Journal of Environmental Science and Sustainable Development

Volume 3
Issue 2 *December*

Article 5

12-31-2020

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Recommended Citation

Shehu, Aisha Isa; Ishiyaku, Bala; Kudan, Hadiza Balarabe; and Milala, Sani Inusa (2020). RELATIONSHIP BETWEEN HOTELS' DESIGN ADEQUACY AND HOTELIERS' PERCEPTION OF SUSTAINABLE ENERGY MANAGEMENT IN ABUJA, NIGERIA. *Journal of Environmental Science and Sustainable Development*, 3(2), 281-301.
Available at: https://doi.org/10.7454/jessd.v3i2.1061

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Journal of Environmental Science and Sustainable Development
Volume 3, Issue 2, Page 281-301
ISSN: 2655-6847
Homepage: https://scholarhub.ui.ac.id/jessd

RELATIONSHIP BETWEEN HOTELS' DESIGN ADEQUACY AND HOTELIERS' PERCEPTION OF SUSTAINABLE ENERGY MANAGEMENT IN ABUJA, NIGERIA

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(Received: 7 September 2020; Accepted: 23 December 2020; Published: 31 December 2020)

Abstract

Energy is a sustainability issue receiving primary global concern. Improving energy efficiency and utilizing renewable resources are important in building energy sustainability. An energy-efficient design is a basis for controlling energy efficiency in buildings, and it is highly motivated by the sustainable energy management perception of relevant stakeholders. Hotels have high energy intensities and high working costs. This study investigates the relationship between hotel design adequacy and hoteliers' perception of sustainable energy management in Abuja, Nigeria. The investigation embraces quantitative structure utilizing exploratory and elucidating techniques. The mean ranking and Pearson product-moment correlation results revealed substantial and weak positive correlations (r = 0.601 and r. = 0.257) between design adequacy and hoteliers' perception of importance as well as barriers of sustainable energy management, respectively. However, a negligible negative correlation was found between hotel design adequacy and hoteliers' opinion advantages of sustainable energy management (r. = -0.088). The findings negate the theoretical argument in cognitive dissonance that although hoteliers are conscious of energy issues and the high cost of power generation from back-up generators, they are not interested in investing in sustainable energy management. This study recommends minimizing hotel energy demand through climate-adaptive design and harnessing renewable energy to ensure comfortable and healthy hotel buildings with reduced operating and maintenance costs. Hotel design in the study area reasonably supports energy efficiency. Positive hoteliers' perception of the importance of sustainable energy management is related to improved design adequacy and thus responsible for a positive outcome.

Keywords: Design adequacy; Energy efficiency; Energy sustainability; Hoteliers' perception.

1. Introduction

The ever-increasing energy prices, fossil energy resource depletion, and the damning effects of global warming stressed the need for high energy efficiency. Energy-efficient buildings are those that consume less energy than standard structures without compromising the comfort of

their tenants. Energy-efficient designs minimize environmental effects and are monetarily sustainable and resilient (Federal Ministry of Power, 2016).

In Nigeria, the electricity supply shortage and energy insecurity experiences are worsened by increasing electricity consumption for various purposes, such as cooling, because of high temperatures associated with climate change (Iram et al., 2020). The country is also confronted with other related environmental, social, and economic challenges that jeopardize its development objectives, such as Millennium Development Goals and Nigeria Vision 20:2020.

However, confronting the identified problems demands the collaboration of building industry stakeholders, particularly at the design stage, to be conscious of these threats and remain proactive in providing energy-efficient buildings. Sustainable energy management is dependent on central standards of sustainable development focused on asset preservation, ecological assurance, and cost savings that give energy security (adequate, safe, and reasonable) for people in the present and future (IEA & World Bank, 2015). Design adequacy is an indicator of the sufficiency of building design to meet the requirement of an energy-efficient building, providing the basis for building energy sustainability. It remains an important determinant of a building's energy requirement, especially when considering the building's heating, ventilation, and air conditioning. A previous study (Akinbogun et al., 2020) reported that the building design and material used could significantly influence the occupant's indoor air quality, noise level, thermal comfort, and health quality.

