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FACTORS OF ECO-FRIENDLY MANAGEMENT PRACTICES IN HOUSEKEEPING: INSIGHTS FROM BUDGET HOTELS IN NCR

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ABSTRACT

Purpose: *The purpose of this study is to explore and classify eco-friendly management practices in the housekeeping operations of budget hotels. The research seeks to identify key factors, group them into meaningful thematic dimensions, and provide theoretical, practical, and policy-level insights into sustainable hospitality practices.*

Design/Methodology/Approach: *The study employed* ***factor analysis*** *using a Rotated Component Matrix to reduce variables and extract underlying components. Eleven components were identified and further synthesized into four thematic dimensions: recycling and cleaning innovation, environmental awareness and institutional measures, water conservation and compliance, and energy and resource management.*

Findings: *The results revealed that eco-friendly housekeeping practices extend beyond operational measures such as energy saving, waste reduction, and water conservation, to include systemic strategies like policy adoption, certification, and staff awareness. These dimensions demonstrate that budget hotels, despite resource constraints, can effectively contribute to global sustainability goals through low-cost and high-impact initiatives.*

Limitations: *The study was limited to budget hotels in the NCR region, which may restrict the generalizability of results to other hotel categories or geographical contexts. Guest perspectives and long-term impacts of green initiatives were not included, suggesting scope for future research.*

Originality/Value: *This research is among the few studies focusing on eco-friendly housekeeping practices in budget hotels. It develops a structured framework of sustainability dimensions that advances theory, offers practical guidance for managers, and provides policy-level direction to support the green transformation of the hospitality sector.*

KEYWORDS: *Determinant factors of Eco- friendly Practices; Housekeeping; Budget hotels; Sustainable development; Delhi (National Capital Region)*

INTRODUCTION

The hospitality sector, especially budget hotels in NCR, faces growing pressure to adopt eco-friendly practices due to rising concerns over sustainability. Hotels are resource-intensive, consuming large amounts of energy and water while generating significant waste, making environmental management vital for efficiency, cost reduction, and guest satisfaction. Housekeeping has introduced sustainable measures like biodegradable cleaning agents, water-saving fixtures, energy-efficient laundry, and recycling programs, aligning with the UN 2030 Sustainable Development Goals (**Blanco-Moreno, 2025**). With the hotel industry contributing nearly 1% of global carbon emissions and high-water use (**Youssef et al., 2022; Florido-Benítez, 2024**), sustainable housekeeping is increasingly a necessity.

Electricity use for lighting, air conditioning, and hot water, combined with heavy water demand and plastic waste, make hotels environmentally costly (**Styles et al., 2015**). Poor practices raise costs and harm ecosystems, while green initiatives improve image and attract eco-conscious consumers (**Songur et al., 2023**). Housekeeping is central to sustainability due to its operational scale and guest interaction. Measures like low-flow showers, towel and linen reuse, and biodegradable detergents reduce impacts while cutting costs (**Subbiah & Kannan, 2011**). Visible actions—such as towel reuse signs or waste segregation—also strengthen green reputation (**Gabarda-Mallorquí et al., 2018**).

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In NCR budget hotels, barriers include limited finances, staff training gaps, and low consumer awareness, unlike luxury hotels that adopt green technologies more easily. However, supportive policies, industry initiatives, and rising eco-conscious demand create opportunities. Even low-cost housekeeping interventions—efficient laundry, waste segregation, and water-saving devices—offer measurable benefits by lowering costs, boosting competitiveness, and supporting sustainability goals.

Need for This Study
Existing research on environmental practices in the hotel industry has predominantly concentrated on international chains and luxury properties. In contrast, budget hotels, despite their wide presence, remain underrepresented in scholarly inquiry. Within the NCR region, systematic investigation into the eco-friendly practices of housekeeping departments is particularly limited.

The current research gaps are threefold: first, a lack of focused studies on budget hotel environmental practices, especially in housekeeping; second, insufficient exploration of the effectiveness and barriers to implementation; and third, limited empirical work specific to NCR, a dense urban hub in India. Addressing these gaps is both timely and significant.
This study seeks "***to examine the determinants of eco-friendly management practices in the housekeeping operations of NCR budget hotels"***.

