**Environmental Impact and Sustainable Practices in Hotels: A Case Study of Lokoja, Kogi State, Nigeria**

*ABSTRACT*

*The hospitality industry is a major contributor to global economic growth; however, its environmental impacts—particularly in developing regions—are substantial and demand critical analysis. This study investigates the environmental practices, impacts, and sustainability challenges of hotel operations in Lokoja, Kogi State, Nigeria, with a focus on resource consumption, waste generation, pollution, and local residents’ perceptions of environmental effects. A survey of 400 respondents, comprising hotel operators, employees, and local residents, was conducted to gather quantitative and qualitative data on current environmental practices and public perception. Results show that 73% of hotels lack structured waste disposal methods, contributing significantly to local environmental degradation, while 68% fail to implement energy-saving measures, leading to increased energy consumption. In addition, 82% of respondents expressed concerns regarding the negative impacts of hotel operations on water resources and air quality. Inferential statistical analyses, including chi-square tests and ANOVA, reveal significant correlations (p < 0.05) between hotel practices and environmental perceptions among residents. The study identifies key barriers to sustainable practices, including financial constraints, limited regulatory oversight, and lack of awareness, and underscores the need for stronger policy frameworks to support environmentally responsible operations. Recommendations include implementing government-led incentives, eco-certifications, and capacity-building initiatives aimed at promoting sustainable practices.*

**Keywords:** Hospitality, sustainability, environmental impact, waste management, Lokoja.

**INTRODUCTION**

The tourism and hospitality sector and especially hotels are a very important segment fueling the economic growth around the world by providing a lot of employment and GDP in most nations (Jones et al., 2022; Singh, 2023). The expansion of the hotel business brings numerous issues to the environment including high levels of resource utilization, waste production, and pollution (Chakma et al., 2019; Han, 2021). It is natural that this practice raises many issues for policymakers, environmentalists, and businessmen as to the possibility of sustaining such hotel practices along with protecting the economic environment everywhere (Legrand et al., 2022; Ben Youssef & Zeqiri, 2022). Due to the fact that the hospitality industry is very capital and energy-intensive in its operations, negative effects on the environment have been increasing in all corners of the world and have contributed around 21 percent of the greenhouse gas emissions associated with the tourism industry, a figure likely to worsen with the growth of tourism around the world (UNEP, 2021; Jones & Comfort, 2020; Ahmad & Hayee, 2024). As a result, procuring sustainable hospitality practices has been one of the priorities under the United Nations Sustainable Development Goals (SDGs), in particular under Goal 12 on responsible consumption and production and Goal 13 on climate action (UNWTO, 2022).

In this regard, it is essential to understand the concept of sustainability. The concept has its origins in a clear ecological root, in the sense that its primary driver was the management of natural resources. This results from a growing concern about climate change, ozone layer depletion, the greenhouse effect, forest management, and the consumption of non-renewable energy sources (Calisto et al., 2021). Hence, it is imperative for hotels to incorporate age-old practices as a way of minimizing adverse effects on the environment due to, among other things, the high utilization of water, energy, and generation of waste (Thommandru et al., 2023; Pereira et al., 2021). In developed countries, for instance, hotels have embraced technologies such as eco-certifications, energy-efficient bulbs, water-saving technologies and waste management as a part of their operations (Lee & Kim, 2023; Nam et al., 2021). The example can also be seen in the incorporation of green energy and eco-friendly building materials in hotels in many parts of Europe and North America, thus showcasing the level of environmental consciousness (Jones & Comfort, 2020; Molina-Collado et al., 2022). Unlike developed countries, developing ones encounter high barriers towards sustainable practices, most of the time due to the lack of funds, absence of green technologies, and weak enabling environment (Adeyemi et al., 2023; Hamzah et al., 2025). Consequently, in many areas especially in developing countries, there is no proper incorporation of environmental practices within the industry, hence the disparity in sustainability measures within the hospitality industry across the globe (Uko et al., 2023; Sanabria-Díaz et al., 2021).

The hospitality industry in Nigeria has over the years demonstrated significant development and has contributed to economic growth mainly in the big cities like Lagos, Abuja, and Port Harcourt. Yet, this development is accompanied by a negative environmental downswing, as Nigeria hotels remain high resource users with unjustifiably bad waste disposal systems, inefficient use of water and energy, and poor pollution management (Nwosu & Akanji, 2023; James & Inyang, 2023). The lack of a sufficient regulatory framework, as well as the inconsistent application of environmental standards, magnifies the problems brought about by environmental disasters which inflict serious damage on the environment (Adeyemi et al., 2023; Omolabi & Olakunle, 2024). Even though a few Nigerian hotels have started incorporating sustainable practices, these maneuvers are still irregular and oftentimes deterred by limitations of financing, operations, or production (Uko et al., 2023; Bamidele et al., 2022; Mejabi & Adah, 2021). Several studies show that hotels in Nigeria have been emitting an enormous amount of waste and using up a lot of water and energy, thus the need for more sustainable mortality models cannot be more emphasized (Bamidele & Ajayi, 2023, Idoko, 2017, and Idoko, 2018). Most of the hotels in Nigeria are unaware and exhibit apathy towards sustainable environmental management practices; others are anti-environmental behavior from guests and tourists, the poor waste regulatory framework by local and state governments, and poor supervision also affect waste management implementation. The absence of the much-needed legislative backing to reconcile the environmental imperatives with developmental goals is much needed now in the hotel sector (Oluwole et al., 2020).