Due to the nature of their operations, hotel buildings are universally identified with high energy intensities (Abdulaali et al., 2020). Hence, energy cost constitutes a crucial part of their operations. However, with sustainable energy management, which encompasses energy-efficient practices and technologies, energy costs can be significantly reduced in a building without necessarily decreasing the occupants' comfort (Roald et al., 2020). Moreover, the concept has been widely embraced by the hotel industry worldwide to tap its numerous advantages, especially reduced energy expenditures and minimized emissions, and thus optimizes their performance and meets the sustainability objective (Wario, 2020).

However, in Nigeria, the adoption of sustainable energy management and the utilization of its opportunities are relatively inadequate, as evidenced by the high operating cost incurred primarily by high energy costs. The situation was further escalated by Nigeria’s insufficient electricity generation and disproportional supply to increasing demand. Consequently, the unsatisfactory services and exorbitant charges not commensurate to the value of services

rendered negatively influence the popularity of Nigerian hotels, thereby benefitting hotels in neighboring countries (Santos et al. 2020).

A design approach that is conscious of the site's specific microclimatic conditions is vital in building an energy-effective structure, specifically in. Therefore, the perception of various stakeholders involved is critical in increasing energy efficiency to determine the orientation and shaping of the building and the materials used and envelope systems. In specific, hoteliers' perception toward the concept of sustainable energy management is significant in optimizing their operational performance, particularly when retrofitting existing hotel buildings toward achieving energy efficiency. In acknowledgment of the importance of perception, Festinger's (1957) theory of cognitive dissonance expects that all people look for intellectual consistency by decreasing negative contemplations and feelings to bring them into harmony (Alkadri et al., 2020). Based on this hypothesis, the importance and acknowledgment of a basis ought to be steady. Moreover, when somebody appends more significance to a measure, the person in question is then prompted to have a higher acknowledgment of it and the other way around (Hong et al. 2015). Surprisingly, the unreliable grid-supplied electricity implies that although hoteliers are conscious of energy issues and the high cost of power generation from back-up generators, they are not interested in investing in sustainable energy management.

Many studies focused on hotel design adequacy, energy management, and hoteliers' perception of energy management and sustainability in energy management. Wang et al. (2018) assessed the energy-saving practices of the hospitality industry in Macau. Alipour, Safaeimanesh and Soosan (2019) investigated sustainable practices in the hotel industry from employees' perspective and collected evidence from a Mediterranean Island. Kannan and Kannan (2016) analyzed energy management strategies for the hotel industry in Papua New Guinea. Said et al. (2017) explored energy-efficient opportunities in hotels. Petrvska and Cingoski (2015) reported the environmental protection and energy efficiency concept in five-star hotels in Macedonia. Shehu et al. (2019) studied hotel energy application practices in Abuja, Nigeria. However, none of the previous studies assessed the relationship between hotel design adequacy and hoteliers' perception of sustainable energy management, especially in terms of importance, benefits, and barriers to sustainable energy management. Therefore, the present study examined the design adequacy and hoteliers' perception, the relationship between hotel design adequacy and hoteliers' perception benefits of sustainable energy

management, and the relationship between design adequacy and hoteliers' perception on barriers to sustainable energy management in Abuja, Nigeria.

Nigeria is located inside the tropical zone but shows unusual climatic varieties in various locales of the nation. The atmosphere is dominatingly hot and dry in the North, with high temperatures and dampness swings. Abuja encounters a composite of hot, damp, and hot, dry atmospheres. The city experiences three climate conditions every year, including a warm, moist, wet season from April to closures in October and a dry season from November to March. A brief break of Harmattan occurs between the two seasons (Mngutyo, 2019). The average yearly temperature is 25.7 ℃, and about 1389 mm of precipitation falls every year. The driest month is December, with 1 mm of a downpour. The more significant part of the rain falls in September, averaging 284 mm (Adeniran et al., 2020). A rainfall distinction of 283 mm occurs between the driest and wettest months. Consistently, temperatures vary by 4.6 °C, and the relative humidity is about 15%.

