**Users’ Perceptions of Eco-Friendly Techniques and its Sustainability Impact on 3-Star Hotels in Minna, Nigeria.**

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**Abstract**

Hotel accommodation services are integral part of Tourism that is fast expanding globally including Minna in recent times. Hotel activities impact significantly on the sustainability of the hotel management. The focus of this paper therefore is to examine the users’ understanding of eco-friendly techniques for achieving comfort and sustainability in a 3-star hotel. The existing Five of such hotels were purposely studied using a descriptive survey approach with 450 questionnaires administered to both workers and guests in these hotels. 300 samples were retrieved and 250 were valid. The valid samples represent 83% responses. The responses were analysed at descriptive and inferential statistics using 5-point likert scale. The descriptive analysis shows that eco-friendly 3-star hotels have low energy consumption and discharge less pollution to the environment but the use of greens in the landscape of the hotels is very low*.* The Relative Importance Indices, RII, shows that eco-friendly techniques impact on the guests comfort and sustainability of a 3-star hotel. The study suggests for collaborations among the professionals in the hospitality industry and development authority for the enforcement of eco-friendly requirements for 3- star hotels in the study area. The study concludes that eco-friendly techniques require legislation and economic incentives for the policy to be embraced among hoteliers and should be a major requirement in the design and construction of hotels in Minna, Nigeria.

**Key words: Hotel; Perception; Pollution; Sustainability; Tourism;**

**Introduction**

Eco-friendly techniques are environmental friendly practices put in hotels environment for making the hotel and its environment complimentary or organic with the hotel facilities rather than being in contrast with the natural environment for efficiency and sustainability in the running of the hotel businesses(AksözA et al, 2021). Eco-friendly principles right from design serve as in-built sustainability tools for integrating the environment into the hotel right from inception upto the post occupancy of the hotel building(Skandrani & Kamoun, 2014). The ‘Eco’ is the short form of ecology. Some researchers refer to it as green environment (Zengeni el al., 2013; Kostić et al., 2019; Abdou et al., 2020). Eco-friendly hotels are ecological buildings where the managements set up programs to save water and energy, and reduce solid waste, thereby saving money and aiding preservation of the environment (Chou et al., 2012). Eco-friendly buildings are organic or green buildings that blend and compliment the environment thereby making it energy efficiency with manageable pollution to the environment. Increase in globalization, economic competition, population growth, and climate change, flooding, air and water pollution, increase in solid waste generation, rise in energy cost, and in recent time security, enforced sustainability requirements in the design and construction of hotel at any locations.

Hotel industry is gradually expanding in the study area, Minna with increase in urbanisation in recent times. However, the general observation shows that most of these hotels depend on the use of energy in the provision of comfort and other services to their guests. This is evidenced in the vast use of concrete floors, walls, concrete floor paving and extensive use of air conditioners in the hotel spaces. Despite the increase in electricity tariff, that is forcing many hotel business outfits to extinction. This informed the goal of the study to investigate the customers’ understanding of eco-friendly techniques in achieving efficiency in the provision of comfort in hotel management.

Rapid growth of hospitality industry significantly contributes to environmental degradation (Dincer et al., 2017). Hotel consumes large amount of space and energy for heating, cooling, and lightning systems in the hotel rooms and generate large substantial amount of pollution to the immediate environment (Kostić et al., 2019). Eco-friendly environment enhance resources efficiency, save energy and water consumptions, reduce environmental pollution and attracts more guests to the hotels (Erdogan & Baris, 2017). The growing interest in the use of eco-friendly approaches in hotel design and management is forcing hotel managers in recent times to implement practices that are environmental friendly (Kapera,2018). Tourism and hospitality industry contribute to a wide range of market opportunities (Jones, 2016). In 2018 for instance, international tourists spent $1.3 billion per day and in total $462 billion in the year 2001 only (Manzoor et al., 2019). In most of the countries, the revenue from tourism is considered as a substitute for export earnings and contributes a lot to their balance of payment [Scheyvens & Russell, 2012]. Tourism helps to “enhance employment opportunities and earnings, which can be of major economic significance to the local population(Durbarry, 2004). Environmental friendly hotel practices are considered to be initiates aimed at eliminating the negative impact of the hotel business on the environment(Radwan et al., 2012).