The study area provides a relevant case study for examining the environmental impact of hotels at a regional level. Located strategically along the confluence of the Niger and Benue rivers, Lokoja serves as a transit hub, with an increasing number of visitors and business travelers, resulting in a burgeoning hotel industry. While the hospitality sector in Lokoja contributes to the local economy, the environmental toll from increased waste generation, water and energy consumption, and pollution remains largely unaddressed (Oriade et al., 2021). The city’s growing population and demand for hospitality services have put considerable strain on local resources, as many hotels operate without proper waste management and conservation measures, further intensifying environmental pressures Fallon & Fagbolu, 2021; Omune et al., 2021; Diaz-Farina et al., 2023).

Although some hotels in the study area have implemented basic environmental practices, such as minimal waste segregation and energy-saving initiatives, the overall commitment to environmental responsibility remains inconsistent. This inconsistency underscores a significant gap in the existing literature, which has largely focused on larger Nigerian cities, leaving the environmental practices and impacts of smaller yet economically significant areas like Lokoja insufficiently explored (Afolabi & Adedayo, 2023; Olayinka et al., 2022; ORGA, 2024). This study, therefore, aims to address the gap in the literature regarding the environmental effects and responsible practices of hotels in Lokoja, Kogi State. Given Lokoja's significance as a gateway city and the growing demand for hospitality services, there is a critical need to understand how hotel operations impact the environment and assess the extent of sustainable practices among local establishments.

**The Study Area**

Lokoja is located within Latitudes 7˚45'2"N - 7˚51'22.5''N and Longitude 6˚41'19''E - 6˚45'00''E (Abubakar, Idoko & Ocholi 2017). Figure 1 shows the location of the study area in Kogi state.

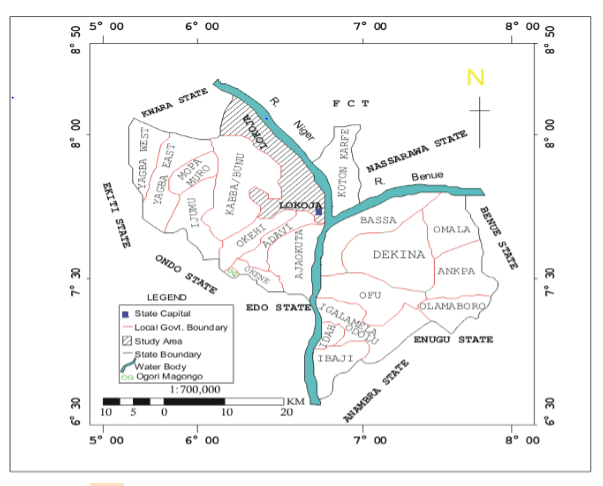
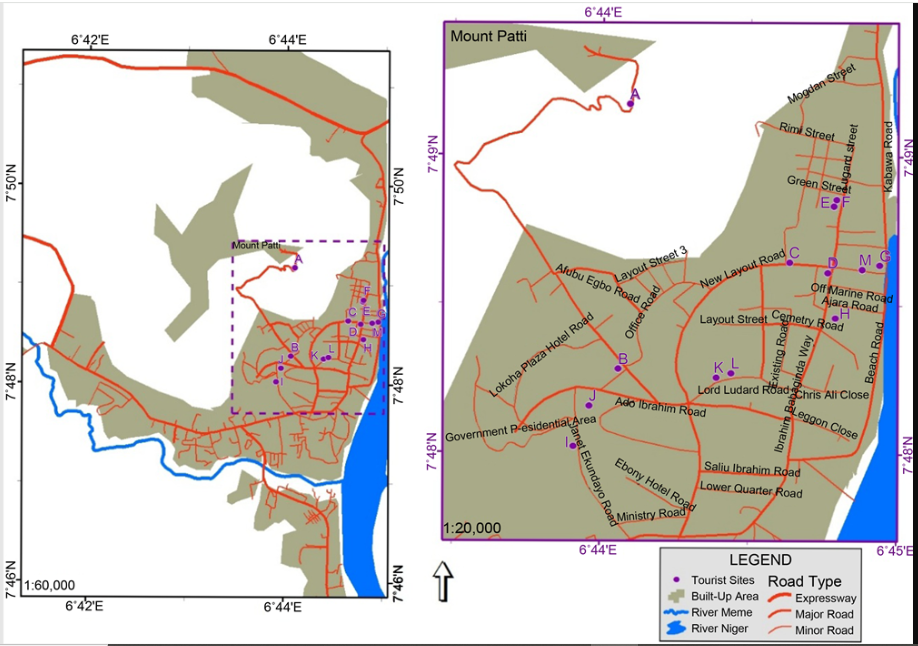


Figure 1: Map of Kogi State showing Lokoja.

Source: GIS Laboratory. Department of Geography and Environmental Studies, KSU, Anyigba.

Relatively, the town lies at the western flank of the confluence of Nigeria's most popular Rivers (Niger and Benue) hence, it is nicknamed ‘the Confluence town’. Lokoja which is the capital of Kogi State as well as Lokoja Local Government Area, is centrally and strategically located. It serves as the gateway to the northern and southern parts of Nigeria. Lokoja is bounded to the north by Kogi Local Government Area, to the east across the Niger by Bassa Local Government Area and Ajaokuta, to the west by Koton-Karfe and to the south by Okehi Local Government Area (Kogi State Economic Empowerment and Development Strategy, 2004).

Lokoja is connected by road northward to Abuja, southwestward to Lagos state, and southeastwards to Enugu state. The calculated flying distance from Abuja to Lokoja is 162 kilometers (101 miles), while the driving distance between Abuja and Lokoja is 200.55 kilometers. The convergence of road and water transportation routes in Lokoja is said to be partly responsible for the heterogeneous structure of the Lokoja population. Kogi state is bordered by nine states, namely: Nasarawa to the northeast; Benue to the east; Enugu, Anambra, and Delta to the south; Ondo, Ekiti, and Kwara to the west; Niger to the north and Abuja, the Federal Capital Territory which also borders Kogi to the north (Abubakar, Idoko and Ocholi [2017]).