REVIEW OF LITERATURE

The growing concern for environmental sustainability has placed hospitality, particularly housekeeping, under scrutiny. As a resource-intensive department, housekeeping influences energy use, water management, waste disposal, and chemical application. Eco-friendly practices such as energy conservation, waste reduction, and green cleaning are essential for environmental protection and guest satisfaction. While luxury hotels often lead due to greater resources, budget hotels face distinct challenges. Existing studies highlight cost, staff awareness, managerial commitment, guest expectations, and regulatory pressures as major determinants. In India, especially in the NCR, systematic research on sustainable housekeeping remains limited.

Globally, the hotel industry is recognized as a high-impact sector across economic, social, and environmental pillars (**Popa, 2023**). Hotels consume vast energy and water resources, contributing to emissions and waste. Many properties adopt energy-efficient lighting, renewable energy, recycling systems, and eco-certifications. In Spain, water overuse by tourists illustrates the need for better resource management (**Florido-Benítez, 2024**). Benchmarks and best practices help reduce costs and consumption (**Styles et al., 2015**), while green technologies such as intelligent systems and renewable energy reshape management (**Songur et al., 2023**). However, adoption varies high-end hotels invest heavily, while budget hotels struggle with financial and managerial constraints (**Rassiah et al., 2024**).

Housekeeping plays a central role in sustainability. Routine tasks—room cleaning, linen changes, detergent use, and waste handling—consume significant resources. Biodegradable cleaning agents, linen reuse policies, and reduced single-use items can cut environmental impacts (**Subbiah & Kannan, 2011**). Employee engagement and customer participation are equally critical.

Economy hotels face greater barriers, particularly in developing countries, due to funding shortages, limited technology, and training gaps. In India, rapid urbanization and poor resource planning exacerbate ecological pressures (**Garg, 2023**). NCR budget hotels struggle with costs, staff awareness, and price-sensitive consumers, though rising eco-consciousness presents opportunities (**Ben Youssef & Zeqiri, 2022**). Even simple measures like efficient laundry, waste segregation, and water-saving fixtures can yield benefits.

Empirical studies further stress determinants of eco-friendly housekeeping. **Gabarda-Mallorquí et al. (2018)** highlighted the role of guest characteristics in conservation. **Choy et al. (2021)** revealed gaps between policy and practice, often caused by weak communication. **Subbiah & Kannan (2011)** underscored technological interventions, while **Blanco-Moreno et al. (2025)** identified emerging themes such as consumer behaviour, CSR, overtourism, and sustainable communication. Together, these findings show that while technology and regulation are vital, sustainable progress also depends on customer engagement and supportive market mechanisms.

Overall, literature indicates that eco-friendly housekeeping is shaped by cost, management commitment, staff training, and guest behaviour. For budget hotels in the NCR, barriers remain, yet opportunities lie in incremental measures, policy support, and consumer demand. The review highlights the need for India-specific research to

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identify determinant factors, positioning eco-friendly housekeeping as both an operational necessity and a strategic advantage in the evolving hospitality industry.

METHODOLOGY & SAMPLE DESIGN

Research Gaps

Existing research offers valuable insights into environmental management in the hotel industry, but key gaps remain. Most studies focus on high-end or international chains, with little attention to economy hotels. At the departmental level, there is limited empirical analysis of eco-friendly practices in housekeeping. Regional studies, particularly on NCR budget hotels, are scarce. Moreover, the role of customer behaviour and employee engagement in housekeeping sustainability requires deeper integration. This study addresses these gaps by examining factors influencing environmental practices in budget hotel housekeeping in NCR, contributing to both academic research and industry application.

Sample Design used in the Study

The researcher has collected the data from 432 Budget Hotels from National Capital Region.

STATISTICAL ANALYSIS & RESULTS

The analysis focuses on key factors influencing the adoption of eco-friendly housekeeping practices in budget hotels of NCR. It examines variations in awareness, implementation, and effectiveness, considering cost, managerial commitment, staff training, guest expectations, and regulatory support. The study highlights gaps between intended policies and actual practices to identify the main drivers and barriers of sustainable housekeeping.

Demographic profile of respondent

Table 1 presents the demographic characteristics of the surveyed budget hotels in NCR, including type of ownership, size of the housekeeping department, number of rooms, and hotel classification. These variables provide essential contextual insights for analyzing the adoption of eco-friendly housekeeping practices.