As Nigeria's capital city, Abuja, home to the bureaucratic capital region, is the federal government's political and regulatory seat. In contrast to Lagos, business activities are restricted in Abuja. Subsequently, business exercises that drive the cordiality area in Abuja are overwhelming government-related (Owolabi et al., 2020). The city is home to around 285 government offices and parastatals; hence, most of Abuja's workforces are government employees. The development and administration areas in Abuja are energetic and contribute most of the work in the private segment.

When defining energy proficiency objectives, the point is to enhance the structure's presentation and operational efficiencies at the lowest cost. The double advantages of cost compromises that can be distinguished through the planning cycle are interconnected with the accompanying destinations: to build structures that are agreeable and beneficial, to develop strict structures with decreased reliance on grid energy supply, and to create a monetarily practical and reasonable design with low capital, operational, and maintenance costs. However, the foremost strategy that provides the basis for achieving the aforementioned goals is through minimized energy demand using a climate-adaptive design that considers local conditions and microclimates.

The climatic plan gives the premise to an energy-efficient hotel. Planning a bioclimatic cognizant structure depends on organizing atmosphere contemplations to accomplish physical solace for tenants with insignificant asset use (e.g., energy, water, and so forth) while considering social and mental angles. The idea organizes and allocates control on heat

increases and misfortunes from the structure because of the atmosphere to enhance natural conditions inside. The bioclimatic plan does not force a specific style on a designer, and a wide range of structures show successful bio-climatic responsiveness in their climates (Federal Ministry of Power, 2016). In general, a conspicuous characteristic is their streamlined direction and joining of sunlight-based protection. The structure volume, geometrical parts, and openings corresponding to the climatic states of the study zone would stop the unwanted thermal gains and promote thermal loss. Techniques identified with the structure form their significant parts, volume, setup of rooms, and open-air territories. Small structures, such as solid shapes, show lower heat gains than lengthened or enunciated structures for a similar volume; the cooling request is lower for the lower surface–volume proportion (S/V). Materials and building skin segments are coordinated to decrease warmth gains by conduction, convection, and radiation; control humidity; and promote thermal loss.

The physical properties (shading, warm mass, and conductivity) of building materials are essential for acceptable thermal performance. Compositional techniques are also important for cooling the structure without mechanical frameworks. The most fitting structure site and orientation should be selected. Nigeria is close to the Equator, and the sun direction throughout the year does not considerably vary, adding direct sunlight-based irradiance to solar heat gains. Therefore, the structure direction corresponding to the sunlight direction is significant to decrease sun-based irradiance. The size of the site should be considered when improving the microclimate around the structure. The number of windows accommodating daylight is limited, and landscaping highlights, particularly trees, are utilized. Similar to evaporative cooling, such a method is powerful in providing shading to structures. Consequently, actions toward saving any currently developed trees and other environmental frameworks on the site should not be overemphasized.

Considering the financial emergency, hoteliers in developed nations have become more cognizant of working feasible housing offices than any time in recent memory to minimize cost. Tremendous measures of energy expenditure are focused on advancing interests in effective energy utilization to prompt significant decreases in energy utilization, working expenses, and energy charges (Kapiki, 2010). This statement opposes the view that developing nations in Africa, where most hotels have yet to receive green practices, including water monitoring and saving, energy use diminishing, and strong waste reduction, are yet to appreciate the advantages of becoming environmentally viable. Such advantages include decreased expenses and liabilities, exceptional yield and generally safe ventures, expanded

benefits, and positive incomes. This maybe could be connected to the hotelier recognition, which joined less significance to the idea.

In any case, Festinger's (1957) hypothesis of intellectual discord states that people look for psychological consistency by decreasing negative thinking and feelings to bring them into harmony (Lu et al., 2020). With this hypothesis, the pertinence and acknowledgment of a model ought to be reliable. Moreover, when somebody connects more significance to a measure, the person is then prompted to have a higher acknowledgment of it and the other way around (Hong et al. 2015). Therefore, accomplishing economic development and seriousness through productive energy, the board requires fundamentally unique authoritative structures and perspectives intended to achieve constant improvement in performance. This goal is cultivated by illuminated administration rehearses, which fuses new, cleaner advancements and stresses on asset preservation, reusing, reuse, and recuperation in progress toward manageability (Di Vaio & Varriale, 2020).