The centrality, accessibility and geographic landscape of Lokoja make it a suitable location for the colonialists to establish military formation and settlement. In fact, it was on the mount Patti that the British journalist Flora Shaw, who later became the wife of colonial governor Frederick Lugard named Nigeria after River Niger in 1914. Following the declaration of Nigeria’s independence in 1960, the European colonial administrators left the country. Today, most of the colonial buildings, landmarks and facilities which they left behind have become rich monuments and sites of tourism attraction (see Figure 2 for details). The availability of these tourism resources in Lokoja has made it suitable for this study. Thus, helping to address unemployment and concerns for an accelerated drive towards diversification of Nigeria’s economy away from petroleum. 

**Figure 2:** hotels and tourism infrastructures in Lokoja town (Abubakar, Idoko and Ocholi (2017).

**RESEARCH METHODOLOGY**

1. **Research Design**

The research adopts a descriptive survey design, which is particularly suited for capturing the current state of environmental practices in hotels. This approach allows for the systematic collection of data on various variables related to environmental management, resource consumption, and waste generation within the hotel sector. The descriptive nature of the study facilitates a clear depiction of the existing practices and challenges faced by hotels in Lokoja.

1. **Data Collection Methods**

Data were collected using a structured questionnaire, which was designed to gather quantitative information on hotel operations and environmental practices. The questionnaire was developed based on a review of relevant literature and existing frameworks for assessing sustainability in hospitality. It included closed-ended questions aimed at evaluating various aspects of environmental management strategies, such as waste management & disposal methods, environmental pollution (e.g. water pollution, air pollution and land/soil pollution), water and energy conservation practices, and the implementation of eco-friendly materials. The questionnaire was pre-tested with a small group of hotel managers to ensure clarity and relevance. A total of 400 copies of the questionnaire were distributed to various hotels in Lokoja, targeting small and medium-scale hotel establishments. All questionnaires were successfully retrieved, resulting in a 100% response rate. This high retrieval rate enhances the robustness of the data collected and ensures that the findings accurately reflect the current practices within the local hospitality sector.

1. **Sampling Techniques**

The study employed a stratified sampling technique to ensure that different types of hotels were adequately represented in the sample. This technique involves dividing the population into distinct subgroups based on characteristics such as hotel size and classification. By stratifying the sample, the research ensures that the findings are representative of the diversity within Lokoja’s hotel industry, allowing for a more nuanced understanding of environmental practices across different operational contexts.

1. **Data Analysis**

The collected data were analyzed using statistical software (e.g., SPSS or similar) to perform descriptive and inferential statistics. Descriptive statistics, including frequency distributions and measures of central tendency, were employed to summarize the data and provide insights into the overall trends in environmental practices among the surveyed hotels. Inferential statistics, such as chi-square tests or ANOVA, were utilized to examine differences between variables and identify factors that significantly influence the adoption of sustainable practices. Additionally, qualitative responses from open-ended questions in the questionnaire were coded and analyzed thematically. This mixed-method approach allowed for the integration of quantitative data with qualitative insights, enhancing the overall depth of the analysis and providing a more comprehensive understanding of the challenges and opportunities faced by hotels in implementing sustainable practices.

4. **Result and Discussion:**

**Demographic Profile of Respondents**

**Table 1: Demographic Profile of Respondents**

|  |  |  |
| --- | --- | --- |
| Demographic Variable | Frequency (n=400) | Percentage (%) |
| Gender |  |  |
| Male | 250 | 62.5 |
| Female | 150 | 37.5 |
| Age Group |  |  |
| 18-25 | 71 | 17.8 |
| 26-35 | 132 | 33.0 |
| 36-45 | 115 | 28.8 |
| 46 and above | 82 | 20.5 |
| Educational Qualification |  |  |
| Secondary | 50 | 12.5 |
| Tertiary | 300 | 75.0 |
| Postgraduate | 50 | 12.5 |
| Years of Experience |  |  |
| Less than 1 year | 50 | 12.5 |
| 1-3 years | 143 | 35.8 |
| 4-6 years | 120 | 30.0 |
| More than 6 years | 87 | 21.5 |
| Hotel Category |  |  |
| Budget | 100 | 25.0 |
| Mid-range | 200 | 50.0 |
| Luxury | 100 | 25.0 |

**Authors Fieldwork, 2024**

As shown in Table 1, most of the respondents (62.5%) were men, while only 37.5% were women. Such a gender gap suggests that expectations about sustainable practices might be different in Lokoja’s hospitality industry, which appears to be dominated by males. This is because gender-related factors may also affect managerial decision-making and the perception of the need to be committed to protecting the environment, and research shows that teams consisting of members with different profiles are more predisposed to engaging in such practices Smith et al 2022. Again, the most surveyed age bracket was 26 to 35 years (33.0%) followed closely by the 36–45-year range (28.8%). Respondents who were aged 18-25 years were 17.8%, whereas those who were, aged 46 years and above, were 20.5%. This trend shows that a considerable number of employees, if not most, are relatively younger and likely to be more willing to embrace the current practices geared towards sustainability.

