

# Factors Influencing the Adoption of Sustainable Design Strategies (SDS) in Large-Sized Hotels in Lagos, Nigeria

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## Abstract

**Introduction:** Hotels are increasingly embracing practices that promote environmental sustainability especially in the areas of energy efficiency, water use and waste management. Nevertheless, the hotel industry is still confronted with excessive generation of waste and high utilization of resources such as water and energy which contribute substantially to carbon emissions with detrimental effects on environmental sustainability. In order to minimize the negative environmental impacts of hotels, it has been underscored that hotels need to adopt sustainable strategies across the entire hotel value chain, especially at the design stage for energy reduction, water conservation, and waste minimisation. Extant literature indicate that adoption of sustainable design strategies (SDS) is not yet widespread in the Nigerian hotel context. Anecdotal information suggests that low adoption of SDS in hotels is associated with a number of factors. These factors have not been studied on a comprehensive basis in the study context.

**Objectives:** Hence, this study investigated the factors that influence the adoption of sustainable strategies at the design stage of hotels in the study context. Lagos, the commercial capital of Nigeria with a preponderance of hotels is the study area. Prior to the investigation, the main factors in the literature were identified.

**Methods:** A survey research design was adopted for the study. The quantitative data were gathered from 130 hotel managers and 56 architectural design professionals through a self-administered questionnaire. The questionnaire is based on thirteen factors of adoption identified in the literature, The data were analysed using descriptive statistics.

**Results:** The study revealed that costs associated with adoption of sustainable design strategies, level of and enforcement of government policies, level of environmental knowledge for hotel managers, availability of adequate and right information, level of technical know-how and general level of stakeholders awareness are the critical factors that influence the adoption of sustainable design strategies in hotels within the study area.

**Conclusions:** The implications of the findings for design professionals, hotel managers, government, and other stakeholders in the built environment were examined. In all, a multi faceted approach hinged on effective acquisition and dissemination of knowledge and information, acquisition of requisite skills and critical evaluation of cost implications are critical to the adoption of sustainable strategies in hotels.

**Keywords:** adoption, design strategies, factors, hotels, Lagos-Nigeria, sustainability

## 1. Introduction

The built environment and specifically the real estate sector constitute an important aspect of economic development with capacity to alter the balance in the natural environment. As represented by the building and construction sector, it accounts for over one-third of global final energy consumption and nearly 40% of both direct and indirect carbon emissions [1]. Buildings are huge contributors to greenhouse gas (GHG) emissions [2]. The climate change conference in Egypt (COP

27), revealed that the building sector accounted for over 34 percent of energy demand and around 37 percent of energy-related carbon emissions in 2021 [3]. Earlier, carbon emissions were projected to increase by 52% between 2005 and 2050 if there are no ameliorative measures to reduce the rising trend [4].

Hotels, which constitute a sizeable part of the building and real estate sector, contribute significantly to GHG emissions [5], [6]. The tourism and hospitality subsector of the travel, tourism and

hospitality (TTH) industry is a key component of the real estate sector as it contributes positively to gross domestic product (GDP). The global TTH sector contributed 10.4% and 7.6% to global GDP in 2019 and 2022 respectively with a projected contribution of 9.2% and 11.6% in 2023 and 2033 respectively [7]. The drop in the contribution of the sector between 2019 and 2022 has been attributed to the COVID-19 incident. In comparison to other building and real estate types, hotels consume an excessive amount of energy, making a substantial contribution to climate change [8]. In a published report, CO<sub>2</sub> emissions in the global hotel industry was estimated to be higher than the average when compared with other real estate asset classes [9]. In general, sustainable initiatives by hotels focus on four key areas: energy efficiency, carbon emissions, water conservation and waste reduction [9]. The carbon emission component is mostly accounted for by energy use. According to the World Tourism Organisation (WTO) and the International Tourism Federation (ITF), hotels contribute up to 21% of the carbon footprint of the Travel, Tourism and Hospitality (TTH) industry [10].

In terms of water consumption, estimates have been varied according to location and type/complexity of facility. In Spain, hotel water consumption has been estimated at between 495 litres and 1476 litres per day per room [11]. Also, Becken [12] estimated a range of 84 - 1802 litres per guest night but observed that EU hotels showed better efficiency in water use with values as low as 200 litres per guest night. Water use in hotels accounts for about 24% of total utility expenses in the the United State of America [13]. Similarly, water consumption in hotels account for about 15% of total water use in commercial and institutional real estate in the United States [14].

