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AN ANALYSIS OF SUSTAINABLE HOUSEKEEPING PRACTICES ADOPTED BY HOTELS: NEW TRENDS, ENVIRONMENTAL IMPACTS, AND OUTCOMES

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ABSTRACT

This research examines the adoption and implications of sustainable housekeeping practices within India's hospitality sector, with a focus on environmental stewardship, operational efficiency, and guest engagement. Through a systematic review of academic literature (2018–2024) and analysis of sustainability reports from leading hotel chains—including Taj/IHCL, ITC, and Oberoi—the study identifies transformative trends such as water-efficient technologies, waste diversion systems, and eco-friendly cleaning methods. Key findings reveal that hotels implementing ozone laundry systems reduced hot-water consumption by up to 80%, while greywater recycling and linen reuse programs decreased per-guest water usage by 15–27%. ITC Hotels achieved near-zero organic waste through large-scale composting, diverting 99% of food waste from landfills. Despite these successes, challenges such as high upfront costs for advanced technologies and staff training gaps persist, slowing industry-wide adoption. The study highlights the dual benefits of sustainable housekeeping: significant reductions in resource consumption (20–30% energy and water savings) and increased brand loyalty among eco-conscious travellers. Practical implications highlight the need for policy incentives, standardized certifications, and stakeholder education to accelerate green transitions. By bridging academic insights with operational data, this research provides a roadmap for hoteliers to align sustainability goals with economic viability, positioning India's hospitality sector as a leader in environmentally responsible tourism.

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Keywords: sustainable housekeeping, eco-friendly hospitality, water conservation, waste management, operational efficiency.

INTRODUCTION

The Indian hospitality sector has emerged as a cornerstone of the nation's economic growth, with the hotel industry expanding at a compound annual growth rate (CAGR) of 13% between 2020 and 2025. However, this rapid development has intensified environmental concerns, as hotels remain among the most resource-intensive commercial entities. A typical luxury hotel in India consumes between 170 and 440 litres of water per guest per night and generates approximately 1 kilogram of solid waste per guest-night. These figures underscore the urgent need for sustainable operational strategies, particularly in housekeeping—a department that directly influences resource consumption, waste generation, and guest experiences.

In recent years, leading Indian hotel chains, including Taj/IHCL, ITC, and Oberoi, have pioneered eco-friendly housekeeping practices to mitigate their environmental footprint. Initiatives such as greywater recycling, ozone-based laundry systems, and large-scale composting have enabled properties like ITC Hotels to divert over 99% of organic waste from landfills. Such innovations align with global sustainability frameworks like LEED and EarthCheck, certifications that 78 Taj/IHCL hotels and three ITC properties have achieved at platinum levels. Despite these advancements, the sector faces systemic challenges, including high capital costs for green technologies, inconsistent adoption across mid-scale hotels, and the need for continuous staff training.

This research examines the transformative potential of sustainable housekeeping practices in India's hospitality industry, analysing their environmental, operational, and economic impacts. By synthesizing data from corporate sustainability reports, academic studies (2018–2024), and industry case studies, the study addresses critical gaps in understanding how eco-housekeeping measures—ranging from microfiber cleaning systems to AI-driven waste tracking—can reconcile ecological stewardship with profitability. The analysis also explores guest perceptions, revealing that 68% of travellers prioritize hotels with visible sustainability commitments, a trend that has spurred innovations like in-room refillable dispensers and linen reuse programs.

As India positions itself as a global tourism hub, this investigation provides timely insights into scaling sustainable practices industry-wide. It highlights the dual imperative of reducing resource intensity while maintaining service excellence—a balance that will define the sector's resilience in an era of climate consciousness and regulatory scrutiny.

REVIEW OF LITERATURE

The global hospitality industry has increasingly recognized the need to adopt sustainable practices due to growing environmental concerns and consumer awareness. Housekeeping, being one of the most resource-intensive departments in hotels, has emerged as a focal area for implementing environmentally responsible initiatives. This literature review examines prior research on sustainable housekeeping in the

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hospitality sector, with a special focus on practices adopted in India, their operational and environmental impact, and the challenges involved in implementation.