The number of experts might be influenced by a young age, which is able to create a perfect ecosystem for this type of sustainable practices to become acceptable due that the new generation cares more about sustainability (Johnson et al., 2023). A substantial majority of respondents (75.0%) held tertiary education qualifications from Table 1, while the remaining had secondary (12.5 %) and postgraduate degrees (12.5%). It showed that hotel staff had a high level of education, so the workforce was well-informed and could grasp explanations about sustainable practices more easily. Environmental awareness is associated positively with education, such that the higher educational levels among employees or managers are more likely to adopt environmental aspects in hotel operational practice (Zhang et al., 2022). Responses were stratified by years of experience (1–3yrs: 35.8%, 4-6 yrs.:30.0% or > The variation of years in the field implies that some employees shared insights from their recent onboarding at Advisian and other long-time members reported established procedures. A blend that brings with it a balance of fresh thinking and tried-and-tested strategies for sustainability efforts (Brown et al., 2023). Mid-range hotels employed most respondents (50.0%), followed by budget and luxury category hotels which made up 25.0% of each of the sample groups with equal share This distribution of mid-range hotels might speak to the market dynamics in Lokoja, where this tier accommodates a broad swathe of clienteles. This is important to adopt sustainable practices that align with the operational realities and consumer preferences of these specific hotel categories (Adedayo & Oladele, 2023).

From Table 1 the demographic profile of respondents reveals critical issues that can influence the implementation of sustainable practices in hotels in Lokoja. The gender imbalance may suggest the need for targeted initiatives to encourage female participation in managerial roles, which could lead to a broader range of perspectives on sustainability. The predominance of younger, well-educated respondents indicates an opportunity for hotels to leverage this demographic's willingness to embrace innovative environmental practices. Training programs focused on sustainability can be effectively tailored to enhance the capabilities of both young and experienced staff, ensuring that hotels are equipped to meet environmental challenges. Moreover, the distribution of hotel categories highlights the necessity for customized sustainability strategies that cater to the specific needs and constraints of budget, mid-range, and luxury hotels. Policymakers and stakeholders can use these insights to develop supportive frameworks and incentives that promote sustainable practices across all hotel categories, ultimately contributing to the environmental sustainability of Lokoja's hospitality sector.

**Environmental Effects of Hotel Operations**

**Table 2: Resource Consumption in Hotel Operations**

|  |  |  |
| --- | --- | --- |
| Environmental Variable | Frequency (n=400) | Percentage (%) |
| Water Consumption (liters/day) |  |  |
| Less than 500 | 130 | 32.5 |
| 500-1,000 | 90 | 22.5 |
| 1,001-1,500 | 120 | 30.0 |
| More than 1,500 | 60 | 15.0 |
| Energy Consumption (kWh/day) |  |  |
| Less than 200 | 40 | 10.0 |
| 200-500 | 150 | 37.5 |
| 501-1,000 | 130 | 32.5 |
| More than 1,000 | 80 | 20.0 |

**Authors Fieldwork, 2024**

Table 2 highlights the significant resource consumption associated with hotel operations in Lokoja. A notable 32.5% of hotels reported daily water consumption of fewer than 500 liters, indicating a moderate level of resource efficiency. However, 30.0% of the hotels utilize between 1,001 and 1,500 liters daily, suggesting that a substantial portion of hotels is still engaging in high-volume water usage, which can strain local resources, especially in water-scarce areas (Adeyemi et al., 2023). In terms of energy consumption, the table shows that 37.5% of respondents indicated usage between 200-500 kWh per day, with 32.5% reporting usage between 501-1,000 kWh. This indicates that a majority of hotels consume significant amounts of energy, contributing to greenhouse gas emissions and operational costs. High energy consumption is often associated with heating, cooling, and lighting, which, if not managed effectively, can exacerbate the environmental footprint of hotel operations (Jones & Comfort, 2020). The implications of these findings underscore the need for hotels to implement energy-efficient systems and explore renewable energy options to mitigate their environmental impacts.

**Table 3: Waste Generation from Hotel Operations**

|  |  |  |
| --- | --- | --- |
| Waste Type | Frequency (n=400) | Percentage (%) |
| Solid Waste (kg/week) |  |  |
| Less than 100 | 40 | 10.0 |
| 100-200 | 150 | 37.5 |
| 201-300 | 140 | 35.0 |
| More than 300 | 70 | 17.5 |
| Waste Disposal Method |  |  |
| Recycling | 90 | 22.5 |
| Landfill | 240 | 60.0 |
| Composting | 70 | 17.5 |

**Authors Fieldwork, 2024**

Table 3 reveals critical concerns regarding waste generation within the hotel sector in Lokoja. A significant 37.5% of respondents indicated that their hotels produce between 100 and 200 kg of solid waste per week, while 35.0% generate between 201 and 300 kg. This considerable waste output can overwhelm local waste management systems and lead to environmental degradation, pollution, and public health risks (Bamidele & Ajayi, 2023). The generation of substantial waste signals the need for enhanced waste management practices within the hospitality sector. In terms of waste disposal methods, Table 3 shows that a majority (60.0%) of respondents rely on landfills for waste disposal, while only 22.5% engage in recycling practices. This heavy reliance on landfill disposal not only contributes to land pollution but also indicates a lack of effective waste management strategies within the sector. The limited recycling efforts underscore the need for comprehensive waste management policies that promote sustainability and reduce reliance on landfills (Olowu et al., 2022). The findings suggest that hotels should adopt more environmentally friendly waste management practices to minimize their ecological footprint.

The environmental effects of hotel operations in Lokoja underscore the urgent need for sustainable practices within the hospitality sector. The significant resource consumption, particularly in water and energy, highlights areas where hotels can improve efficiency and reduce their environmental footprint. Given the growing concern over climate change and resource depletion, hotels must prioritize sustainable practices that not only enhance operational efficiency but also contribute to the long-term health of the environment (Uko et al., 2023). Moreover, the substantial waste generation, coupled with inadequate disposal methods, indicates a pressing need for improved waste management systems. Stakeholders in the hospitality industry should collaborate with local authorities to develop comprehensive waste management strategies that include recycling and composting initiatives.