Therefore, given the significance contributions of Tourism and hospitality industries to economic and social developments as mentioned, the need to provide the much needed comfort and hospitality at affordable cost required proper integration of the hotel and its facilities with the environment for sustainability. Given the high energy and water consumption, large amount of solid waste and greenhouse emissions to the environment, this study assessed the user’s perception of eco-friendly principles in 3-start hotels in Minna. The objective is to determine the understanding of users’ of the 3-start hotels about eco-friendly techniques for hotels management.

In this study a quantitative approach was used to collect data from the respondents. The anticipated result of the study may give architects and other allied professionals in the built-environment industry the need to enforce the use of eco-friendly techniques in the design and management of hotels. The findings of the study are limited to hotels registered as 3-start hotels by Niger state Ministry of Tourism development, Minna. The study is restricted to users perception of greens in a 3-star hotel environment.

Globally, many hotel sustainability approaches have been studied from variety of angles, in different cities and with a variety of methodologies. In Hungarian hotels, karakas and Tatar (2015) examined the impacts of economic crisis on hotel industry in Hungary. The study discovered that cost reduction, reorganization and a multitude of efficiency-improving measures were the most important strategies put in place by the hotel management. The study employed a case study approach were hotel financial performances for a period of 7years was critically investigated to understand the impacts of the eco-friendly approaches put in place by the management for sustainable running of the hotel. Bohdanowicz *et al.*, (2001) have for a long time expressed concern about unsustainability of high energy consumption of hotel industry and the urgent need to incorporate strategies for reducing the energy consumption right from planning and design stages. According a study by Supansa (2015) in Thailand, the total GHG emission as a result of the various activities of the hotel in a study carried out. His study was discovered that approximately 3,844 tons of CO2 were discharge to the environment. This study shows that the GHG pollutants from the hotels in cities are significance and call for proper management.

Mbasera et al., (2016) did a study in Zimbabwe to determine the environmentally-friendly practices in hotels in Zimbabwe and South Africa and establish the contribution that hotels are making towards mitigation of the negative environmental effects. The method used in this research followed a case study approach. In this study, multiple case studies were used to collect data from eight hotels. In order to reach the goal of the study, a qualitative research approach was employed. All the participants in this study were hotel managers in three- to five-star-graded hotels in South Africa and Zimbabwe. These hotels are spread throughout the countries in both urban and rural areas. Purposive sampling was employed to determine the sample. semi-structured interviews were used to collect data for this study from a sample comprising managers in star-graded hotels in Zimbabwe and South Africa. A digital voice recorder was employed as the main tool for recording the interviews while field notes were taken. The study established that green management initiatives are sometimes implemented for marketing purposes as the country has no green hotel policy. The initiatives for efficiency services vary among the hotel managers.

Justice Agyei Ampofo (2020) examined the contributions of the Hospitality Industry (Hotels). In The Development Of Wa Municipality In Ghana. The objective of the study was to find out the role of the hotel industry in the development of Wa Municipality in the Upper West Region of Ghana. A descriptive survey was used by the study. The study focused on four (4) hotels in the Wa Municipality of the Upper West Region of Ghana. The researchers used questionnaire in collecting data for the research. The study found out that hotels provide employment opportunities to people, hotels in WA Municipal create a variety of jobs for the residents, local businesses benefit the most from the hotels in Wa, hotels helped in the provision of infrastructure in the Wa, hotels generate tax revenues for local governments, hotels helped in improvement of social services and also hotels has helped in the improvement of the area‘s located appearance (visual and aesthetic) in the Wa Municipality.