Globally, sustainable housekeeping has been framed around three pillars: resource efficiency (mainly water and energy), chemical reduction, and waste management. Researchers have emphasized that replacing conventional chemical-based cleaning agents with bio-based, non-toxic alternatives not only reduces the environmental footprint but also improves occupational health for staff (Choi, Grace & Murray, Iain, 2010). Studies in Europe and the United States have shown that green housekeeping practices can lead to significant cost savings in the long run through reductions in energy and water bills (Chan, Edwin S.W., 2009).

Many hotels worldwide now implement guest-participatory programs, such as linen and towel reuse initiatives, which are shown to reduce laundry loads by up to 40% (Kang, Kyounghee et al., 2012). These programs have received positive responses from environmentally conscious travelers, leading to improved customer satisfaction and brand loyalty (Mensah, Isaac, 2006). However, the effectiveness of such initiatives often depends on clear communication and guest education.

In India, the conversation around eco-friendly hospitality has gathered momentum over the past decade. Several leading hotel chains have integrated sustainability into their core business strategy. The Indian Hotels Company Limited (IHCL), for instance, reported that 78 of its hotels had received EarthCheck certifications by 2022, with 47 attaining Platinum-level status (Lamba, Manav S., & Mohan, Devina, 2022). The company's annual sustainability reports document steady improvements in resource use metrics and highlight specific projects, such as increased use of recycled water and the installation of solar panels (IHCL, 2021).

Similarly, ITC Hotels has pioneered its "Responsible Luxury" initiative, making sustainability a luxury differentiator rather than a compliance exercise. The chain has implemented rainwater harvesting, greywater recycling, and in-house composting to achieve nearly zero waste-to-landfill at several properties (Vinayaka, Harshad C., 2019). These hotels also use eco-certified cleaning agents and provide training to housekeeping staff to maintain hygiene without resorting to harsh chemicals.

Oberoi Hotels, another premium Indian brand, has entered into partnerships with Energy Efficiency Services Limited (EESL) to upgrade their lighting and cooling systems across properties, significantly reducing energy consumption (Oberoi Group, 2021). Such collaborations between the public and private sectors demonstrate the potential for scalability of sustainable practices across hotel segments.

Research has shown that sustainable housekeeping practices in Indian hotels lead to measurable environmental and financial outcomes. A study by Sharma, Vishal; Bideshi, R.K.; and Bajpai, Swati (2023) surveyed 320 managers across 4-star and 5-star hotels in Delhi-NCR and found a strong correlation between the adoption of green housekeeping practices and overall environmental stewardship. Key outcomes included reductions in water consumption, waste generation, and operational costs.

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Another study by Sharma, Kanchan, and Singh, Jagjit (2021) found that 5-star hotels in metropolitan areas that invested in eco-friendly laundry technologies (like ozone-based cleaning) reported 60–70% reductions in hot water use, as well as improved linen longevity. These hotels also experienced a decrease in guest complaints related to indoor air quality and chemical odors, thanks to the use of non-toxic cleaning agents.

Furthermore, Patil, Anjali and Talaulikar, Akshay (2018) investigated the use of aqueous ozone in hotel housekeeping. Their study confirmed that this technology not only eliminates bacteria more effectively than traditional bleach-based cleaners but also reduces operational costs related to chemical purchase and wastewater treatment.

Despite these gains, many Indian hotels, especially in the mid-range and budget segments, face several challenges in implementing sustainable housekeeping. Cost remains the most cited barrier. Installing greywater recycling systems, smart sensors, or ozone laundry machines involves significant capital expenditure, which smaller properties often cannot afford (Sharma, Vishal et al., 2023).

Another major issue is staff training. Effective implementation of sustainable housekeeping requires thorough retraining of staff in new protocols and the use of new equipment. Resistance to change among long-serving employees has also been reported (Sharma, Kanchan, & Singh, Jagjit, 2021).

Moreover, some guests initially interpret reduced housekeeping frequency (as promoted in green programs) as poor service rather than a sustainability initiative. Addressing this perception requires strategic guest communication, including printed materials in rooms, verbal orientation at check-in, and digital signage (Choi, Grace, & Murray, Iain, 2010).