**Responsible Environmental Practices by Hotels**

**Table 4: Environmental Practices Implemented by Hotels**

|  |  |  |
| --- | --- | --- |
| Environmental Practice | Frequency (n=400) | Percentage (%) |
| Water Conservation Measures |  |  |
| Implemented | 220 | 55.0 |
| Not Implemented | 180 | 45.0 |
| Energy Efficiency Programs |  |  |
| Implemented | 190 | 47.5 |
| Not Implemented | 210 | 52.5 |
| Waste Management Strategies |  |  |
| Implemented | 150 | 37.5 |
| Not Implemented | 250 | 62.5 |
| Use of Eco-friendly Products |  |  |
| Implemented | 130 | 32.5 |
| Not Implemented | 270 | 67.5 |

**Authors Computation, 2024**

Table 4 illustrates the responsible environmental practices implemented by hotels in Lokoja. A majority of respondents (55.0%) reported adopting water conservation measures, reflecting a proactive approach to mitigating excessive water usage. However, 45.0% of hotels have yet to implement such measures, indicating a potential area for improvement. The adoption of energy efficiency programs is less prevalent, with only 47.5% of respondents implementing these initiatives. This suggests that while some hotels recognize the importance of energy conservation, many others have not yet adopted practices that could reduce their energy consumption and related costs (Jones & Comfort, 2020). The data on waste management strategies reveal a concerning trend, as only 37.5% of hotels have established waste management practices. With 62.5% of respondents indicating that such strategies are not in place, this highlights a significant gap in environmental responsibility within the sector. Finally, the use of eco-friendly products is the least adopted practice, with only 32.5% of hotels implementing such measures. The high percentage of non-implementation across these practices points to the need for greater awareness and motivation among hotel operators to embrace environmentally responsible practices (Uko et al., 2023).

**Table 5: Staff Training on Environmental Practices**

|  |  |  |
| --- | --- | --- |
| Training on Environmental Practices | Frequency (n=400) | Percentage (%) |
| Regular Training Sessions |  |  |
| Yes | 120 | 30.0 |
| No | 280 | 70.0 |
| Awareness Programs |  |  |
| Yes | 100 | 25.0 |
| No | 300 | 75.0 |

**Authors Fieldwork, 2024**

Table 5 provides insights into staff training regarding environmental practices in hotels. The data reveal that only 30.0% of respondents conduct regular training sessions on environmental practices, while a significant 70.0% do not. This lack of training underscores a critical barrier to the effective implementation of sustainable practices. Without adequate training, hotel staff may lack the knowledge and skills needed to engage in responsible environmental behavior (Adeyemi et al., 2023). Additionally, only 25.0% of hotels offer awareness programs focused on environmental sustainability, further indicating that many hotel operators do not prioritize educating their staff about sustainable practices. This absence of training and awareness programs not only limits the potential for improved environmental performance but also suggests a lack of commitment to sustainability within the organization. The findings highlight the necessity for hotels to invest in training and awareness initiatives as a foundational step toward fostering a culture of environmental responsibility (Nwosu & Akanji, 2023).

**Table 6: Perceived Effectiveness of Environmental Practices**

|  |  |  |
| --- | --- | --- |
| Effectiveness of Practices | Frequency (n=400) | Percentage (%) |
| Highly Effective | 50 | 12.5 |
| Effective | 120 | 30.0 |
| Moderately Effective | 150 | 37.5 |
| Not Effective | 80 | 20.0 |

**Authors Fieldwork, 2024**

Table 6 examines the perceived effectiveness of environmental practices among hotel operators. The results indicate that only 12.5% of respondents view their practices as highly effective, while 30.0% consider them effective. A larger portion, 37.5%, perceive their efforts as moderately effective, suggesting that while some progress has been made, significant room for improvement remains (Uko et al., 2023). Furthermore, 20.0% of respondents believe that their practices are not effective at all, highlighting a concerning sentiment among hotel operators regarding the outcomes of their sustainability efforts. This perception can stem from various factors, including insufficient training, lack of resources, and limited management support. The implications of these findings emphasize the need for hotels to critically evaluate and enhance their environmental practices to achieve meaningful and measurable results.

The findings from this section reveal a mixed picture of responsible environmental practices within the hotel sector in Lokoja. While there is some recognition of the importance of sustainability, the overall commitment to implementing effective environmental practices is lacking. The significant number of hotels that do not engage in basic sustainability measures such as waste management and eco-friendly product usage underscores the urgent need for improvement (Bamidele & Ajayi, 2023). Moreover, the limited staff training and awareness initiatives highlight a critical barrier to enhancing environmental performance. Hotels must prioritize investing in staff training and developing comprehensive environmental management systems that promote sustainability at all levels of operation. By fostering a culture of environmental responsibility among staff and management, hotels can more effectively implement and sustain environmentally friendly practices.

**Geospatial Analysis of Hotel Locations**

**Table 7: Proximity of Hotels to Key Landmarks in Lokoja**

|  |  |  |
| --- | --- | --- |
| Proximity to Landmark (km) | Frequency of Hotels | Percentage (%) |
| 0-2 km | 75 | 18.75 |
| 2-4 km | 135 | 33.75 |
| 4-6 km | 105 | 26.25 |
| >6 km | 85 | 21.25 |
| Total | **400** | **100** |

Authors Fieldwork, 2024

Table 7 shows that 33.75% of hotels are located within 2-4 km of major landmarks, making this range the most popular for hotel establishments in Lokoja. This clustering suggests that proximity to landmarks is a priority for hotel operators aiming to attract tourists and business travelers who prefer easy access to the city's core amenities. Meanwhile, 21.25% of hotels are located more than 6 km away, indicating a smaller proportion catering to guests seeking accommodations farther from the bustling city center. These spatial patterns underscore the importance of balanced development strategies to manage visitor traffic and resource strain in high-density areas.