Mady (2020) studied environmental sustainability and practices and uncovered that most hoteliers perceive that their facilities affect the environment, and that the hotel business would profit from natural favorability to liveliness. However, the cost for hotels to be eco-accommodating and communicated is a cause of concern, especially among independent managers from Poland and Croatia. Chain and subsidiary foundations exhibit a higher natural support of animation than autonomously affiliated foundations with awareness rates on practical environmental issues in the hotel business of 51.4% against 24.2%. According to Anwar et al. (2020), the abovementioned finding can be ascribed to the endeavors made by most chain head workplaces toward creating and authorizing strategies and projects, similar to providing staff training.

Concerning the environmental activities attempted by hotels (energy preservation, water protection, mindful waste administration), these exercises rely more on the district than on the size of the office. Over 83% of directors from Poland and Sweden announced contribution in energy sparing measures compared with only 26% from Croatia. This finding is credited to various degrees of general awareness only as budgetary methods controlled by hoteliers from these three areas (Yusoff et al. 2020). The distinction in the association between chain hotels and exclusive chain hotels in energy sparing estimates is negligible (81.5%, respectively 77.5%). The marginally higher contribution in a wide range of exercises showed by agents of the chain hotels is credited to the presence of a natural corporate

arrangement and activity plans among chain foundations and the accessibility of broad budgetary assets.

Over 40% of the hotel chain administrators announced having an environmental arrangement articulation in their business strategy, and only 18% of the separately overseen offices reacted decidedly. A few hoteliers accept that consistency with laws and nearby principles is sufficient to make their offices environmentally mindful, as the Green Flag concentrate likewise uncovered. This exhibits the need to convey the natural effects from hotel offices and the arrangements (aside from guidelines) to bring down this effect, such as energy protection measures.

The most energy-saving exercises carried out by hoteliers are the utilization of useful hardware with relatively fast rates of profitability (e.g., proficient lighting), utilization of sustainable power source arrangements, and correspondence to hotel visitors on “great signals” to receive. Kapiki (2010) proposed to distinguish the energy-saving frameworks in four- and five-star hotels of Thessaloniki, Greece and investigate whether or not these frameworks lessen the energy and working cost of green practices, such as productive energy lighting, and contribute to cost reduction and environmental sustainability. Other financially savvy arrangements incorporate appropriation of eco-marking, utilization of energy toolbox, and the mix of remote energy. The executives' frameworks pointed toward lessening energy utilization. Hotel directors and their staff are additionally prepared to improve understanding, energy-saving, and expanded benefit.

Hotels utilizing sustainable power source assets have the option to lessen energy utilization and expanded benefits. The use of energy-efficient measures and sustainable power sources by Greek hoteliers contribute significantly to the nation's economy in the present deep recession. The best practice model that follows is a Greek hotel utilizing geothermal energy, which is one of the most natural, cordial, and savvy energy assets and can help moderate an Earth-wide temperature boost if broadly conveyed instead of petroleum products. This, in the end, shows the significance joined to maintainable energy the executives by hoteliers in that aspect of the globe.

An investigation by Saad, Hewedi, and Abdel-maboud (2012) in Egypt shows that less significance being appended to energy maintainability as petroleum products are the fundamental hotspots for creating energy at three- and four-star hotels and the structures utilized are in a slipping request, electricity, diesel oil, liquefied oil gas, flammable gas. Moreover, 39 of the 176 examined three- and four-star hotels utilize sun-oriented energy for

water warming and settled that wrong staff practices in utilizing hardware and gadgets are the fundamental drivers that prompt energy failures in their hotels. A study by Mungai and Irungu (2013) in Mombasa, Kenya demonstrated that 88.9% of the managers are zeroing in on improving their energy proficiency. This effort is shown in the degree of appropriation of energy maintainability of nine hotels, of which seven (77.8%) utilized energy-saving bulbs while two (22.2%) did not. Moreover, five hotels (55.6%) operated sun-based boards as an elective wellspring of energy while four hotels (44.4%) lacked sun-based boards. Most hotels (77.8%) utilized sunshine to limit the utilization of counterfeit lighting, whereas 22.2% of the hotels did not have good standard lighting. On the side of the above discoveries, Hong et al. (2015) revealed that a decent beginning is in their situation of standard lights with energy effective lights. They further reported that energy administration organizations assist in organizing venture financing of energy improvements and fabricating the case to the senior administration in energy upgrades. Green buying and acquirement were grasped by six hotels (66.7%) while three hotels (33.3%) did not utilize the training. The study likewise indicated that the more significant part of these hotels (55.6%) included the neighborhood networks in environmental administration. Given the above findings, the potential for energy saving through green practices, such as supplanting lights with energy-effective ones, was assessed at 10%–25% depending on the hotel's age and size.