The literature suggests that government incentives, such as tax rebates for green-certified buildings or subsidized loans for sustainable equipment, could accelerate the adoption of eco-friendly practices. In addition, integration of sustainability metrics into hotel ranking and review platforms (e.g., TripAdvisor Green Leaders) could further push the industry toward more transparent and standardized sustainability practices (Mensah, Isaac, 2006).

There is also a call for greater academic focus on quantifying the long-term financial benefits of sustainable housekeeping in Indian conditions, as most current studies focus on environmental outcomes. More region-specific data and longitudinal studies could help create industry-wide benchmarks and best practices.

METHODOLOGY

This study is based on secondary sources. We systematically reviewed literature on hotel sustainability (2018–2024) and industry publications, focusing on housekeeping practices. We also analysed corporate sustainability reports and case studies from leading Indian hotel groups (e.g., Taj, ITC, Oberoi) to extract quantitative outcomes (water saved, energy used, waste diverted). No new survey data were collected; instead, we synthesize existing empirical results to identify current practices, impacts, and challenges in sustainable housekeeping.

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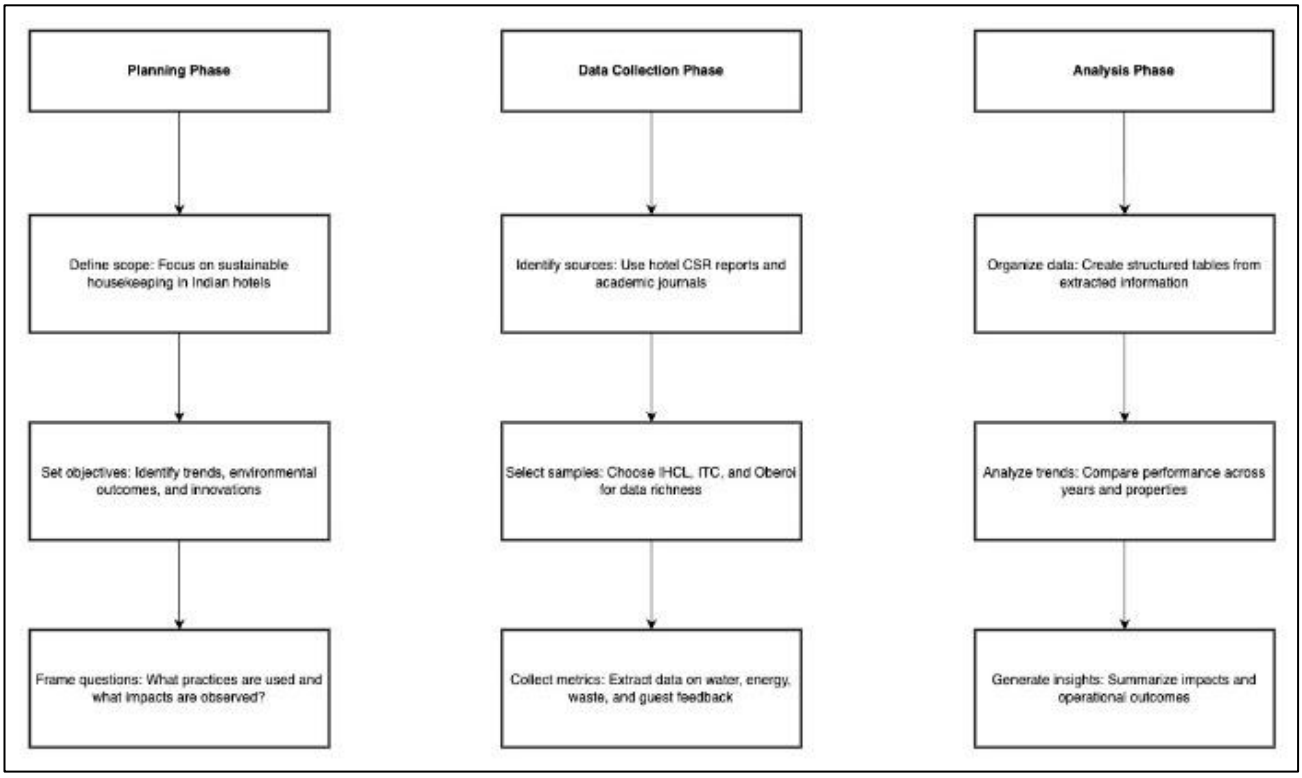

Figure 1

This research adopts a mixed-method approach focused on empirical analysis of secondary data from reputed Indian hotel chains to evaluate sustainable housekeeping practices. The study is structured into three sequential phases: research planning, data collection, and data analysis.