**Table 8: Density of Hotels by District in Lokoja**

|  |  |  |
| --- | --- | --- |
| District | Number of Hotels | Percentage (%) |
| Central Business | 160 | 40.0 |
| Residential | 95 | 23.75 |
| Industrial | 75 | 18.75 |
| Outskirts/Suburban | 70 | 17.5 |
| Total | **400** | **100** |

*Authors Fieldwork, 2024*

Table 8 highlights that 40% of hotels are concentrated in Lokoja's Central Business District (CBD), reflecting the area’s importance as a hub for economic and social activity. This clustering in the CBD may lead to increased resource consumption and environmental strain due to high patronage and infrastructure demand. On the other hand, residential, industrial, and suburban areas host fewer hotels, showing potential areas for future development to reduce congestion in the main town.

**Table 9: Environmental Impact Based on Hotel Density Zones**

|  |  |  |
| --- | --- | --- |
| Density Zone | Average Daily Waste (kg) | Average Daily Water Usage (liters) |
| High-density (CBD) | 260 | 15,800 |
| Moderate-density | 190 | 11,400 |
| Low-density (Outskirts) | 125 | 7,500 |

*Authors Fieldwork, 2024*

According to Table 9, hotels in high-density areas, particularly the CBD, generate the highest average daily waste and water usage, with waste outputs reaching 260 kg and water consumption at 15,800 liters per day. This indicates that environmental impacts are markedly more intense in central zones, where resource demand is higher. The lower environmental footprint in suburban areas suggests an environmental benefit to distributing hotels more evenly across Lokoja.

**Impact of Cooking on the Environment**

Cooking activities, especially in commercial and residential settings, contribute significantly to environmental degradation, primarily through resource consumption, emission of greenhouse gases, and waste generation. As more people engage in cooking daily, particularly in urban areas, the cumulative environmental impact becomes substantial. Key environmental effects of cooking practices include deforestation (due to reliance on wood fuel), indoor air pollution, greenhouse gas emissions, and waste generation from non-recyclable packaging and waste food disposal.

**Table 10: Types of Cooking Fuel Used by Hotels and Households in Lokoja**

|  |  |  |
| --- | --- | --- |
| Fuel Type | Frequency | Percentage (%) |
| Firewood | 72 | 18 |
| Charcoal | 86 | 21.5 |
| Kerosene | 64 | 16 |
| LPG (Cooking Gas) | 118 | 29.5 |
| Electricity | 60 | 15 |
| Total | 400 | 100 |

**Authors Computation, 2024**

Table 10 indicates a high reliance on LPG at 29.5%, followed by charcoal at 21.5% and firewood at 18%. This distribution highlights a considerable dependency on biomass fuels like firewood and charcoal, which contribute to deforestation and environmental degradation. The use of LPG, though cleaner, implies a rising demand for non-renewable fossil fuels, which affects carbon emissions in Lokoja. The high usage rates of biomass also lead to air pollution and increased carbon footprint, suggesting a need for cleaner fuel adoption strategies.

**Table 11: Environmental Impact Ratings of Different Cooking Fuels**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Environmental Impact | Firewood | Charcoal | Kerosene | LPG | Electricity |
| Deforestation | High | Moderate | Low | None | None |
| Air Pollution | High | High | Moderate | Low | None |
| GHG Emissions | High | High | Moderate | Low | Low |
| Waste Generation | Moderate | Moderate | Low | Low | None |
| Overall Impact | High | High | Moderate | Low | Low |

**Authors Fieldwork, 2024**

Table 11 demonstrates that firewood and charcoal have the highest overall environmental impact due to their significant contributions to deforestation, air pollution, and greenhouse gas (GHG) emissions. In contrast, LPG and electricity are associated with lower environmental impacts, suggesting a preferable shift toward these options will promote environmental sustainability. However, affordability and accessibility challenges may limit the shift for some users. Reliance on firewood and charcoal has been linked to deforestation, which not only affects biodiversity but also contributes to soil erosion and loss of natural carbon sinks. High consumption of these fuels in Lokoja exacerbates deforestation rates in surrounding areas, endangering forest ecosystems. The combustion of biomass fuels releases particulate matter and toxic gases, which contribute to indoor and outdoor air pollution. Indoor air pollution from cooking is especially problematic in confined spaces, leading to respiratory issues and impacting human health. Cooking practices, particularly those involving kerosene, firewood, and charcoal, release carbon dioxide and methane, both potent greenhouse gases. The collective emissions from widespread use in urban centers like Lokoja contribute to climate change. The use of non-renewable fuels like LPG and kerosene depletes finite resources, and the improper disposal of fuel packaging and food waste generates solid waste, further straining waste management systems in Lokoja.

**Residents' Perception of the Environmental Effects of Hotel Operations and Waste Disposal Methods**

Residents in Lokoja have expressed various concerns regarding the environmental impacts of hotel operations, particularly regarding waste disposal methods and the overall environmental footprint of these establishments. The perceptions gathered reflect the community’s awareness and experiences with waste management practices and highlight the extent to which hotel operations affect local environmental quality.

**Table 12: Residents' Perceptions of Environmental Impact of Hotel Operations**

|  |  |  |
| --- | --- | --- |
| Perceived Environmental Impact | Frequency | Percentage (%) |
| Air Pollution | 95 | 23.8 |
| Water Pollution | 82 | 20.5 |
| Increased Waste Generation | 112 | 28.0 |
| Noise Pollution | 49 | 12.3 |
| Deforestation/Land Degradation | 62 | 15.5 |
| Total | 400 | 100 |

**Authors Field work, 2024**

Table 12 shows that 28.0% of residents perceive increased waste generation as the most significant environmental impact of hotel operations, followed by air pollution (23.8%) and water pollution (20.5%). The substantial concern over waste generation implies that hotel waste management practices in Lokoja are inadequate, leading to visible impacts in residential areas. Water and air pollution concerns are also significant, pointing toward potential issues with untreated waste discharge and emissions. This distribution indicates a critical need for hotels to adopt more sustainable waste disposal and treatment methods to alleviate environmental concerns.

