also advised using advanced water-saving technologies such as AI-based taps, dual-flush and vacuum toilets, and systems that reuse wastewater for flushing. They recommended switching from water-cooled to air-cooled ice machines to further reduce water usage.

Verma and Chandra (2016) discovered that guests are open to using recycling bins in both private rooms and public spaces, and some prefer amenities in dispensers over individual sachets. Towel reuse programs also received positive feedback. Namkung et al. (2017) revealed that guests are often willing to pay more to experience green restaurant practices, with some even happy to pay extra for the opportunity to enjoy their meals in an eco-friendly dining environment.

Objectives of the Study

1. To explore the sustainable methods adopted by leading chain hotels in Lucknow for conserving water and energy.
2. To examine how these eco-friendly initiatives influence guest satisfaction and improve overall operational performance.
3. To suggest strategies for increasing the implementation of water and energy-saving practices in chain hotels.

RESEARCH METHODOLOGY

This research adopts a quantitative methodology, utilizing a structured questionnaire distributed to staff and management of chain hotels in Lucknow. The survey comprised sections covering demographic information, current water and energy conservation practices, and their perceived outcomes. Responses were measured on a 5-point Likert scale. The collected data was examined using descriptive statistical methods to evaluate the effectiveness of these eco-friendly initiatives and identify associated challenges.

ANALYSIS AND FINDINGS

Table 1: Demographic profile of respondents

S.No	Variable	Interpretation
1.	Gender Distribution	Among the participants, 51.4% identified as male, while 48.6% identified as female.
2.	Age Group	A majority of respondents (73.8%) were between 18–30 years of age. The 31–40 age group accounted for 16.8%, followed by 41–50 years (6.5%), 51–60 years (0.9%), and those above 60 years (1.9%).
3.	Marital Status	Most participants were single (67.3%), while 30.8% were married. A small portion (1.9%) chose not to disclose their marital status.
4.	Educational Qualifications	Half of the respondents (50.5%) had completed postgraduate studies. 30.8% were undergraduates, 15.9% were graduates, and 1.9% held doctoral degrees.
5.	Occupation	Students made up the largest group at 40.2%, followed by individuals in private jobs (24.3%), government jobs (21.5%), self-employed individuals (7.5%), and others (6.5%).
6.	Occupation	Around 39.3% reported having no income. 17.8% earned up to ₹3 lakhs annually, 23.4% earned between ₹3–6 lakhs, 12.1% between ₹6–10 lakhs, and 7.5% had an annual income above 10 lakhs.

Identification of eco-friendly practices related to water and energy conservation followed by prominent chain hotels in Lucknow.

A review of existing literature reveals that hotels incorporate a range of eco-friendly practices into their daily operations. These include the use of solar panels for energy generation and occupancy sensors that automatically adjust room temperature based on presence. Electronic key cards contribute to energy conservation by activating electrical systems only when the card is inserted, and deactivating them once the card is removed. The adoption of energy-efficient lighting solutions, such as LED bulbs, and the use of energy-saving appliances also play a significant role in reducing power consumption.

In terms of water conservation, hotels employ measures like linen reuse programs, water sprinklers, rainwater harvesting systems, greywater recycling, and the installation of dual-flush toilets.

To minimize waste, many hotels provide eco-friendly in-room amenities, place recycling bins in guest rooms, and use wall-mounted dispensers for toiletries like soap and shampoo. Additionally, some establishments promote green dining options through sustainable menu cards and reduce food waste by donating surplus food to NGOs.

Impact of eco-friendly practices related to water and energy conservation on customer satisfaction and operational efficiency.

Based on the review of previous literature, a comprehensive list of commonly implemented eco-friendly practices in hotels was compiled. To address the second objective—analyzing the impact of these sustainable practices on consumer preferences when selecting star-rated hotels in the NCR region—responses from 101 surveyed guests were evaluated. Using a Likert scale ranging from 1 (Not at all influential) to 5 (Extremely Influential), participants were asked to rate the extent to which eco-friendly initiatives influenced their hotel choice.

Table 2 : Ecofriendly Practices and their Mapped Variables

Variables	Eco-friendly Practices
A	Solar Panels
B	Occupancy Sensors
C	Electronic Key card
D	Energy efficient lighting system
E	Energy efficient appliances
F	Linen Recycle
G	Use of water Sprinklers
H	Rainwater Harvesting
I	Recycling of water
J	Dual flush in bathroom
K	Eco-friendly room amenities
L	Recycling bins in guestrooms
M	Wall fixed dispensers
N	Green menu
O	Donating leftover food

Table 3: Influence of Eco-Friendly Practice Followed by Star Category of Hotels on Individuals

Eco-friendly Practices Variables	Not at all influential (1)	Slightly influential (2)	somewhat influential (3)	moderately influential (4)	extremely influential (5)	total	weighted total	weighted mean	Rank
A	3	5	17	33	43	101	411	4.069307	**6**
B	2	7	32	37	23	101	375	3.712871	**14**
C	1	7	24	30	39	101	402	3.980198	**10**
D	2	1	12	34	52	101	436	4.316832	**1**
E	2	2	12	35	50	101	432	4.277228	**2**
F	1	3	23	36	38	101	410	4.059406	**7**
G	2	5	20	43	31	101	399	3.950495	**11**
H	2	3	19	29	48	101	421	4.168317	**3**
I	2	2	19	33	45	101	420	4.158416	**4**
J	5	4	26	36	30	101	385	3.811881	**13**
K	1	4	14	42	40	101	419	4.148515	**5**
L	2	2	23	36	38	101	409	4.049505	**8**
M	5	3	24	36	33	101	392	3.881188	**12**
N	2	5	19	38	37	101	406	4.019802	**9**
O	1	4	17	36	43	101	419	4.148515	**5**

Analysis and Findings

The analysis revealed that the most widely adopted **energy conservation practices** include:

- **Energy-efficient lighting systems (LEDs)** with a weighted mean score of **4.31**.
- **Solar energy systems** with a mean score of **4.06**.
- **Automated energy management systems** for air conditioning and lighting.

For **water conservation**, the practices adopted were:

- **Rainwater harvesting systems** with a mean score of **4.16**.
- **Low-flow showerheads and dual-flush toilets** with a mean score of **3.81**.
- **Water recycling programs** in laundry and landscaping.

Challenges identified include the high cost of installation, lack of trained staff, and insufficient government incentives. However, the study also found that hotels adopting these practices reported higher customer satisfaction and a positive brand image.

Suggestive Measures

1. The government can offer financial incentives and subsidies to encourage hotels to install solar panels and energy-saving appliances.
2. Training programs should be implemented to educate hotel staff on how to use water and energy efficiently.
3. Hotels should adopt smart technologies, such as IoT-based energy management systems and sensor-based water monitoring, to optimize resource usage.
4. Promoting green certifications can build customer confidence and enhance the hotel's brand image.

CONCLUSION

In conclusion, the study finds that eco-friendly practices for water and energy conservation benefit chain hotels by increasing sustainability, customer satisfaction, and operational efficiency. Broader adoption, however, is dependent on addressing high costs and low awareness. Effective implementation can also significantly improve a hotel's brand image and contribute to a more sustainable hospitality industry.

Limitations and Future Research

- The study was limited to chain hotels in Lucknow and may not represent independent or budget hotels.
- Future research could focus on the economic benefits of eco-friendly practices in the long term and their impact on customer loyalty.

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