The study directed on Zimbabwean hotels by Karatepe et al. (2020) found a negative and positive connection between green neighborliness and working cost, as observed by hotel representatives. Many lower-level representatives lacked information on the green tourism industry and thus failed to give extensive practices that are being received and some green practices that could be consolidated instead of the customary strategies.

The supervisors concluded that conventional techniques are better because they still had questions on green practices' economic effects. Similarly, Ahn and Kwon (2020) attested that many hotel managers have questions concerning the monetary adequacy of green practices because green practices' useful traits are exceptionally identified with the establishment of innovations or frameworks that expand costs. They are aware that hotels pay for the water and electricity bills and that green practices further add to the department's cost. To build up the relationship, administrative staff were asked about the rates that water and energy add to the general working cost.

Improving efficiency and quality while diminishing environmental emissions and energy costs is an incredible inspiration for organizations to incorporate energy management (Amara

& Chen, 2020). Destek and Sinha (2020) indicated that associations handle the weight of improving the item and satisfying the developing business sector requests while diminishing the natural impression through expanding their energy effectiveness. Total quality management (TQM) assists organizations in creating an expansive and coordinated methodology to work a business optimally; consequently, energy cost ought to be remembered for this model (Agyabeng-Mensah et al., 2020). TQM's principle is that cutting-edge representatives should make adjustments and different decisions at a minimal working level. Subsequently, if these representatives have the energy the executives preparing, they can undoubtedly settle on taught and sound choices and advice on energy costs (Agyabeng-Mensah et al., 2020).

The possibility that workers may have an urgent task in this energy management program and not referenced enough. Representatives are essential for the structure of any organization and are often the most unexploited asset for these sorts of programs (Nævestad et al., 2020). Including workers and their ideas in energy, utilization can be the most productive exertion of the whole program. The program organizers should perform such tasks for a particular measure of time and then rotate. This rotation carries a unique segment to the program as new individuals accompany groundbreaking thoughts and approaches. It also allows moving nonstrategic performers and engages a superior number of people (Gueldner et al., 2020).

2. Methods

The research adopted a quantitative approach that covers exploratory and enlightening strategies. Data were gathered through an extensive review of the literature and personal administration of questionnaires. The critical advantage of this approach is that it subjects the data gathered to a rigorous quantitative analysis formally and rigidly. Denis (2020) pointed out that quantitative data offer high levels of reliability.

This study was carried out in May 2019 in Abuja, Nigeria's capital. The scope and longitude of Abuja are 9°12' North and 7°11' East. The longitude of Nigeria is toward the east of the Prime Meridian, and the time distinction is 1 hour in front of the Greenwich Meridian Time. Abuja is an arranged city and was fabricated mostly during the 1980s. It authoritatively turned into Nigeria's capital on 12 December 1991, replacing Lagos. Nevertheless, Lagos remains the nation's second generally crowded after Kano. The National Population Commission (2006) statistics, indicated that Lagos had a total populace of 1,606,239, including 933,172 male and 673,067 females. Abuja has seen a tremendous convergence of

individuals into the city; the development has prompted the rise of satellite towns, such as the Karu metropolitan zone, Suleja, Gwagwalada, Lugbe, Kuje, and smaller settlements to which the planned city is rambling. The informal urban territory of Abuja has a populace of well more than 3,000,000 and involves the fourth-biggest metropolitan region in Nigeria, outperformed distinctly by Kano, Lagos, and Ibadan (National Population Commission, 2006).

