

**Identification of Operational Waste in Hotels:
A Descriptive Study of Key Departments within the Hospitality Industry**

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ABSTRACT

This study aims to identify and analyze the types of waste generated by major operational departments in hotels, including the Front Office, Food and Beverage, Housekeeping, and Engineering & Maintenance departments. Using a descriptive qualitative method through observation, document analysis, and literature review, the research categorizes various waste sources and evaluates their environmental impacts. The findings reveal that each department produces distinct waste types: the Food and Beverage Department generates organic and packaging waste, the Housekeeping Department contributes mixed solid and chemical waste, and the Engineering & Maintenance Department produces hazardous and electronic waste requiring specialized handling. These results emphasize the importance of department-specific waste management strategies to reduce environmental degradation and promote sustainability in hotel operations. Implementing comprehensive waste management practices not only improves operational efficiency and brand reputation but also aligns with global sustainability goals and the growing consumer demand for environmentally responsible hospitality.

Keywords: hotel waste, sustainability, environmental management, hospitality operations, green practices.

INTRODUCTION

The hospitality industry plays a vital role in the global economy, contributing significantly to employment, tourism, and regional development. However, alongside its economic benefits, the industry also generates substantial environmental challenges, particularly in the form of operational waste. The identification of such waste is crucial for enhancing sustainability and improving overall hotel performance. Various departments within hotels—including food service, housekeeping, and maintenance produce large quantities of waste, which, if unmanaged, can contribute to pollution, resource depletion, and climate change. Hotels are major consumers of food, and studies indicate that approximately 30% of food prepared in hotels is wasted, creating both environmental and economic burdens (Kasavan et al., 2017). As highlighted by Kasavan et al., the volume of food waste generated by hotels poses substantial challenges for sustainable waste management (Kasavan et al., 2017). Further emphasize that a considerable portion of hotel waste originates from guest activities in rooms and dining areas, highlighting the lack of effective waste management systems across many hospitality operations (Sobti et al., 2024). Similarly, it found that inadequate waste handling is a significant contributor to environmental degradation, particularly in rapidly developing regions such as Nakuru County, Kenya.(Agesa et al., 2022).

The literature also suggests that sustainability has become a strategic advantage for hotels that effective waste management can yield both environmental and financial benefits, while enhancing a hotel's competitive position(Alipour et al., 2019; Khatter et al., 2021). Biswas (2023)supports this view, noting that the adoption of environmentally friendly technologies in hotels not only strengthens market competitiveness but also meets growing guest expectations for sustainable hospitality experiences. For illustration several five-star hotels in Thailand have successfully implemented food waste management strategies, setting examples for practical waste reduction in the food and beverage sector (Kattiyapornpong et al., 2023).

Despite these positive developments, the transition toward sustainability remains uneven. Smaller and medium-sized hotels often face resource constraints and limited awareness that hinder the adoption of waste reduction and recycling initiatives (Herath et al., 2023; Srijuntrapun et al., 2022) . To enhance

sustainability in the hospitality industry, Herath et al. advocate for greater engagement in green practices such as recycling, water conservation, and energy efficiency. Therefore, this study aims to identify and analyze the types of waste generated by major operational departments in hotels—Front Office, Food and Beverage, Housekeeping, and Engineering & Maintenance—and to examine their environmental implications as part of a sustainable waste management framework.

METHOD

This study employs a qualitative method with descriptive approach to identify and analyze the types and characteristics of waste generated by each hotel department, including the Front Office, Food and Beverage, Housekeeping, and Engineering & Maintenance departments. Primary data were collected through direct observations, semi-structured interviews with general manager to reconfirm. while secondary data were obtained from reports and relevant literature. Data were analyzed qualitatively using thematic analysis to describe waste sources and management practices.

RESULTS AND DISCUSSION

The identification of operational waste in hotels is crucial for enhancing sustainability and improving operational performance. A variety of key departments within the hospitality industry produce significant amounts of waste, primarily in areas such as food service, housekeeping, and general facility maintenance. Understanding the types, sources, and characteristics of waste generated from each department is essential to develop effective waste management strategies and reduce environmental impact. Furthermore, analyzing the negative environmental impacts caused by waste in each department provides a clearer understanding of how operational activities contribute to pollution and resource inefficiency. These aspects are systematically presented in a table of waste identification, which outlines the specific types of waste, their departmental sources, and their corresponding environmental implications.