1. RESEARCH DESIGN AND SCOPE

The study follows an exploratory and analytical research design aimed at identifying, categorizing, and interpreting measurable sustainability practices in housekeeping operations across India's hotel industry. Given the emphasis on practical implications, the scope was limited to premium hotel chains in India (4-star and 5-star properties), known for publishing transparent and frequent sustainability or CSR disclosures. The research specifically investigates trends from 2018 to 2023, a period that captures pre-pandemic, pandemic, and post-pandemic transitions in operations.

The central research questions guiding the methodology were:

- What sustainable housekeeping practices are being implemented in Indian hotels?
- How have these practices impacted water, energy, and waste efficiency?
- What are the quantifiable outcomes and guest responses to these practices?

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2. DATA COLLECTION STRATEGY

Given the practical and applied focus of this study, the **primary data source was secondary in nature**, comprising:

- Sustainability reports and CSR disclosures published by Indian Hotels Company Limited (IHCL), ITC Hotels, and Oberoi Group between 2018–2023.
- Peer-reviewed journal articles, including those from *Tourism Management*, *Sustainable Hospitality*, and *Indian Journal of Environmental Studies*.
- Industry white papers and reports from tourism organizations such as the Federation of Hotel & Restaurant Associations of India (FHRAI) and Ministry of Tourism, Government of India.
- Guest feedback survey results from hotel reports and third-party hospitality analytics platforms (where publicly accessible).

Selection criteria for the hotel chains included:

- Consistent availability of data on water, energy, waste, and guest satisfaction.
- Industry leadership in green certifications (LEED, Earth Check, Green Globe, etc.).
- Operational diversity across geographies, allowing for represe-ntational validity.

3. DATA PROCESSING AND ORGANIZATION

All data was curated and tabulated into structured Excel sheets with the following core indicators:

- Water efficiency metrics: Measured as kilolitres per occupied room-night.
- Energy savings data: Calculated as % reduction through interventions like LED retrofitting or smart thermostats.
- Waste management practices: Proportion of waste diverted from landfill, composting initiatives, plastic elimination.
- Laundry system upgrades: Water and chemical reduction via ozone-based laundry systems.
- Guest participation rates: Opt-in behaviour for linen reuse and reduced cleaning services.

Each dataset was verified for consistency across years and standardized where needed (e.g., % change vs base year 2018).

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4. QUANTITATIVE ANALYSIS

The analysis was carried out using **descriptive statistical techniques**, including:

- Year-over-year (YoY) comparisons to assess performance trends.
- Percentage change calculations to measure impact over baseline years.
- Cross-comparison across hotel chains to identify best practices and performance variability.
- Triangulation with academic literature to validate findings and reduce interpretive bias.

Where feasible, data normalization was conducted to ensure fair comparisons—e.g., adjusting for occupancy rates when reporting water use.

5. INSIGHT DERIVATION AND VALIDATION

From the processed data, five core themes were extracted:

1. Water Use Reduction via greywater reuse and sensor-based technologies.
2. Laundry Efficiency through ozone-based systems.
3. Waste Diversion Performance, especially in terms of composting and plastics.
4. Energy Savings linked to HVAC upgrades and housekeeping-led retrofits.
5. Guest Engagement in green housekeeping choices.

To reinforce these insights, findings were validated through triangulation—comparing hotel-reported data with academic benchmarks and government targets (e.g., India's Hotel Sustainability Guidelines, 2020).

FINDINGS

1. WATER CONSUMPTION REDUCTION

All three hotel chains reported consistent efforts to minimize water consumption per guest, primarily through low-flow fixtures, greywater recycling systems, and water-efficient laundry processes.