In addition, hotels generate more than 35 million tons of solid waste annually with more than half being biodegradable [15]. Solid waste generated per hotel guest ranges from 0.83kg to 2.5kg per guest per day depending on the geographical location [16], [17], [18]. Also, [19] observed that sustainable waste management is not as advanced and widespread as other environmental practices in the hotel sector and underscored kitchen wastes as the most important hotel waste to attract mitigation strategies.

Hence, hotels, more than other tertiary building types, are required to adopt an environmental strategy that can reduce or minimize the impact of their operations on the natural environment [20]. As a result, many stakeholders in the industry have advocated sustainable paths for hotels. As indicated in the Cornell University Hotel Sustainability Benchmark Report, hotels are responding to the low energy, low carbon and low water mantra, albeit to different degrees [21], [22]. However, there is still a wide gap between the volume of literature on hotel sustainability and actual interventions to ensure sustainability, underscoring the need for continuous efforts in this regard [23].

In Nigeria, the hotel and tourism industry contributed 4.4 % to the national GDP as estimated by [24]. The outlook in terms of employment potential is positive and commendable [25]. The modern hotel industry in Nigeria is less than 100 years old with 1942 adjudged as the commencement year [26]. The industry has grown to become a major player in the African hotels market with most of the international hotel brands already existing or planning their entry. In a survey conducted by PricewaterhouseCoopers (PwC), it was found that Nigeria has the best potential of adding more hotel rooms within the period 2019 to 2023 with most of the hotels located in Lagos and Abuja [27]. The economic outlook for hotels in Nigeria also appear bright relative to other surveyed African hotels. However, in terms of sustainable hotels certifications in Africa, only about 3.4% of hotels have some kind of certification as at 2018 and Nigerian hotels did not rank very well as indicated by [28].

Previous empirical studies on hotels in the study area have mainly focused on biodiversity and corporate social responsibility (CSR) and other aspects of sustainability. For example, [29] examined how transnational hotels operating in Nigeria engage in the conservation of biodiversity. Similarly, [30] examined sustainability awareness, management practices, and the organizational culture for sustainability within hotels in developing countries. Also, [31] investigated hotels' involvement in sustainable development practices especially in the area of corporate social responsibility. In a different study, [32] investigated

how hotel employees' opinions of green training and practices affected the sustainability of the industry. Meanwhile, [33] examined the awareness of sustainable waste management methods and possible impacts of unmanaged waste among classified hotels in Bauchi State, Nigeria. In addition, energy use related issues characterised the works of [34] and [35].

Hence, previous studies did not comprehensively examine the adoption of sustainable strategies at the design stage of the hotels. Hence this study examined the factors that affect the adoption of sustainable design strategies in large-sized hotels. The study context is Lagos, which hosts a preponderance of large-sized hotels in Nigeria. Large-sized hotels were selected as previous studies indicated that they are more disposed to adoption of innovative strategies than smaller hotels. The class of hotels studied were dominated by chain hotels with offices outside Nigeria as well. Hence, this study addressed the following research questions:

- i. What are the design strategies for energy efficiency, water efficiency and waste minimization in hotels generally?
- ii. What factors affect the adoption of the SDS at the design stage of the studied hotels.

## **2. Literature Review**

Hotel sustainability has acquired renewed impetus in the literature in the build-up to a more sustainable built environment. It has several dimensions which have been described variously as: environmental sustainability practices [36], green practices [37], green supply chain management [38], environmental management in hotels [39], responsible tourism [40], green hotel human resources management [41] and [42], among others. Some studies adopted multi stakeholder dimensions involving hotel associations, hotel managers and hotel users [43]. Even though all these dimensions are interwoven, the emphasis of this study is on three aspects of hotel sustainability namely: energy reduction/efficiency, water conservation and waste minimization.

### **2.1 Energy Reduction/Energy Efficiency**

A number of energy reduction strategies are useful in reducing energy use of hotels and reducing carbon emissions associated with energy use. Identified in this section are energy reduction strategies that can be deployed through design at the design stage of the hotels. The strategies are a combination of both passive and active energy reduction principles. However, passive strategies such as daylighting [44] and [45], natural ventilation of some hotel spaces [46] and [47], deployment of shading devices [48] and [49], use of sustainable materials [50], and use of natural vegetation [51] and [52], dominate the strategies. Use of renewable energy [53] and [54], energy efficiency appliances [55], [56], and smart technologies [46], [57], dominate the active strategies. In addition to energy reduction, use of eco-friendly materials also improve well-being of occupants [58].