Table 1. Waste In Front Office Department

| Type Of Waste | Source/Activity | Description (Environmental Context) |
|-------------------------------|--------------------------------------|--|
| Paper | Reservation forms, reports, invoices | High paper consumption contributes to deforestation; transitioning to digital systems reduces this impact. |
| Plastic bottles and packaging | Staff and guest consumption areas | Common recyclable waste that should be collected and separated for proper recycling. |

Source: Compiled and processed by the researcher (2025)

The environmental impacts associated with the front office department are significant, as this area represents the hotel's first impression and operational core. Paper waste generated from reservation forms, invoices, and reports contributes to resource depletion and deforestation if not properly managed. Similarly, plastic bottles and packaging from guest and staff areas increase the hotel's overall waste footprint. Studies have shown that sustainable front office practices—such as digital documentation, e-receipts, and refillable beverage systems—can effectively minimize these impacts while maintaining service efficiency (Putri et al., 2023; Antari et al., 2024). Moreover, integrating staff training and environmental awareness initiatives encourages behavioral change, making employees active participants in waste reduction efforts. Consequently, the front office not only plays a functional role in guest service but also acts as a driving force for the hotel's environmental commitment and overall sustainability profile.

Table 2. Waste In Food and Beverage Department

| Type Of Waste | Source/Activity | Description (Environmental Context) |
|---------------|-----------------|-------------------------------------|
|---------------|-----------------|-------------------------------------|

| | | |
|---------------------------------|--|---|
| Food waste (organic) | Leftover meals, food preparation residues, expired ingredients | Food waste often emerges from mismanagement of stock levels and portion control, indicating specific areas where attention is needed (Rani et al., 2024). |
| Plastic and packaging waste | Bottled drinks, plastic wraps, condiment containers | Common recyclable waste that should be collected and separated for proper recycling. |
| Used cooking oil (liquid waste) | Frying and food preparation | Can contaminate water systems if disposed improperly; may be recycled into biodiesel or soap. |

Source: Compiled and processed by the researcher (2025)

Food waste management is a critical issue within the food and beverage department, as it directly affects operational costs, sustainability practices, and environmental performance. In the hospitality sector, food waste represents a significant proportion of total waste, with studies estimating that 4% to 10% of purchased food is discarded before being served (Soliman, 2020). This issue often results from improper stock control, portion oversizing, and poor forecasting, emphasizing the need for systematic waste management strategies. Implementing the First-In-First-Out (FIFO) storage method, maintaining proper food storage temperatures, and regularly monitoring expiration dates are effective measures to minimize waste and optimize resource utilization (Kattiyapornpong et al., 2023b; Kilibarda et al., 2019). Additionally, repurposing leftover food for staff meals or converting organic waste into compost can enhance waste recovery efforts, while donating surplus edible food supports community welfare (Filimonau & De Coteau, 2019; Ndung'u & Magaju, 2024; Rani et al., 2024; Soliman, 2020). Overall, food waste management in hotels requires an integrated approach that combines employee training, operational efficiency, and innovative practices to align departmental performance with broader sustainability objectives.

Table 3. Waste In Housekeeping department

| Type Of Waste | Source/Activity | Description (Environmental Context) |
|---|---|---|
| Solid waste (mixed) | Guest rooms, public areas, bathroom amenities | Includes used tissues, packaging, and residual guest waste; requires proper segregation to minimize landfill load. |
| Plastic waste (amenities) | Shampoo, soap, and lotion containers | Small plastic bottles and sachets accumulate in large quantities; hotels are shifting toward refillable dispensers. |
| Paper waste | Guest directories, brochures, newspapers | Recyclable materials that contribute to deforestation if not reused or recycled. |
| Fabric waste | Damaged linens, towels, uniforms | Textile waste that can be reused as cleaning cloths or repurposed to reduce disposal volume. |
| Laundry | Liquid waste (detergent and chemical residues) from washing, rinsing, and bleaching processes | Contains surfactants and phosphates that can pollute water bodies if untreated; requires wastewater treatment systems. |
| Chemical cleaning waste (liquid and container residues) | Liquid waste from Floor cleaners, disinfectants, glass and toilet cleaners | Contains surfactants, ammonia, and chlorine compounds that can harm aquatic ecosystems if discharged untreated; containers should be rinsed and sent to hazardous waste collectors. |