It was concluded from the results of variety of studies on hotels from literature reviewed above that, in addition to the negative and positive impacts of hotels on the environment, there are other areas that required investigation about environmental friendly hotels. Thus, users’ perceptions of the eco-friendly techniques to identify the awareness of the people about the different strategies employed in providing the much needed sustainable hospitality to the guests is the identified gap within the literature which the study tend to fill in the study area.

**Materials and Method.**

The study area, Minna, is the capital of niger state, in the north central geographical zone of Nigeria. It is located at Latitude 9o 37’N and Longitude 6o 33’E and occupies an area of about 884 hectares. The city’s estimated population in 2022 is 488,012. The 2006 population of 304,113 was used as the bases for this projection at 3% growth rate. The study was conducted with distribution of well-structured questionnaire to both staff and customers in the sampled hotels.

**Data Collection**

A case study approach was employed in the conduct of the study. Populations of five (5) 3-star hotel buildings spread within the study area were visited to elicit information about the presence of eco-friendly techniques in the design and management of these 3-star hotels. Self-administered questionnaires were used to collect information from the respondents (staff and guests) to get their understanding about the role play by eco-friendly techniques in the design and running of hotel for provision of comfort and satisfactory services to the users. 450 questionnaires were administered to both workers and guests in these five (5) hotels. 300 samples were retrieved and 250 were valid. The valid samples represent 83%. The responses were analysed at descriptive and inferential statistics using 5-point Likert scale. The descriptive analysis result presents their perceptions to the eco-friendly factors and Relative Important Index, RII, was used to determine the impact of eco-friendly techniques on the users for the provisions of comfort and satisfactory services in line with sustainability principle.

**Results and Discussion**

**Table1: Distribution of the Questionnaire among the Hotels Covered.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SN | Hotel visite(3-star) | Questionnaire distributed | Validly retrieved Questionnaire | Percentage (%). |
| 1. | WhiteHill Hotel | 100 | 70 | 28.0 |
| 2. | Doko International | 100 | 56 | 22.4 |
| 3. | Safco | 80 | 41 | 16.4 |
| 4. | Hydro Hotel. | 90 | 46 | 18.4 |
| 5. | Nasfa Hotel | 80 | 37 | 14.8 |
| Total |  | 450 | 250 | 100% |

Author’s field work, 2022

Table 1 shows the distribution of the 450 self-administered questionnaires across the studied 3-star hotels. Central to the study is information on the degree of awareness of the respondents on the role play by eco-friendly environment in the provision of comfort and satisfaction in a hotel management. The questionnaire as established in literature covered questions on eco-friendly techniques on: water provisions, energy consumption, solid waste management, air and noise pollutants control, use of greens, role of building control authority in enforcing eco-friendly practices in hotels design and construction. The opinions were measured in 5-point Likert scale; strongly Disagree (SD)=1 to strongly agree (SA) = 5.

The responses were rated and total Likert values for each of the variables were calculated. The mean values calculated were used to determine the degree of awareness or lack of it of the respondents about the impact of eco-friendly techniques in the design and management of hotels for sustainability. It is imperative to state here that this study adopted the midpoint values of three, i.e. value that is significantly greater or lower than this mean value of three(3) is regarded as agree and disagree respectively as the case may be (see Abdulrahman,2018). The eco-friendly techniques as found in the literature were subjected to users’ opinion. The analysis of the respondents about their awareness of eco-friendly techniques are presented in the Table 3(a-h).