### **2.2 Water Conservation Strategies**

The water conservation strategies with design implications have been identified as follows: rainwater harvesting [59], [60], green roofs for stormwater management [61], [62], use of water efficient and waterless appliances [63], [64], greywater harvesting [64], sustainable external drainage systems [65], [66], use of low-water consuming vegetation [67], and use of smart water management systems [68]. The strategies are aimed at reducing the quantity of fresh water used in hotels by curtailing use through water efficient appliances and by harnessing what otherwise would have been wasted. The bulk of water consumption in hotels is linked to the hotel rooms, laundries and kitchens consume the highest volume of water [69], [70].

### **2.3 Waste Minimization Strategies**

Waste minimization strategies used in hotels and which can be incorporated in the design phase of hotels include: separation of wastes [71], [72], recycling of waste [33], [73], composting for biodegradable wastes [74], [75], and disposal to landfills [33], [71]. Combinations of the strategies have been reported in literature [71]. Of all the waste management strategies, disposal to landfill is the most unsustainable and currently characterise waste management efforts in many developing

countries [33]. It is also ranked the least preferred in the UNEP waste management framework [76], which rated prevention, reduction, recycling and recovery higher than disposal. Waste recycling is not only beneficial to the environment but in addition provides some economic benefits [77].

#### **2.4 Factors that affect adoption of SDS**

Various scholars have investigated the adoption of sustainability strategies in the hotel industry operations and have identified several factors that can affect adoption. The factors can be grouped into three categories. The categories include: knowledge and skill based barriers, organisational and environmental factors, and cost/finance related barriers.

##### **2.4.1 Knowledge and Skill based factors**

The foundation of any innovation is knowledge and the availability of relevant skill sets to power its spread. Level of environmental awareness has been identified as a key factor in the adoption of sustainability practices in the hotel industry [78]. Closely related to this is the level of awareness by critical stakeholders in the hotel industry [79]. In addition, effective dissemination of available information on hotel sustainability has also been identified [80]. Also noteworthy is the availability of retrofits for existing hotel buildings [81]. A very important factor under this category is the level of technical know-how. Green technology and innovation are critical components of sustainable design strategies in hotels. The level of technical know-how and expertise within the organization can influence the adoption of new sustainable technologies and innovations [82]. Low level of technology know-how, human resource limitations, and guest experience have been associated with factors that affect to the adoption of SDS in hotels [83].

##### **2.4.2 Organisational and Environmental Factors**

Organizational policies and management styles that promote environmental performance and compliance with relevant environmental legislation are crucial for the adoption of sustainable design strategies. Such policies can identify priority areas of action and set objectives for improving environmental performance [79]. Level of knowledge, inefficiency in implementing green

building practices, level of regulations and by-laws, level of professional advice, company's corporate culture, and level of staff involvement have been associated with organizational and policy factors that affect the adoption of SDS [78], [79].

Government policies and their enforcement can significantly impact the adoption of sustainable design strategies. Implementation of green practices improves environmental sustainability and efficient technology leading to environmental sustainability. The level of enforcement of environmental policies and regulations can differ from country to country [84], [85]. The implementation of SDS in hotels has been affected by a lack of government enforcement and regulation, as well as by a lack of environmental regulations [78], [20].

The availability of adequate and accurate information on sustainable design strategies is essential for making informed decisions and reducing risks associated with organizational operations on the environment. Stakeholders' awareness and level of environmental knowledge depend on the availability of relevant information [80], [86].

Stakeholder involvement is a crucial aspect of hotel sustainability. Owners, management, employees, guests, government, society, and design professionals are considered stakeholders. Studies have shown that stakeholder involvement, support, and commitment play significant roles in driving sustainable practices in hotels [87], [88], and [89]. Lack of support from owners and management and lack of staff involvement are factors that have been associated with the adoption of SDS in hotels [90], [83]. In addition, the attitude of resisting new trends and innovations cannot be discountenanced [20].