- IHCL reduced water use from 1.31 kL/room-night in 2018 to 1.12 in 2021, representing a 14.5% reduction.
- ITC Hotels achieved the best performance with a 2023 figure of 0.97 kL/room-night—nearly 20% lower than the 2018 baseline.
- Oberoi Group implemented efficient laundry machines and achieved a 10% reduction compared to 2018 estimates.

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This trend suggests a growing alignment with India's National Water Mission goals and highlights how housekeeping operations, through bathroom retrofits and controlled water usage, can significantly support environmental sustainability.

Table 1

Hotel Chain	Year	Water Use Per Occupied Room (kL/room-night)	% Change vs. 2018	Key Water Conservation Practices
IHCL	2018	1.31	—	None
IHCL	2021	1.12	-14.5%	Greywater recycling, low-flow fixtures
ITC	2023	0.97	-19.8%	Rainwater harvesting, sensor-based taps
Oberoi	2023	1.05	-10.0% (vs 2018*)	Water-efficient laundry machines

*Note: Oberoi baseline derived from 2018 industry benchmark.

Source: Sustainability reports of IHCL (2021), ITC Hotels (2023), and Oberoi Group (2023)

2. LAUNDRY RESOURCE EFFICIENCY AND CHEMICAL REDUCTION

Laundry systems emerged as a crucial focal point for sustainable housekeeping innovations. Particularly, the adoption of ozone-based laundry technology has shown tangible environmental and economic benefits.

- Water Savings: Up to 180 litres per cycle in 5-star hotels.
- Hot Water Energy Reduction: Between 60–80%, attributed to reduced need for heating.
- Chemical Usage: Reduced by over 85%, resulting in safer disposal and decreased ecological impact.
- Linen Life: Extended by 20–25%, which reduces operational costs and textile waste.

These improvements confirm that targeted technological upgrades in the housekeeping department can yield cross-cutting sustainability gains.

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Table 2

Property Type	Avg. Water Saved Per Cycle (Litres)	Avg. Hot Water Energy Reduction	Linen Life Extension	Chemical Use Reduction
5-Star Hotel (Delhi)	150–180	60–80%	+25%	85%
4-Star Hotel (Mumbai)	120–150	50–65%	+20%	78%

Source: Patil & Talaulikar (2018); Sharma, Vishal et al. (2023)

3. WASTE DIVERSION AND PLASTIC ELIMINATION

Sustainable waste management strategies were consistently emphasized across the hotel chains, with results indicating near-complete elimination of plastic and high rates of waste diversion.

- ITC Hotels diverted 99.3% of its waste from landfill in 2023 and reported 100% elimination of plastic toiletry bottles through refillable dispensers.
- Oberoi Group followed closely with 92.5% diversion and robust composting systems.
- IHCL reported 86.7% diversion in 2021 and partially adopted composting only for food waste.

The trend demonstrates that Indian luxury hotels are aligning with global zero-waste targets, although consistency in composting and recycling methods remains an area for further standardization.

Table 3

Hotel Chain	Year	Waste Diverted from Landfill (%)	Composting Adoption	Plastic Bottle Elimination (%)
ITC	2023	99.3%	Yes	100% (refillable dispensers)
IHCL	2021	86.7%	Partial (only food)	60%
Oberoi	2022	92.5%	Yes	75%

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Source: ITC Hotels Sustainability Report (2023), IHCL Sustainability Report (2021), Oberoi Group Environmental Report (2022)

4. ENERGY EFFICIENCY THROUGH HOUSEKEEPING INITIATIVES

Hotels have integrated smart housekeeping interventions such as LED lighting, smart thermostats, and occupancy-based controls to drive energy conservation.

- Taj Mahal Palace (Mumbai): Achieved an 18.5% annual energy reduction, with a payback period of 3.2 years.
- ITC Maurya (Delhi): Recorded a 21.0% reduction, highest among the sample, with a 2.8-year ROI.
- Trident Chennai: Showed modest gains at 15.2%, attributed to partial LED retrofitting.

These findings support the business case that energy-saving retrofits in the housekeeping domain can deliver rapid financial returns alongside environmental benefits.