**Table 3(a): Eco-Friendly Techniques Exploited for Designs-Physical Characteristics.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
| a). | **Designs-Physical Characteristics** |  |  |  |  |  |  |  |  |  |
| 1. | Hotel should be designed according to landform | 75  30% | 77  31% | 36  14% | 22  9% | 40  16% | 250  100% | 625 | 2.50 | 4 |
| 2 | Hotel buildings should have orientation for low energy usage. | 10  4% | 30  12% | 45  18% | 85  34% | 80  32% | 250  100% | 945 | 3.78 |  |
| 3 | Use of low heat and sound conductor cladding material should be mandated on walls. | 25  10% | 25  10% | 30  12% | 90  36% | 80  32% | 250  100% | 925 | 3.70 |  |
| 4 | Use of sand crate and reinforcement columns and beams should be cladded with low heat and noise absorption material. | 20  8% | 22  9% | 30  12% | 88  35% | 90  36% | 250  100% | 956 | 3.82 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 13.8 |  |
|  | RII = ∑(Means)/Item No |  |  |  |  |  |  |  | 3.45 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(b): Water Management.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. | Hotels should have borehole water system | 18  7% | 14  6% | 38  15% | 100  40% | 80  32% | 250  100% | 960 | 3.84 | 4 |
| 2. | Rain water harvest storage should be encouraged. | 85  34% | 70  28% | 40  16% | 30  12% | 25  10% | 250  100% | 590 | 2.36 |  |
| 3. | A 3-star hotel design should have recycling water plan. | 7  3% | 11  4% | 41  16% | 98  40% | 93  37% | 250  100% | 1009 | 4.04 |  |
| 4. | All foul domestic waters should not be discharged to the public drainage. | 20  8% | 10  4% | 60  24% | 70  28% | 90  36% | 250  100% | 950 | 3.80 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 14.04 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.51 |  |