##### **2.4.3 Costs associated with sustainable design strategies**

The adoption of sustainable design strategies in hotels is often linked to cost considerations. Various scholars have identified capital costs, limited capital budget, high implementation and maintenance costs, and initial implementation costs as major influencing factors in the adoption of sustainable design strategies [91], [86], [92], [79], [80], [82]. Evidence in literature indicates that incentives in

the form of tax rebates and development concessions have proved catalytic in the adoption of sustainable design strategies [20]. Literature also indicates that even though hotel customers and prospective customers are positively disposed to patronizing green hotels, the extra cost of services is still a major concern [93].

### **3. Methods**

The study targeted high-end hotels as previous studies revealed that such hotels are more active in adopting innovative strategies as a goal rather than smaller, low-end hotels [94]. The minimum standard for the classification of selected hotels was adopted from the Nigerian Tourism Development Corporation Hospitality and Tourism Establishment Act [95], which defines a standard luxury hotel as hotel with a minimum of 100 rooms. Incidentally, the foregoing is in agreement with the classification by the Hospitality School [96], which rates as small any hotel that provides guest rooms of below 25, medium hotels as hotels with guest rooms ranging between 26 and 100, large hotels as hotels with number of guest rooms ranging between 101 and 300 and very large hotels as hotels that provide guest rooms of 301 and above [96]. For this study, 100 rooms and above is adopted for the selected hotels.

Survey research design was adopted for the study to enable a general overview of the subject matter. From a population of 808 registered hotels in the study area, as published by the Lagos State Government [97], a sampling frame made up of 24 hotels with a minimum of 100 rooms were purposively selected for the study. Upon further preliminary investigation, four of the hotels were found to be out of operation at the time of the study as they were undergoing major renovations. Hence, a census sample of 20 hotels was selected for the study as indicated in Table 1.

In addition, 20 architectural design firms that either worked on the selected hotels or on other similar hotels were selected for the survey as shown in Table 1. The scope of the study is the design stage and architects play the most important roles at this stage. The research targeted the design firms that designed the 20 selected hotels. However, some of the firms had either relocated or could not be traced. Hence other design firms with expertise in

hotel design were incorporated into the study. Previous studies conducted in the study area indicated that architects are generally knowledgeable about SDS [98].

Hence, for the survey, seven managerial staff from the hotels and three senior architects from the architectural design firms were selected for questionnaire administration. Hotel managers such as the reservation managers, front desk managers, property managers, food and banquet managers, maintenance managers, human resource managers, operation managers, and in some instances, general managers were the respondents. The questionnaire was administered on the hotel managers and senior architects in the selected hotels and architectural design firms for primary data collection.

From the foregoing, 140 hotel managers and 60 senior architects participated in the survey out of which responses were received from 130 hotel managers and 56 senior architects. Thirteen variables were identified in the literature and were used for the questionnaire construction. The variables are as listed in Table 1, Table 2 and Figure 1.

The questionnaire adopted the 5 point Likert scale format requesting the respondents to rate the thirteen factors identified in the literature in terms of the extent to which they affect the adoption of sustainable design strategies. This was preceded by background information about the respondents and the organizations they represent. The analysis conducted on the data was descriptive statistics and mean ranking using IBM SPSS Statistics, Version 20. The results were presented descriptively with the aid of tables and charts.

### **4. Results**

The results of the analysis of the responses to the questionnaire are presented under three sub-headings. The first is the responses from the design professionals while the second deals with responses from the hotel managers. The third section combines the responses from both the design professionals and the hotel managers. The analysis was conducted with responses from 56 design professionals and 130 hotel managers. Specifically, Table 2 displays the output of the descriptive statistics of the 13 factors that were

considered in this study with respect to the design professionals (architects). Similarly, Table 3 shows the result for the hotel managers.

**4.1 Factors influencing the adoption of SDS: Design Professionals**

As shown in Table 2, the mean values are used to rank the various factors based on the perception of the design professionals. Considering the descriptive statistics from the design professionals, factors such as "availability of adequate and right information on sustainable design strategies," "the level of technical know-how of design professionals," and "level of stakeholder's awareness of Sustainable Design Strategies" with mean scores of 4.43, 4.43, and 4.34 respectively, are the most significant factors influencing the adoption of sustainable design strategies in the study area, with the first two factors jointly ranked. This is followed by "costs associated with Sustainable Design Strategies," "the level of knowledge of retrofits," and "the level of enforcement of government policies on building regulations." with mean scores of 4.23, 4.16 and 3.89 respectively.