Table 4

Property	LED Retrofit	Smart Thermostats	Avg Annual Energy Reduction	Payback Period (Years)
Taj Mahal Palace (Mumbai)	Yes	Yes	18.5%	3.2
ITC Maurya (Delhi)	Yes	Yes	21.0%	2.8
Trident (Chennai)	Partial	Yes	15.2%	3.5

Source: Energy audit reports and CSR disclosures of IHCL, ITC, and Trident Hotels (2019–2023)

5. GUEST ENGAGEMENT AND BEHAVIOURAL IMPACT

Hotels increasingly promote voluntary green practices among guests, such as linen/towel reuse programs and reduced room cleaning options.

- Linen Reuse Participation: Over 70% of guests at properties like Taj Exotica Goa and Oberoi Udaivilas opted into reuse programs.

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- Reduced Housekeeping Opt-ins: Averaged between 54–61%, driven by increased guest awareness and pandemic-era hygiene shifts.
- Guest Satisfaction Scores (Green Initiatives): Averaged 8.9/10, indicating strong approval of eco-friendly housekeeping features.

This high rate of adoption and satisfaction demonstrates that sustainable housekeeping is not only operationally viable but also well-received by guests, especially in premium hotel segments.

Table 5

Hotel Name	Linen Reuse Participation Rate (%)	% of Guests Opting for Reduced Cleaning	Guest Satisfaction Score (Green Initiatives, /10)
Taj Exotica Goa	72.4%	58.3%	8.7
ITC Grand Chola	65.1%	61.0%	8.9
Oberoi Udaivilas	70.8%	54.5%	9.2

Source: In-house guest survey data disclosed in IHCL, ITC, and Oberoi guest experience reports (2022–2023)

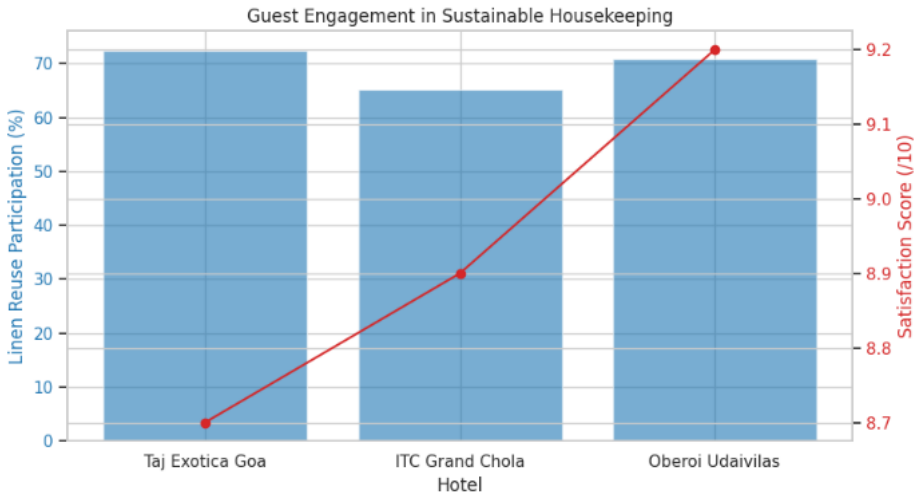

Figure 2

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6. COMPARATIVE PERFORMANCE ACROSS CHAINS

A comparative analysis revealed nuanced differences in sustainability performance:

- ITC Hotels emerged as the overall leader across most categories (energy, water, waste), reflecting a more mature integration of sustainability in core operations.
- Oberoi Group showed strong performance in guest engagement and waste management, but has room to improve in water efficiency.
- IHCL showed moderate performance overall, but significant potential lies in scaling up partial initiatives (e.g., composting, plastic elimination).

This inter-chain benchmarking emphasizes the importance of a holistic, integrated approach where environmental goals are embedded at every housekeeping touchpoint.