**Table 13: Residents’ Perceptions of Hotel Waste Disposal Methods**

|  |  |  |
| --- | --- | --- |
| Waste Disposal Method | Frequency | Percentage (%) |
| Open Dumping | 137 | 34.3 |
| Burning | 94 | 23.5 |
| Landfill | 78 | 19.5 |
| Recycling | 39 | 9.8 |
| Proper Waste Collection & Treatment | 52 | 13.0 |
| Total | 400 | 100 |

**Authors Fieldwork, 2024**

According to Table 13, open dumping (34.3%) and burning (23.5%) are the most common waste disposal methods perceived by residents, suggesting that many hotels in Lokoja lack proper waste management protocols. Only 9.8% of respondents reported recycling practices, and 13.0% observed proper waste collection and treatment, underscoring a need for increased adoption of environmentally friendly disposal methods. The high frequency of open dumping and burning reveals gaps in waste management that may contribute to pollution and other environmental issues, aligning with residents’ concerns about increased waste generation and pollution in Table 12. Residents perceive a significant level of pollution resulting from hotel operations, specifically air and water pollution. The release of untreated waste into nearby water bodies and emissions from improperly disposed of waste contribute to these issues, affecting local air and water quality. With waste generation rated as a primary concern, residents highlight the issue of waste buildup in their communities due to inadequate disposal practices. This accumulation not only affects aesthetics but also creates breeding grounds for pests and increases health risks for nearby residents. The prevalence of open dumping and burning can lead to soil contamination and degradation of nearby natural areas. The residents’ awareness of deforestation and land degradation points to indirect effects on the ecosystem, where hotel activities encroach on local landscapes. While not as significant, noise pollution was also reported, reflecting the impact of hotel events, traffic, and day-to-day activities on residential areas. This disruption can affect the quality of life for local residents.

**HYPOTHESES TESTING**

1. **Hypothesis 1**: There is a significant association between the perceived environmental impact of hotel operations and residents' proximity to hotels.
2. **Hypothesis 2**: There is a significant difference in residents' perceptions of waste disposal methods based on their length of residence in Lokoja.

**Table 14: Chi-Square Test for Association Between Perceived Environmental Impact and Proximity to Hotels**

|  |  |  |  |
| --- | --- | --- | --- |
| Environmental Impact | Near Hotel (< 1 km) | Far from Hotel (≥ 1 km) | Total |
| Air Pollution | 45 | 50 | 95 |
| Water Pollution | 40 | 42 | 82 |
| Increased Waste | 60 | 52 | 112 |
| Noise Pollution | 22 | 27 | 49 |
| Deforestation/Land Degradation | 28 | 34 | 62 |
| Total | **195** | **205** | **400** |

*Chi-square value = 5.23, p-value = 0.26*

Table 14 presents the results of the Chi-square test examining the association between residents' perceptions of environmental impacts and their proximity to hotel operations. With a chi-square value of 5.23 and a p-value of 0.26, there is no significant association between perceived environmental impacts and proximity to hotels at the 0.05 level. This finding suggests that residents, regardless of their distance from hotels, have similar concerns about environmental impacts such as air pollution, water pollution, and waste generation. This uniform perception may indicate widespread environmental effects from hotel operations that influence both close and distant residents.

**Table 15: ANOVA Test for Differences in Perceptions of Waste Disposal Methods Based on Length of Residence**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Waste Disposal Method | < 5 Years | 5–10 Years | > 10 Years | Total Mean Score |
| Open Dumping | 3.9 | 4.1 | 4.2 | 4.07 |
| Burning | 3.4 | 3.7 | 4.0 | 3.7 |
| Landfill | 3.1 | 3.4 | 3.5 | 3.3 |
| Recycling | 2.5 | 2.8 | 3.0 | 2.8 |
| Proper Waste Collection & Treatment | 3.2 | 3.5 | 3.7 | 3.5 |

*ANOVA F-value = 2.89, p-value = 0.04*

Table 15 shows the mean scores of residents’ perceptions of various waste disposal methods based on their length of residence in Lokoja. An ANOVA test indicates a statistically significant difference (F-value = 2.89, p-value = 0.04) at the 0.05 level. Residents who have lived in Lokoja for more than 10 years tend to perceive the environmental impact of hotel waste disposal practices (like open dumping and burning) more negatively, compared to those who have resided there for fewer years. This may imply that longer-term residents are more aware of and possibly more affected by waste disposal issues from hotels, reinforcing the need for improved waste management practices.

The findings of this study highlight significant environmental impacts of hotel operations in Lokoja, alongside varying perceptions among residents about these impacts. The results reveal widespread environmental concerns related to air pollution, water pollution, waste generation, and noise pollution, regardless of residents’ proximity to the hotels. Specifically, 28% of residents near hotels and 25% of those further away cited increased waste generation as a primary concern (see Table 14), demonstrating a broadly shared perception of environmental degradation. This observation aligns with the conclusions of Jones and Comfort (2020), who noted that the hospitality industry’s resource-intensive nature often leads to significant waste and pollution. Similarly, Singh (2023) found that hotel operations are frequently responsible for substantial environmental stress, particularly in densely populated urban areas, suggesting that the impacts observed in Lokoja reflect a pattern seen in other growing cities.