**Table 1: Hotels and Architectural Firms Surveyed**

SN	Name of Hotel	Rooms	Architectural Design Firms
1	Lagos Continental Hotel, VI	352	Design Group Nigeria.
2	Golden Tulip, Festac Town	471	DAA Architects
3	Lagos Marriott Hotel, Ikeja	206	DAA Architects
4	Ibis Lagos Airport Hotel	188	DAA Architects
5	Radisson Blu, Ikeja	100	DAA Architects
6	Four Points by Sheraton, Oniru	231	Design Group Nigeria
7	Southern Sun Hotel, Ikoyi	195	Consultant Collaborative
8	Orchid Hotels, Lekki	171	Contemporary Group Ltd
9	Rockview Hotel, Apapa	106	Paul- B Nigeria

10	Eko Hotel & Suites, VI	824	Delano Architects
11	BON Hotel Stratton, Ikeja	150	James Cubitt Architects
12	Novatel Hotel, Lekki	200	ATO Architects
13	Sheraton Lagos Hotel, Ikeja	337	The Building Practice Ltd
14	Lagos Oriental Hotel, VI	131	ECAD Design Architects Ltd
15	Hotel Ibis, Ikeja	165	Baron Arch.
16	Radisson Blu Victoria Island	170	Interstate Architect
17	Beni Hotel, Broad Street	100	Amarch Consultants
18	Swiss Int. D'Palms Airport Hotel, Ajao Estate	120	FMA Architects ltd
19	Protea Hotel Ikeja	117	ACCL
20	Etal Hotel & Halls, Victoria Island	124	OAC Architects

In addition, the responses of the design professionals place factors like "the level of organizational policy for environmental knowledge," "the availability of retrofits," "the Level of stakeholder's involvement in the adoption of sustainable design strategies for hotel design," and "resistance to change on the part of design professionals towards the adoption of sustainable design strategies" as the 6th, 7th, 8th, and 9th factors respectively. The "level of environmental knowledge" and "availability of sustainability rating tools for hotels" are jointly ranked in the 10th position. Lastly, the degree to which sustainable design strategies are incorporated into hotel design the level of government support or private funding for the training of design professional has the lowest mean value of 3.16 and is the least ranked factor by design professionals.

**Table 2: Factors of Adoption by Design Professionals**

Factors:Design Professionals	N	M	SD	Rank	level of stakeholder's involvement in the Adoption of SDS	56	3.8	0.903	8
Availability of adequate and right information on SDS	56	4.43	0.85	1	Level of resistance to change	56	3.77	0.894	9
Level of technical know-how	56	4.43	0.892	1	Level of environmental knowledge	56	3.66	1.225	10
Level of stakeholder's awareness	56	4.34	0.745	2	Availability of sustainability rating tools for hotels	56	3.66	1.164	10
Costs associated with sustainable design strategies	56	4.23	0.894	3	Level of government support or private funding programs	56	3.16	1.304	11
Level of knowledge of retrofits	56	4.16	0.93	4					
Enforcement of government policies on building regulation	56	3.89	1.231	5					
Organizational policy for environmental knowledge	56	3.86	0.796	6					
Availability of retrofits	56	3.84	0.848	7					

**4.2 Factors influencing the adoption of SDS: Hotel Managers**

The summary of the responses of the hotel managers are presented in Table 3. From the table, "costs associated with the adoption of sustainable design strategies" was ranked as the first determining factor as against the 4th ranking by design professionals. This is understandable because cost is always a crucial factor for management decision-making. As against design professionals who are focused on adequate information and technical issues. Table 3 also shows that , "the level of enforcement of government policies on building regulations" was ranked as the second most significant, followed by "the level of organizational policy for environmental knowledge" as the 3rd most significant factor. Moreover, "the availability of adequate and right information on Sustainable Design Strategies" and "level of stakeholder's awareness in the adoption of sustainable design