Source: Compiled and processed by the researcher (2025)

The housekeeping department plays a vital role in ensuring hotel cleanliness and guest comfort while simultaneously influencing environmental sustainability. Housekeeping is another significant source of waste, the types of waste generated in this department can vary widely, involving cleaning supplies, plastic bags, solid waste from guest rooms, plastic from amenities, textile waste from damaged linens, and chemical residues from cleaning products (Dani et al., 2021). Such activities, if not properly managed, can contribute significantly to landfill accumulation and water pollution. The department's intensive workload—such as collecting waste, laundering linens, and using chemical cleaners—makes efficient waste segregation and handling essential to reduce environmental impact (Mangco & Andales, 2023; Sanon, 2013). Implementing eco-friendly cleaning products, adopting refillable amenity dispensers, and reusing old fabrics for cleaning materials are among the strategies that can effectively minimize waste generation. Furthermore, regular staff training on green housekeeping practices enhances awareness and ensures compliance with sustainability goals. In conclusion, the housekeeping department serves not only as the backbone of hotel hygiene but also as a key driver of sustainable operational management.

Table 4. Engineering & Maintenance Department

| Type Of Waste | Source/Activity | Description (Environmental Context) |
|----------------------------|--|---|
| Hazardous waste (B3) | Lubricants, used oil, batteries, fluorescent lamps | Toxic substances that require special handling and disposal through licensed waste vendors to prevent soil and water contamination. |
| Electronic waste (e-waste) | Broken equipment, wires, electrical parts | Contains heavy metals that are hazardous to health; can be recycled through authorized collectors. |

Source: Compiled and processed by the researcher (2025)

The engineering and maintenance department plays an essential role in supporting hotel operations through the maintenance of electrical, mechanical, and plumbing systems. However, these activities generate hazardous waste (B3) such as lubricants, used oil, batteries, and fluorescent lamps, which contain toxic substances that can contaminate soil and water if not disposed of properly. Similarly, electronic waste—including damaged equipment, wiring, and electrical components—contains heavy metals like lead and mercury that pose serious environmental and health risks. Effective waste management in this department therefore requires strict adherence to government regulations and collaboration with licensed hazardous waste vendors for collection and disposal. In addition, implementing preventive maintenance programs and recycling initiatives for electronic components can significantly reduce the volume of waste generated. Training maintenance personnel on environmental safety and waste segregation further enhances compliance and sustainability awareness. Overall, the engineering and maintenance department is pivotal in ensuring that technical operations align with the hotel's environmental management system and sustainability objectives.

CONCLUSION

In conclusion, the hotel industry faces significant challenges in managing waste across multiple operational departments, yet emerging sustainable practices offer pathways to minimize environmental impact. The front office department contributes to the waste of paper and packaging litter. The Food and Beverage Department contributes the largest portion of waste through food residues, packaging, and used cooking oil. Inefficient stock management and portion control often result in food waste, emphasizing the need for strategies such as the First-In-First-Out (FIFO) system, waste segregation, and food donation initiatives to reduce environmental burden. The Housekeeping Department produces diverse waste streams including plastics, paper, fabrics, and chemical residues from cleaning

activities. Proper segregation, recycling programs, and the adoption of refillable amenities can significantly minimize landfill contribution and water contamination risks. Meanwhile, the Engineering and Maintenance Department generates hazardous and electronic waste from lubricants, batteries, and electrical components, requiring strict handling and disposal procedures in compliance with environmental regulations to prevent soil and water pollution.

The implications of this study emphasize the urgent need for hotels to implement integrated waste management systems that not only reduce environmental degradation but also strengthen operational efficiency and brand reputation. Collaboration among hotels, local authorities, and waste management organizations is essential to establish standardized frameworks for waste treatment and monitoring. Furthermore, adopting green innovations, such as digitalization to reduce paper use, refillable dispensers, and energy-efficient technologies, can significantly enhance the industry's environmental performance. Effective waste reduction initiatives align with the growing consumer demand for sustainable tourism and offer economic advantages through cost savings and improved resource utilization (Norton, 2024; Soni et al., 2022). By embedding sustainability in every operational process, the hospitality sector can progress toward achieving long-term environmental goals while maintaining competitiveness and social responsibility.

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