**Table 3(c): Use of Greenery**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. | Hotels open spaces should be designed in greenery: Tree, shrubs, lawn grasses. | 73  29% | 70  28 | 72  29% | 15  6% | 20  8% | 250  100% | 591 | 2.36 | 7 |
| 2. | Use of concrete paving should be discouraged in hotel buildings. | 70  28% | 75  30% | 67  27% | 22  9% | 16  6% | 250  100% | 589 | 2.36 |  |
| 3. | Hotel kitchen, generator house and lawns should be surrounded by greens. | 84  34% | 72  29% | 56  22% | 26  10% | 12  5% | 250  100% | 560 | 2.24 |  |
| 4. | Outdoor activity areas should be well landscaped in greens. | 16  6% | 22  9% | 56  23% | 90  36% | 66  26% | 250  100% | 918 | 3.67 |  |
| 5. | Do you agree that Greenhouse gases from hotels are harmful to the hotel guests | 60  24% | 70  28% | 65  26% | 25  10% | 30  12% | 250  100% | 645 | 2.58 |  |
| 6. | Do you agree that hotels with green environment attract more guests. | 20  8% | 38  15% | 24  10% | 88  35% | 80  32% | 250  100% | 920 | 3.68 |  |
| 7. | Do you agree that a hotel with green environment has low energy consumption and low pollution to the environment. | 50  20% | 45  18% | 55  22% | 60  24% | 40  16% | 250  100% | 745 | 2.98 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 19.87 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 2.83 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(d): Solid Waste Management**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  | 250  100% |  |  |  |
| 1. | Do you agree that solid waste generated from the hotel is harmful to the guests. | 18  7% | 38  15% | 45  18% | 70  28% | 79  32% | 250  100% | 904 | 3.62 | 4 |
| 2. | Do you agree to burning the solid waste within the hotel premises. | 70  28% | 65  26% | 60  24% | 25  10% | 30  12% | 250  100% | 630 | 2.52 |  |
| 3. | Do you agree to the use of municipal waste bins collection of hotel solid waste. | 16  6% | 12  5% | 32  13% | 100  40% | 90  36% | 250  100% | 986 | 3.94 |  |
| 4. | The use of polythene, foil and plastics should be ban in hotel rooms. | 35  15% | 46  18% | 46  18% | 52  21% | 71  28% | 250  100% | 828 | 3.31 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 13.39 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.35 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(e): Air and Sound Pollution**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  | 4 |
| 1. | Fresh air can be enhanced by tree planting around the hotels spaces. | 30  12% | 45  18% | 65  26% | 60  24% | 50  20% | 250  100% | 805 | 3.22 |  |
| 2. | Tree planting will reduce the carbon dioxide around the kitchen and carparks. | 34  13% | 42  17% | 55  22% | 79  32% | 40  16% | 250  100% | 799 | 3.20 |  |
| 3. | Do you agree that availability of trees and shrubs around the hotels buildings can reduce the noise and air pollutants. | 40  16% | 36  14% | 52  21% | 52  21% | 70  28% | 250  100% | 826 | 3.30 |  |
| 4. | The use of polythene, foil and plastics should be ban in hotel rooms. | 60  24% | 65  26% | 68  27% | 30  12% | 27  11% | 250  100% | 649 | 2.60 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 12.32 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.08 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(f): Energy Management**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. | Do you agree that power consumption can be reduced by the use of low energy bulbs in hotel rooms. | 12  5% | 25  10% | 35  14% | 79  31% | 99  40% | 250  100% | 978 | 3.91 | 6 |
| 2. | Do you agree that use of air conditioners can be replaced by fresh air from the trees planted in hotel spaces. | 45  18% | 40  16% | 65  26% | 45  18% | 55  22% | 250  100% | 775 | 3.10 |  |
| 3. | Do you agree that use of AC in hotels should be regulated for energy efficient. | 17  7% | 27  11% | 46  18% | 90  36% | 70  28% | 250  100% | 919 | 3.68 |  |
| 4. | Do you agree to the use of guests’ sensor for power control in hotels rooms. | 25  10% | 30  12% | 45  18% | 67  27% | 83  33% | 250  100% | 903 | 3.61 |  |
| 5. | Wall sockets in hotel rooms should be for low energy consumption appliances only. | 35  14% | 30  12% | 45  18% | 66  26% | 74  30% | 250  100% | 864 | 3.45 |  |
| 6. | Do you agree that hotel alternative source of power should be solar system. | 17  7% | 25  10% | 33  13% | 82  32% | 93  38% | 250  100% | 959 | 3.84 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 21.59 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.60 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(g):** **Community Education**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. | Do you agree to the use of billboards for community education about sustainability attitude requirements in a hotel premises. | 35  14% | 38  15% | 45  18% | 62  25% | 70  28% | 250  100% | 844 | 3.38 | 3 |
| 2. | Do you agree that hotel staff should be on continuous training about rules for low energy and safety requirements in a hotel. | 10  4% | 14  6% | 34  13% | 100  40% | 92  37% | 250  100% | 1000 | 4.00 |  |
| 3. | Do you agree that hotel guests should know the low and safety energy rules of the hotel. | 12  5% | 33  13% | 42  17% | 63  25% | 100  40% | 250  100% | 956 | 3.82 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 11.20 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.73 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**Table 3(h): Development Authority**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | SD  (1) | D  (2) | U  (3) | A  (4) | SA  (5) | Resp  (n) | Total  (TV) | Means  (N) | Item No(x) |
|  |  |  |  |  |  |  |  |  |  | 4 |
| 1. | Do you agree that building development authority should have guideline for ensuring green design for hotels. | 14  6% | 24  10% | 44  17% | 80  32% | 88  35% | 250  100% | 954 | 3.82 |  |
| 2. | Do you agree that hotels with green environment should attract tax reduction. | 17  7% | 21  8% | 33  13% | 81  33% | 98  39% | 250  100% | 972 | 3.89 |  |
| 3. | Do you agree that hotels with greenery environment should be given award annually. | 34  14% | 44  17% | 48  19% | 60  24% | 64  26% | 250  100% | 826 | 3.30 |  |
| 4. | Do you agree that the government should evolve greenery policy for hotels development in Minna.. | 23  9% | 28  11% | 45  18% | 70  28% | 84  34% | 250  100% | 914 | 3.66 |  |
|  | ∑(Means) |  |  |  |  |  |  |  | 14.67 |  |
|  | RII =∑(Means)/Item No |  |  |  |  |  |  |  | 3.67 |  |

Tv=∑(n\*Likert value); means = TV/250 ; item no(x)=∑mean and RII = ∑means/item no(x).