The Federal Capital Territory is partitioned into areas, and the regions are assembled into four development phases. Each phase is separated into districts and cadastral zones. Most regions in phase 1 and phase 2 are exceptionally developed with the foundation set up. A few regions in phase 3 and phase 4 are likewise developed, while others are still being created (Madu, 2017). All the regions in phase I with the exemption of Guzape are developed with infrastructure set up. The regions are as follows:

a. Asokoro District (Cadastral zone Ao4)
b. Central business district (Cadastral zone A00)
c. Garki I District (Cadastral zone A01)
d. Garki II District (Cadastral zone A03)
e. Guzape District (Cadastral zone A09)
f. Maitama District (Cadastral zones A05 and A06)
g. Wuse District (Cadastral zone A03)
h. Wuse II District (Cadastral zones A07 and A08)

The respondents of the study are management and technical staff of rated hotels within the eight districts of phase I, Abuja, Nigeria. Thus, rated hotels considered for this study are those that conform to the standard descriptions encapsulated in the national classification and grading of hotels provided by Nigeria Tourism Development Corporation. In the phase I district, Abuja has 45 hotels, of which 4 are in the two-star category, 15 are in the three-star category, 5 are in the four-star category, 1 is in the five-star category, and 20 are unrated.

The respondents for the study were drawn from the Housekeeping, Engineering and Maintenance, Food and Beverages, and Accounting departments of hotels. They were composed of the department head (manager) and any other four senior staff knowledgeable in hotel energy use and management, particularly in relation to his/her department. The departments selected were those whose functions entailed using a significant amount of energy and/or connected to energy use and management in a hotel organization. Hence, they

are highly relevant in acquiring accurate data for evaluating sustainable energy management of hotels in the study area. The managers and senior staff of their various departments were selected to provide reliable data because they are knowledgeable of the functions and activities of their departments in relation to energy use and management.

The hotel sample size is 24. This sample size was chosen according to Krejcie and Morgan (1970) sample size determination table, which recommended the sample size of 24 in a population of 25. Therefore, this translates to 480 respondents, considering the number of staff respondents (5) in each of the four departments in the 24 sampled hotels. Therefore, a total of 480 questionnaires was administered.

The questionnaires were administered and retrieved in 5 weeks. A total of 480 questionnaires were administered. A total of 424 (88.3%) questionnaires were retrieved, and 56 (11.7%) were discarded due to incomplete responses, univariate, and multivariate outliers. The incomplete responses were in half-filled questionnaires, which rendered them inappropriate for inclusion for the analyses. The missing data refer to the questionnaires with few questions not answered. Such questionnaires were included, whereas the missing data were filled by the SPSS software, as explained in Section 4.3. Therefore, 407 (84.8%) responses were finally used for analysis (Table 1). High-percentage responses were achieved due to the involvement of both management and junior staff in questionnaire administration. Descriptive statistics using mean ranking and correlation analysis using the Pearson correlation product-moment coefficient were used in data analysis. Preliminary analyses were performed to ensure no violation of the assumption of normality, linearity, and homoscedasticity was made. The results revealed that no violations of any assumption were made.

Table 1. Assumptions for multiple correlation analysis

Multivariate outliers	Independence of sampling	Linearity	Homoscedasticity	Multicollinearity
Mahalanobis 12.9982 to 0.0399	Cook's 0.06966 to 0.00000	Normal distribution	Tolerance .932	VIF 1.072

The size of the connections detailed was deciphered utilizing descriptors, with coefficient >0.69 as very strong, 0.50–0.69 as substantial, 0.30 to 0.49 as moderate, 0.10–0.29 as weak, and 0.01–0.09 as negligible. The descriptive results are presented in Table 2.