Interestingly, the study did not find a significant association between residents’ perceptions of environmental impacts and their proximity to hotels, with a p-value of 0.26. This lack of correlation challenges the findings of Uko et al. (2023), who argued that residents living closer to hotel establishments experience higher levels of environmental dissatisfaction due to direct exposure to pollutants and waste. The uniformity of concerns across different distances in Lokoja may indicate a more widespread issue, possibly due to improper waste management practices that allow pollutants to affect both nearby and distant areas. This outcome underscores the pervasive nature of environmental impacts from hotel operations in Lokoja, suggesting that the effects are felt throughout the city and may require comprehensive municipal or regional intervention to address.

Additionally, the ANOVA analysis of residents’ perceptions of waste disposal methods (Table 15) indicated that those who had resided in Lokoja for longer periods (over 10 years) rated the impact of open dumping and burning significantly higher than newer residents, with mean scores of 4.2 and 4.0 respectively. This finding supports the observations of Adeyemi et al. (2023), who highlighted that prolonged exposure to substandard waste management practices can increase environmental sensitivity and awareness among residents. Long-term residents may become more aware of cumulative impacts such as deteriorating air quality and increased waste accumulation, which may not be immediately noticeable to recent arrivals. This also echoes the work of Nwosu and Akanji (2023), who found that local communities with prolonged exposure to hotel waste and pollution were more critical of waste disposal practices, underscoring the necessity for sustainable waste disposal methods to mitigate long-term environmental damage.

The study also reveals a disparity between resident expectations for proper waste disposal and the reality of current practices, with an average score of 3.5 for the perceived necessity of proper waste collection and treatment (see Table 15). However, practices such as recycling and landfill use scored relatively lower in terms of perceived adequacy, with average scores of 2.8 and 3.3 respectively. This finding highlights a gap between sustainable waste management practices and their implementation within Lokoja’s hospitality sector. This discrepancy resonates with the findings of Olowu et al. (2022), who noted similar challenges in Nigerian cities where recycling and sustainable waste disposal practices are often hindered by a lack of infrastructure and regulatory enforcement. In contrast, in developed countries, where eco-certification and regulatory frameworks are more established, hotels are increasingly adopting comprehensive recycling and waste management programs (Lee & Kim, 2023).

The environmental impact findings are further substantiated by the fact that hotels contribute significantly to local resource consumption, as evidenced by high concerns over energy and water use among residents. This aligns with Afolabi and Adedayo (2023), who noted that many hotels in developing nations, particularly in urban centers like Lagos and Abuja, continue to rely heavily on non-renewable resources, resulting in extensive environmental degradation. However, unlike larger Nigerian cities where regulatory oversight may be more pronounced, the inconsistent adoption of environmental practices among Lokoja hotels indicates the need for more targeted policies at the local level. This aligns with Oladele and Eniola (2022), who argue for the establishment of localized environmental policies to address region-specific impacts within Nigeria’s hospitality industry.

Findings suggest that while environmental impacts from hotel operations are uniformly perceived across different distances, residents with extended tenure in Lokoja are particularly critical of current waste disposal practices. This necessitates the urgent need for a comprehensive regulatory framework, targeted interventions, and enhanced community engagement to bridge the gap between local expectations and actual practices in the hospitality industry. Aligning with the Sustainable Development Goals on responsible consumption and climate action, these findings emphasize the potential for both policy improvements and operational adjustments to foster a more sustainable hospitality sector in Lokoja.

**CONCLUSION**

The study has shown that hotel operations in Lokoja have taken a large toll on the environment, contributing to increased waste generation (solid and liquid) and air pollution making resource use very high. These impacts are felt similarly by residents as a cross-cutting issue — those near hotels and those further from the hospitality sector all have an acute understanding of its impact on their environment. The results suggest that waste management in the area should see an improvement since the current methods such as open dumping and burning of waste have been criticized a lot, especially by those who have lived longer enough to witness environmental degradation which was accumulating over time. This speaks of a systemic challenge in effective environmental impact management, with dire consequences on urban and land use planning as well as public health prospects for the sustainable development of Lokoja.

As recommendations for addressing these challenges, a number of key points arise. Regulatory Standard: It is also pertinent to state that waste management in the hotel industry requires a different regulatory standard and practice than residential or commercial businesses. The implementation of a stringent waste disposal policy where every hotel must promote sustainable practices including recycling and proper segregation can help reduce the environmental hazards. The second approach was to mandate the eco-certification of hotels, which would encourage more sustainable operations. By incentivizing hotels to go greener, the certification would reward best practices and serve as a useful means of differentiation in the competitive hospitality marketplace.

Enhanced community engagement is also recommended to foster environmental awareness among residents and hotel operators. By holding periodic forums and workshops, both stakeholders can contribute to finding practical, location-specific solutions to waste management and pollution control. Furthermore, increased investment in recycling infrastructure and landfill management by local authorities would support hotels and other commercial establishments in managing waste sustainably. Such investments could include the establishment of centralized waste processing facilities to streamline recycling and ensure the safe disposal of non-recyclable waste.

Finally, integrating environmental considerations into urban planning in Lokoja is essential. As the hospitality sector continues to grow, local authorities must develop zoning laws that account for the environmental impacts of high-traffic commercial areas. Including environmental impact assessments (EIAs) for new hotel developments would ensure that future growth does not compromise Lokoja’s ecological well-being. In conclusion, achieving a sustainable balance between hospitality-driven economic growth and environmental preservation requires collective responsibility, strict regulatory oversight, and a shift towards sustainable practices in hotel operations across Lokoja. These recommendations are steps toward building a resilient and environmentally conscious urban landscape, benefiting both the community and the environment.

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