Table 1: Demographic Profile of Budget Hotels in the National Capital Region (NCR)

Demographic Profile	Types	Valid Frequency	Valid Percent
Type of ownership of hotel	Sole ownership	76	17.6%
	Partnership	122	**28.2%**
	Privately owned company	97	22.5%
	leased	72	16.7%
	Franchise	49	11.3%
	Outsourced/ Management Contract	16	3.7%
No. of employees in housekeeping department	1-5	217	**50.2%**
	6-10	163	37.7%
	11-15	49	11.3%
	16-20	3	0.7%
No of rooms	1-10	231	**53.5%**
	11-20	191	44.2%
	21-30	10	2.3%
Classification of hotel	Chain	133	30.8%
	Non chain	169	**39.1%**
	Independent	130	30.1%

From the above table 1 showcase the demographic profile of the respondents, which reveals that budget hotels in NCR are largely partnership-based (28.2%) and privately owned (22.5%), with sole ownership (17.6%) and leased properties (16.7%) also contributing significantly, while franchises (11.3%) and outsourced contracts (3.7%) remain limited. Most hotels operate with small housekeeping teams, as over half (50.2%) employ only 1–5 staff and 37.7% employ 6–10, indicating limited manpower for eco-friendly initiatives. Similarly, most hotels are small in scale, with 53.5% having 1–10 rooms and 44.2% having 11–20 rooms, reflecting capacity constraints in adopting advanced sustainability practices. In terms of classification, non-chain hotels (39.1%) dominate, followed closely by chain (30.8%) and independent hotels (30.1%), suggesting a diverse mix but with non-chain hotels leading the segment. Overall, the data highlights that most NCR budget hotels are small, independently managed, and resource-constrained, factors that may significantly shape their ability to implement eco-friendly housekeeping practices.

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Objective: Explore various factors of Eco-Friendly Management Practices in Housekeeping Operations

For the study of above objective factor analysis was used. It is a data reduction technique. ***Factor Analysis Result -*** To achieve the objective of exploring eco-friendly management practices in housekeeping operations, factor analysis was employed. The Rotated Component Matrix (shown in Annexure, Table 2) extracted eleven components with eigenvalues greater than one, cumulatively explaining 75.19% of the total variance. This high explanatory power indicates that the selected variables effectively represent the underlying structure of eco-friendly housekeeping practices in budget hotels.

Further table 3, the extracted components were grouped and meaningfully labelled.

Table 3: Extracted component and suggested names

Component extracted	*Items*	*Variable included*	*Extracted Components and Suggested Names*
Component 1	*04*	*V12, V13, V14, V15*	***Plastic & Reusable Material Management***
Component 2	*04*	*V7, V8, V9, V10*	***Toiletries & Waste Minimization Practices***
Component 3	*02*	*V28, V29*	***Regulatory & Water-Saving Compliance***
Component 4	*03*	*V31, V32, V34*	***Ozone-Based Environmental Practices***
Component 5	*03*	*V24, V30, V33*	***Laundry & Linen Sustainability***
Component 6	*05*	*V1, V4, V16, V17, V18*	***Sustainable Laundry Alternatives***
Component 7	*04*	*V5, V25, V26, V27*	***Certification & Policy Promotion***
Component 8	*05*	*V19, V20, V21, V22, V23*	***Safe & Green Chemical Practices***
Component 9	*01*	*V2*	***Energy Efficiency Practices***
Component 10	*03*	*V3, V5, V6*	***Natural Resource Utilisation***
Component 11	*01*	*V11*	***Room-Level Recycling Practices***
75.19 % of CV	*34*	*34*	*11 components, Eigan value more than 1.*

From the above table3, it is clear, that together, these components highlight diverse yet interrelated areas of environmental sustainability within housekeeping operations, ranging from operational measures to institutional mechanisms.

For analytical clarity, the eleven components were further synthesized into **four broad thematic dimensions**:

- ✓ **Recycling and Cleaning Innovation** (Components 1, 4, 11)
- ✓ **Environmental Awareness and Institutional Measures** (Components 7, 8)
- ✓ **Water Conservation and Compliance** (Components 3, 5)
- ✓ **Energy and Resource Management** (Components 2, 6, 9, 10)

This classification reveals that eco-friendly housekeeping is a multidimensional construct that combines tangible operational practices with systemic measures such as compliance, certifications, and awareness-building.