Source: Author’s fieldwork 2022

**3a). Design-Physical Characteristics:** table 3(a) presents responses from on design physical characteristic**s.** The responses from the 3-star hotels users interacted with on the eco-friendly design techniques employed in the design of the hotels revealed that the majority of the respondents (30% and 31%) claimed strongly disagree or disagree with designing a 3-star hotel according to the landform. The respondents understanding of designing against the landform is very low. The respondents (34% and 32%) strongly agree or agree respectively to have hotel buildings having orientation for low energy usage. Similarly, the majority of the respondents (36% and 32%) and(35% and 36%) respectively claimed strongly agree or agree to the use of cladding materials for low heat and sound control on walls, beams and columns for protections in a 3-star hotel buildings.

**b). Water Management:** the description analysis in Table 3b of the respondents on water provision techniques in the 3-star hotels show that the majority of the respondents (40% and 32%) and (40% and 37%) strongly agree or agree respectively to having borehole and recycling water system as the most reliable sources of water supply in a 3-star hotel. Some of the respondents (34% and 28%) are in favour of rain water harvest as alternative source of water supply in a hotel management due to lack of pipe borne water in most parts of the city. The majority of the respondents (28% and 36%) agrees or strongly agrees that hotel foul domestic water should not be emptied directly to the main public drains.

3c). **Use of Greenery in a 3-star hotel: t**he analysis in Table 3c shows that the majority of the respondents (29%and 28%) claimed strongly disagree or disagree to hotels open spaces to be designed with trees, shrubs and lawn grasses, majority of the respondents (28%and 30%) prefer use of concrete paving in hotels, while most of the respondents (34%and 29%) claimed kitchens and generator house should not be fortified with green elements and most of the respondents (24% and 28%) strongly disagree or disagree that GHG from the 3-start hotels are detrimental to their health. However, majority of the respondents (36% and 26%) agree or strongly agree that outdoor activity areas should be well landscaped. Most of the respondents (35% and 32%) and (24%and 16%) agree or strongly agree that 3-star hotels with green environment attract more guests and consume low energy and generate low pollutants to the environment.

**3d).Solid Waste Management in 3-star hotels**: the analysis in Table 3d reveals that the majority of the respondents (28% and 32%); (40%and 36%) and (21%and 28%) agree or strongly agree respectively that solid waste generated is harmful to guests, prefer hotel solid waste collection through municipal bins system and agree or strongly agree that the use of polythene, foils and plastic materials should be prohibited in 3-star hotels. The analysis also revealed that most of the respondents (28%and 26%) strongly disagree or disagree to the burning of solid waste within hotel premises.

**3e).Air and Sound Pollution:** Table 3e presents the analysis of the respondents on their perception toward air and sound pollutants in the 3-star hotels studied. The majority of the respondents(24% and 20% or 44%); (32% and 16% or 48%) and (21% and 28 i.e. 44%) agree or strongly agree that fresh air can be enhanced by having trees around hotel spaces, the carbon dioxide as well as noise pollutants respectively can be reduced to acceptable level in a 3-start hotel environment. The majority of the respondents (24% and 26% or 50%) strongly disagrees or disagrees that musical noise should be banned from hotel rooms.

**3f).Energy Management:** table 3(f) shows the respondents perception on eco-friendly techniques for sustaining energy consumption in a 3-star hotel. The majority of the respondents (31% and 40% or 71%); (36% and 28% or 64%) and (27% and 33% or 60%) agree or strongly agree that the use of low energy bulbs in hotel rooms, regulation of AC usage and use of guests’ sensor respectively in hotels rooms contribute to low energy consumption thereby making it sustainable in 3-star hotel management. The respondents (18% and 22% 0r 40%) did not perceive fresh air from the trees planted in hotel spaces as a substitute to use of AC in hotel rooms. The majority of the respondents (26% and 30% or 56%) and (32% and 38% or 70%) respectively agree or strongly agree that wall sockets should be of low energy appliances and solar energy system should be alternative source of power in hotel rooms.