Table 2. Result of descriptive analysis on design adequacy and hoteliers' perception

Variables	Mean	Std. Deviation	Rank
Ratio of hotel and other services area to administrative area	4.18	0.525	1
Paved surfaces around the facility	4.13	0.667	2
Ratio of landscaped to paved area	4.11	0.531	3
Light-colored surfaces to external walls	4.04	0.603	4
Smooth/reflective walls	4.03	0.776	5
Window open ability	4.02	0.738	6
Shading from buildings/trees	4.00	0.734	7
Ratio of built area to open spaces	3.98	0.888	8
Windows sizes (15%–20% of floor area)	3.98	0.729	9
External wall opening protection	3.96	0.701	10
Wall overhangs	3.89	0.666	11
Roof insulation system provisions	3.88	0.728	12
Roof overhangs	3.86	0.828	13
Thermal insulation on external wall	3.83	0.856	14
Use of natural lighting	3.83	0.741	15
Shading devices provision where necessary to fenestrations	3.82	0.729	16
Cross ventilation (opposite openings/inlets)	3.73	0.746	17
Window placement against solar radiation	3.69	0.829	18
Water bodies around and within the facility	3.68	0.974	19
Shading from buildings/trees	3.57	0.955	20

The mean ranking of key design adequacy considerations by hotels shows that most essential design considerations by the hotels in the study area are the provision of an adequate

proportion of hotel/other services area to administrative area with a mean value of 4.18, paved surfaces around the facility with a mean value of 4.13, a ratio of landscaped to a paved area with a mean value of 4.11, light-colored surfaces to external walls with a mean value of 4.04, smooth/reflective walls with a mean value of 4.03, window open ability with a mean value of 4.02, and shading from buildings/trees with a mean value of 4.00.

However, the provision of shading devices where necessary to fenestrations with a mean value of 3.82, cross ventilation (opposite opening inlets) with a mean value of 3.73, window placement against solar radiation with a mean value of 3.69, and water bodies around and within the facility with a mean value of 3.68 are less considered in the design of hotels in the study area.

The correlation analysis between hotel design adequacy and hoteliers' perception of sustainable energy management results is presented in Table 3.

Table 3. Results of correlation analysis

	Hoteliers' perception on importance	Hoteliers' perception on benefits	Hoteliers' perception on barriers
Design Efficiency	0.601**	-0.088	
Design Efficiency and Design Adequacy			0.257**

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

A substantial positive correlation was found between design adequacy and hoteliers' perception on the importance of sustainable energy management and hoteliers' perception on the importance of sustainable energy management (r =0.601). However, a negligible negative correlation was found between hotel design adequacy and hoteliers' perception benefits of sustainable energy management (r=-0.088). Results also revealed a weak positive correlation between design adequacy and hoteliers' perception on barriers to sustainable energy management (r = 0.257).

3. Results and Discussion

The mean ranking analysis results indicate that the most significant design considerations of hotels in the study area are the provision of an adequate proportion of hotel/other services area to the administrative area, paved surfaces around the facility, a ratio of landscaped to a paved area, light-colored surfaces to external walls, smooth/reflective walls, window open ability, and shading from buildings/trees. This result is expected because hotels prioritize security and patrons' comfort, which are perceived to provide more significant business benefits than energy efficiency.

The substantial positive correlation between design adequacy responsiveness and hoteliers' perception of the importance of sustainable energy management is also expected. The positive interaction explained by the results indicates that hoteliers are convinced that design efficiency responsiveness forms a crucial part of sustainable energy management. However, the negligible negative correlation between hotel design adequacy responsiveness and hoteliers' perception benefits of sustainable energy management (r=-0.088) explains unequal hoteliers' confidence in the benefits of sustainable energy management. Moreover, the negative result further explains that an increase in the path of the negative perception of the benefits reduces the chances of having an adequate design. The weak positive correlation between design efficiency responsiveness and hoteliers' perception on barriers to sustainable energy management (r= 0.257) suggests a relationship between the two, further explaining that the barriers play a role in the inhibited hoteliers' adoption of concept and association to the poor perception of the benefits of sustainable energy management.

Moreover, an energy-efficient responsive building is that designed to minimize energy demand and provided with efficient equipment and materials appropriate for the location, use, and conditions, which are operated in such a manner that results in low energy use when compared with other similar buildings (Federal Ministry of Power, 2016). Therefore, three fundamental issues should be prioritized in the energy-efficient building strategy: bioclimatic design, energy-efficient systems, and renewable energy integration.