Research Significance

This study is significant as it provides a structured framework for classifying eco-friendly housekeeping practices in budget hotels, an underexplored segment of hospitality research. The findings offer practical guidance for managers to prioritize cost-effective sustainability measures and policy insights for promoting green initiatives in small and medium hotels. Overall, it highlights eco-friendly housekeeping as both an operational need and a strategic driver of competitiveness and long-term sustainability.

Discussion

The analysis revealed that eco-friendly housekeeping practices in budget hotels can be grouped into eleven components and four broad dimensions, encompassing both operational measures and institutional strategies. The findings show that even with limited resources, budget hotels can adopt low-cost initiatives such as waste minimization, water conservation, and energy efficiency, while gradually incorporating advanced practices like ozone-based cleaning and eco-friendly chemicals. These results align with global sustainability goals and highlight the dual role of housekeeping—operational efficiency and environmental stewardship. However, barriers such as financial constraints, lack of training, and low guest awareness must be addressed through policy support, staff development, and cultural change.

CONCLUSION

The study concludes that housekeeping departments play a vital role in driving eco-friendly practices in budget hotels. Through factor analysis, eleven components were identified and synthesized into four thematic dimensions covering recycling, awareness, compliance, and resource management. The findings highlight that sustainability is achievable even with limited resources by prioritizing low-cost, high-impact initiatives. Overall, eco-friendly

housekeeping is both an operational necessity and a strategic pathway toward competitiveness and alignment with global sustainability goals.

AREA FOR FURTHER RESEARCH

Future research could extend this study to different hotel categories and regions for comparative insights, while incorporating customer perspectives to assess awareness and willingness to support eco-friendly practices. Longitudinal studies may also evaluate the long-term financial and environmental impacts of sustainable housekeeping initiatives and emerging technologies.

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Annexure 1 TABLE 2: ROTATED COMPONENT MATRIX

Rotated Component Matrix												
		Components										
S. No	Eco Friendly Housekeeping Practices	1	2	3	4	5	6	7	8	9	10	11
V12	Avoid use of plastic straws	**.680**										
V13	Use containers having lids	**.888**										
V14	Use refillable soap containers	**.906**										
V15	Use reusable glass bottles	**.835**										
V7	Use of Left over toilet papers for staff washrooms.		**.853**									
V8	Low flow toilets and showers are used in bathrooms.		**.879**									
V9	Separate bins for dry and wet waste.		**.772**									
V10	Partially used shampoo and conditioners bottles are refilled and reused.		**.667**									
V28	Government and legal aspirations must be imposed.			**.931**								
V29	Minimise the amount of water used on floor care.			**.903**								
V31	Proper disposal of cleaning solutions				**.471**							
V32	Ozonisers can be used in rooms to improve indoor air quality.				**.964**							

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V34	In laundry ozone can be used as a cleaning agent.				.964							
V24	Linen is sending for laundry if soiled after three days.					.745						
V30	Ensure adequate ventilation for drying laundry.					.845						
V33	Ozone treatment for swimming pool cleaning.					.411						
V1	Employees encouraged to use regular mugs for coffee and water.						.287					
V4	Use of energy efficient appliances.						.413					
V16	Use canvas bags /cloth bag/ basket for laundry						.768					
V17	Try to make compost using biodegradable or organic waste						.797					
V18	Separate bin for plastic and aluminium cans.						.519					
V5	Use of motion sensors in low traffic area to conserve electricity.							.401				
V25	Linen must be changed when new guest is coming.							.551				
V26	Certification must be obtained to priority.							.637				
V27	Promotion of 5 R's Refuse, Reduce, Reuse, Recycle and Restored							.720				
V19	Staff must be well informed about ecological policy of hotel.								.221			
V20	Rainwater use for flushing toilets.								.519			
V21	Hazardous chemicals are stored at safe and secure place.								.509			
V22	Environment friendly chemicals are used in rooms.								.820			
V23	Containers are tightly covered and properly labelled.								.594			
V2	All lights are turned off when not in use.									.646		
V3	Escalators are turned off between late hours from 11 pm to 6 am.										.778	
V5	Use of natural lighting during daytime hours.										.504	
V6	Use of Ozonisers in lobbies.										.527	
V11	Recycling bins are provided in rooms											.653

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization, [A] Rotation converged in 16 iterations.