**3g).Community Education:** table 3(g) presents the respondents opinion on the role of public enlightenment in the spread of eco-friendly techniques knowledge for human satisfactions and sustainability in hotel setting. The majority of the respondents (25% and 28% or 53%); (40% and 37% or 77%) and (25% and 40% or 75%) agree or strongly agree to use of billboards for public education on sustainability attitude requirements, continuous training of the hotel staff and making low and safety energy rules of the hotel known to the guests respectively.

**3h).Development Authority:** table 3(h) is the respondents’ perception to the role of the urban physical development authority in enforcing the use of eco-friendly techniques in 3-star hotel buildings. The majority of the respondents (32%and 35% or 67 %%) agrees and strongly agrees that building development authority should have guidelines for ensuring greenery design for hotel buildings. Similarly, most of the respondents (33% and 39% or 72%) and (24% and 26% or 50%) agree and strongly agree that 3-star hotels with greenery environment should attract annual tax reduction and award respectively. The majority of the respondents (28% and 34% or 62) agrees and strongly agrees that the government should evolve greenery policy for hotels development in Minna.

**Impact of Eco-Friendly Techniques on Hotel Sustainability Management.**

The Likert scaleresults of the guests’ perception on eco-friendly techniques in table 3(a-h) were used to determine the indices for the impact of eco-friendly techniques on sustainability of 3-star hotel management in Minna using these formulae:

Total value (TV) = n x LV……………………………….. (1)

Where; TV is the total value of Likert scale variables; n, is the number of respondents and LV, is Likert range value.

And the formulae;

Mean score, N = LV/250 …………………………. (2)

Relative Important Index, RII = ∑N/x …………... (3)

Where x, is the number of items measured, and RII, Relative Important Index.

The variables n; TV; N ; x and RII as calculated are indicated in the tables 3(a-h) for each of the eco-friendly techniques used for this study. The results as extracted from the tables 3(a-h) are summarised in table 4.

**Table 4: Impact of Eco-Friendly Techniques Ranked.**

|  |  |  |  |
| --- | --- | --- | --- |
| SN | Eco-Friendly Techniques | RII | Rank |
| a. | Designs-Physical Characteristics | 3.45 | 5 |
| b. | Water Management | 3.51 | 4 |
| c. | Use of Greenery( trees, shrubs, lawns) | 2.83 | 8 |
| d. | Solid waste Management | 3.35 | 6 |
| e. | Air And Sound Pollution | 3.08 | 7 |
| f. | Energy Management | 3.60 | 3 |
| g. | Community Education | 3.73 | 1 |
| h. | Development Authority | 3.67 | 2 |

Source: Author’s fieldwork 2022

**i). Design-Physical Characteristics:** The Relative Important index, RII value is 3.45 and ranked 5th among the techniques examined in Table 4. The RII was calculated using equation (3). The values used are calculated and shown in Table 3(a), the total Likert value(V) and the mean score (N) of all the variables rated in the sample were used to arrive at the total means(N) and the Relative Important Index, RII values indicated in the table 3(a). The means (N) is 13.8 and RII of the eco-friendly techniques is 3.45. the RII value, 3.45 is above the average,3, and thisS implies that the respondents agreed that physical characteristics as a component of eco-friendly techniques impact on the design and management of a 3-star hotel for guests’ satisfaction and sustainability. This variable is ranked the 5th among the variables of eco-friendly techniques employed in the study as in table4.

i**i) Water Management:** the mean score of variables and the RII are 14.04 and 3.51 respectively as calculated in table 3(b). The respondents agree that water management is eco-friendly technique in a 3-star hotel as the RII 3.51 is above the average and this was ranked 4th as in table 4. The respondents agree that water management in a 3-star hotel has significant impact on the guests satisfaction and hotel sustainability.

i**ii).Greenery:** the respondents’ opinion on the use of greenery (trees& shrubs) in a 3-star hotel is presented in table 3(c) and was used in calculating the total mean score of the variables and the RII. The total mean score is 19.87 and the relative importance index, RII is 2.83. The RII value is less than the average 3. Thus the respondents did not see the use of greenery in the 3-star hotels studied to have any impact on the guests’ satisfaction and hotel sustainability. This opinion is ranked the 8th as indicated in table 4.