The highlights of design adequacy responsiveness of the sampled hotels assessed show that the orientations for three out of five have windows approximately facing north and south, which is essential in reducing solar gains in the study area's hot and dry climate. Meanwhile, the remaining two have approximately east- and west-facing windows, which is considered poor orientation for reduced solar gains. Thus, the former is expected to have reduced energy demand and cost than the latter.

The building form, which prescribes natural daylight and ventilation effectiveness through the building, also indicates that three have compact geometry while two were of open form. This finding further demonstrates that the former conforms to the Nigerian energy efficiency guideline, which prescribes compact geometry as the most suitable building form, particularly concerning passive strategy application in hot and dry climates.

However, all but one of the sampled hotels have external window shading devices. One of the sampled hotels meets the recommended 1 m horizontal overhangs for reduced thermal gains and optimal energy efficiency. Moreover, the cooling situation in the sampled hotels is complemented by shade provision using plants. The supplied information that one hotel dependably has roof insulation requisite for reduced heat gains is expected because of the poor perception of its ability to reduce mechanical cooling substantially.

In relation to the theory of cognitive dissonance on importance of perception, Festinger's (1957) theory of cognitive dissonance expects that the hoteliers look for intellectual consistency through understanding the design adequacy and how it affects energy efficiency in the hotels and then decrease negative contemplations and feelings by adopting sustainable energy management, such as renewable energy, to bring them into harmony. Meanwhile, the results inform that hoteliers are convinced that design efficiency responsiveness forms a crucial part of sustainable energy management but prioritize security and patrons' comfort, which are perceived to provide more business benefits than energy efficiency ultimately. It further explains that the barriers play a role in the inhibited hoteliers' adoption of sustainable energy management and are associated with the poor perception of the benefits of sustainable energy management.

4. Conclusion

The hotel design in the study area reasonably supports energy efficiency (based on descriptive analysis). Apparently, positive hoteliers' perception of the importance of sustainable energy management is related to improved design adequacy and thus responsible for a positive outcome. Poor hotelier's confidence in the benefits of sustainable energy management explained by the negligible negative correlation between hotel design adequacy and hoteliers' perception benefit of sustainable energy management is responsible for partly acceptance of sustainable energy management, hence facilitating the high energy costs incurred by hotels.

The weak positive correlation between design adequacy and hoteliers' perception on barriers to sustainable energy management, which suggests a relationship between the two, further explains that the barriers play a role in the inhibited hoteliers' adoption of sustainable energy management and are associated to the poor perception of the benefits of sustainable energy management. However, the need for improved positive perception of sustainable energy management is critical in achieving energy sustainability and, by implication, an improved business operation in the hotel industry.

These results suggest that hoteliers give priority where it is less needed. Instead of improving energy efficiency services, hoteliers focus on services that cannot achieve energy efficiency. In addition, they are convinced that design efficiency responsiveness forms a crucial part of sustainable energy management. Nevertheless, they have less confidence in sustainable energy management benefits, thereby reducing the chances of having design adequacy or action to achieve sustainable energy management. This phenomenon led to the indicated negative impact of barriers to sustainable energy management on the inhibited hoteliers' adoption of sustainable energy management and the poor perception of sustainable energy management benefits.

The study indicated the need for massive orientation programs for hoteliers on sustainable energy management indicators, including importance, benefits, and barriers. The relevance of design adequacy on sustainable energy management also needs special emphasis on construction management courses for the development of professionals. The study thus recommends minimizing hotel energy demand through climate-adaptive design and complementing the remaining demand by harnessing renewable energy, which ensures comfortable and healthy hotel buildings in addition to reduced operating and maintenance costs.

Author Contribution

Aisha Isa Shehu, Bala Ishiyaku, Hadiza Balarabe Kudan and Sani Inusa Milala conceived of the presented idea. As need of sustainability in energy management persisted, Aisha Isa Shehu and Bala Ishiyaku investigate the need of energy sustainability management in hotel and developed a framework idea of user perception in the management. Hadiza Balarabe Kudan administers and retrieves the questionnaire survey while Sani Inusa Milala did the research analysis and confirm together with Bala Ishiyaku, Aisha Isa Shehu and hadiza

balarabe kudan after the supervision of findings by Bala Ishiyaku, all the authors collectively discussed the result and contributed to the final manuscript.

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