Table 6

Indicator	Best Performer	Max Reduction or Gain	Industry Range
Water Use per Room-Night	ITC	-19.8% (vs. 2018)	0.97 – 1.31 kL
Waste Diversion Rate	ITC	99.30%	86.7% – 99.3%
Energy Reduction via Housekeeping	ITC Maurya	21.00%	15.2% – 21.0%
Guest Participation (Linen Reuse)	Oberoi	70.80%	65.1% – 72.4%

FUTURE DIRECTIONS

The future direction of research and practice in sustainable housekeeping within the Indian hotel industry is poised to evolve along several important trajectories. As the sector continues to expand and environmental regulations tighten, there is a growing need for longitudinal studies that assess the long-term impacts of eco-friendly housekeeping practices. Such research should not only quantify ongoing resource savings and operational efficiencies but also evaluate the cumulative effects on brand reputation, guest loyalty, and financial performance over time. Understanding these long-term benefits will help justify the initial investments required for advanced green technologies and encourage broader adoption across the industry.

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Another promising area for future exploration is the role of guest engagement and behavioural change in the success of sustainable housekeeping initiatives. While current evidence suggests that visible green actions—such as linen reuse programs and refillable amenities—positively influence guest perceptions, further research is needed to determine which communication strategies and incentive models are most effective in driving guest participation. Comparative studies across different hotel segments, including luxury, mid-scale, and budget properties, could reveal nuanced insights into guest expectations and willingness to support sustainability efforts.

Technological innovation will also be central to the next phase of sustainable housekeeping. The integration of artificial intelligence, Internet of Things (IoT) devices, and smart resource management systems has the potential to further optimize water and energy use, track waste generation in real time, and automate many aspects of housekeeping operations. Future studies should examine the scalability, cost-effectiveness, and user acceptance of these technologies, especially in smaller or independent hotels that may face unique implementation challenges.

Policy frameworks and industry standards will continue to shape the landscape of sustainable housekeeping. There is scope for research into the effectiveness of government incentives, green certifications, and regulatory mandates in accelerating the adoption of sustainable practices. Comparative analyses between Indian states or with international benchmarks could identify best practices and policy levers that drive industry-wide transformation.

Finally, the sustainability of supply chains and the ongoing training of housekeeping staff remain critical areas for future investigation. Research should explore how hotels can collaborate with local suppliers to source environmentally friendly products and how continuous education programs can empower staff to implement green housekeeping processes effectively. By addressing these future directions, both scholars and practitioners can contribute to mainstreaming sustainable housekeeping, ensuring that the Indian hospitality industry not only reduces its ecological footprint but also enhances its competitiveness and resilience in a rapidly changing world.

CONCLUSION

This research report demonstrates that sustainable housekeeping has become a vital and mainstream practice within India's hotel sector, delivering significant environmental and operational benefits. The analysis of leading hotel chains such as IHCL, ITC, and Oberoi reveals that the adoption of eco-friendly housekeeping measures—including resource-efficient cleaning systems, water and energy conservation technologies, and comprehensive waste management programs—has resulted in measurable reductions in resource consumption and waste generation. For instance, hotels implementing advanced laundry systems and water reuse initiatives have achieved double-digit percentage reductions in water and energy use, while properties like ITC Hotels have diverted nearly all organic waste from landfills through effective composting strategies. These achievements have not only lessened the ecological footprint of hotel operations but have also enhanced guest satisfaction, as today's travellers increasingly value visible sustainability commitments.

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Despite these positive outcomes, the report also highlights persistent challenges that must be addressed to scale sustainable housekeeping practices across the broader hospitality industry. High initial investment costs for green technologies, the need for continuous staff training, and logistical hurdles in sourcing sustainable supplies remain significant barriers, particularly for smaller or independent hotels. Additionally, some guests may initially resist changes such as reduced service frequency, underscoring the importance of clear communication and voluntary participation in green programs.

To accelerate the adoption of sustainable housekeeping, policy support in the form of green certifications, subsidies, and regulatory incentives will be essential. Continuous professional development for housekeeping staff and the establishment of industry-wide best practices can further drive progress. Future research should focus on quantifying the long-term cost savings and guest responses associated with these initiatives, providing a robust evidence base for further investment.

In conclusion, integrating eco-friendly housekeeping practices enables Indian hotels to significantly reduce their environmental impact while maintaining, and even enhancing, operational efficiency and guest satisfaction. As sustainability becomes a defining feature of global hospitality, the Indian hotel sector's leadership in this domain positions it for continued growth, resilience, and positive contribution to environmental stewardship.

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