**iv). Solid waste Management:** the respondents’ perception of solid waste management has presented in table 3(d) is further confirmed by the total mean score of the variables and the RII values. The total mean score is 13.39 and RII is 3.35. The RII is above the average and this implies that the respondents agreed to the eco-friendly approach to solid waste management employed in the 3-star hotels investigated. The solid waste management technique ranked the 6th in table 4.

**v). Air and Sound Pollution:** the impact of air and noise pollutants on the comfort and sustainability of the guests investigated show that the respondents slightly agree that air and sound pollutions impact on the comfort of the guests in hotel setting. The mean score of the variables is 12.32 and the RII is 3.08 as shown in table 3(e). The RII is slightly above the average and thus suggested that the respondents agree to the significance of air and sound pollutants as an eco-friendly technique in a 3-star hotel setting. This is ranked the 7th among the variables investigated.

**vi). Energy Management**: the respondents agree that energy consumption impact on the comfort and sustainability of the hotel users as indicated in the total mean score value 21.59 and relative importance index, RII value, 3.60 as presented in table 3(f). The energy management is ranked 3rd among the hotel eco-friendly techniques for guests satisfaction and hotel sustainability as in table 4.

**vii). Community Education:** the respondents’ opinion on public enlightenment in a 3-star hotel is presented in table 3(g). From table 3(g) the total mean score variables, N, and relative importance index, RII, are 11.20 and 3.73 respectively. The RII value, 3.73, is above the average of 3. This implies that the respondents agree that sharing information about the need to integrate hotels with the ecological environment has impact on the guests’ satisfaction and hotel sustainability management. This factor is ranked 2ndas in table 4.

**viii). Development Authority:** table 3(h) reveals the total mean score of the variables and the relative importance index, RII, of the respondents’ perception on the role of the urban physical development authority in ensuring eco-friendliness hotel environment. The total means score and the relative importance index, RII values are 14.67 and 3.67 respectively. The RII value is above the average of 3. Therefore the respondents strongly agree that development authority has significance impact in ensuring the adaptability of eco-friendly techniques in the design and management of a 3-star hotel for satisfaction and sustainability. This factor is ranked 1st as presented in table 4.

**Recommendations and implications of the study.**

Based on the findings above, the study suggests the need for improved hotel environment by eco-friendly techniques for guests’ satisfaction and hotels’ sustainability. This could be achieved through professional collaborations among the built environment professionals so as to focus toward common objectives. The following recommendations that stem from the study findings could be considered by all the stakeholders in the hotels management business.

* There is the need for government policy on eco-friendly techniques to be adopted in the design and management of hospitality buildings in the study area.
* There should be continuous public enlightenment on the need to have greenery features as an integral of hotels design and construction.
* The hoteliers should be encouraged to embrace eco-friendly techniques by way of incentives like tax reduction and annual award for 3-star hotels with the best greenery environment.
* The need to reduce energy consumption, solid waste generation and pollution control in hotel environment required holistic approach and should be the concern and business of all stakeholders.
* There is the need for more public awareness on the danger of polluted air and high degree of noise in a hotel environment as users do not see these as detrimental to their health.

The implications of this study is that the methodology, results obtained and presented could be of relevant to experts working in the field of architecture, urban planning and urban managers.

**Conclusion**

The study employs case study approach through the use of questionnaire research tools to establish the perception of both hoteliers and guests about environmental friendly 3-star hotel in the city of Minna. According to the respondents greenery features are not perceived as having impact on the guests’ satisfaction and sustainability of 3-star hotel management. This could be the reason why the hotels are poorly landscaped in greens. These perceptions need continuous public enlightenment among hoteliers and users as well. There is the need to enforce this practice through robust policy on greenery and incentives for acceptance of this Sustainable Development Goals among the 3-star hotels managers.

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