strategies for hotel design" with mean values of 4.06 were ranked 4th, while hotel managers ranked "the Level of Environmental Knowledge in the Adoption of Sustainable Design Strategies" fifth. Furthermore, other factors like "the level of technical know-how," "availability of sustainability rating tools for hotels," "level of stakeholder's involvement in the adoption of sustainable design strategies," and "availability of retrofits" were ranked as 6th, 7th, 8th, and 9th respectively, with means of 4.03, 3.97, 3.96, and 3.80. The terms "level of knowledge of retrofits" and "the level of government support or private funding for the training of hotel managers" were rated 10th and 11th, respectively, with mean values of 3.69 and 3.68. While "resistance to change on the part of hotel managers towards the adoption of sustainable design strategies" with a mean value of 3.62 is the least ranked factor by hotel managers. Table 3 further shows that the hotel managers have mean score values ranging from 3.62 to 4.15, while the mean score values of design professionals range from 3.16 to 4.43. The overall mean value of the hotel managers is higher than that of the design professionals. This implies that the factors influencing the adoption of sustainable design strategies are to some extent higher in hotel managers and lower than the design professionals. Furthermore, the high mean score values of the design professionals, 4.43, and 4.23 earlier adopted, which are higher than the hotel managers, further confirm the fact that the professionals have a higher level of awareness about sustainable design strategies in the selected hotels in Lagos than the hotel managers. The findings suggest that professionals involved in the design of hotel constructions are better knowledgeable and have greater potential to influence the adoption of SDS in Lagos, Nigeria.

Enforcement of Govt. policies on building regulation	130	4.09	1.015	2
Organizational policy for environmental knowledge	130	4.08	1.068	3
Availability of adequate and right information on SDS	130	4.06	1.002	4
Level of stakeholder's awareness	130	4.06	1.077	4
Level of environmental knowledge	130	4.05	1.095	5
Level of technical know-how	130	4.03	1.141	6
availability of sustainability rating tools for hotels	130	3.97	1.12	7
Level of stakeholder's involvement in the adoption of SDS	130	3.96	1.11	8
Availability of retrofits	130	3.8	1.045	9

<b>Factors: Hotel Managers</b>	<b>N</b>	<b>M</b>	<b>SD</b>	<b>Rank</b>
Costs associated with sustainable design strategies	130	4.15	0.96	1

Level of government support or private funding programs	130	3.69	1.269	10
Level of knowledge of retrofits	130	3.68	1.093	11
Level of resistance to change	130	3.62	1.278	12

**Table 3: Factors by Hotel Managers**

**4.3 Combined Factors of Adoption (Design Professionals and Hotel Managers)**

In line with the results in Table 2, the main factors influencing the adoption of sustainable design strategies in the design of hotels in Lagos, Nigeria, according to design professionals, include:

- (i) Availability of adequate and right information on sustainable design strategies
- (ii) Level of technical know-how
- (iii) Level of stakeholder’s awareness
- (iv) Costs associated with sustainable design strategies
- (v) Level of knowledge of retrofits
- (vi) Enforcement of government policies on building regulation.

Similarly, as presented in Table 3 for the hotel managers, it is safe to conclude that the main factors affecting the uptake of sustainable design strategies in the hotel industry in Lagos, Nigeria, according to the hotel managers, include:

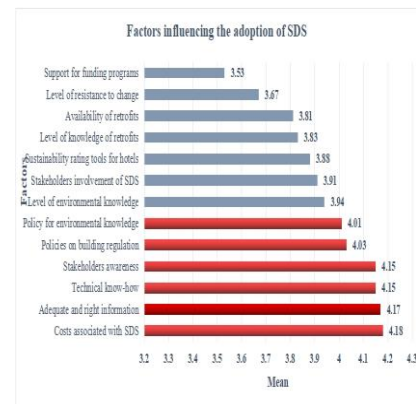
- (i) Costs associated with sustainable design strategies
- (ii) Level of enforcement of government policies on building regulation
- (iii) Level of organizational policy for environmental knowledge
- (iv) Availability of adequate and right information on sustainable design strategies
- (v) Level of stakeholders' awareness,
- (vi) Level of environmental knowledge

A combined effect of results in Table 1 and Table 2 as depicted in Figure 1 shows the first five factors

identified as the most significant in influencing the adoption of SDS. They as follows:

- (i) Cost associated with SDS,
- (ii) availability of adequate and right information,
- (iii) level of technical know-how,
- (iv) level of stakeholders' awareness, and
- (v) enforcement of government policies and building regulations.

The combined mean score are 4.18, 4.17, 4.15, 4.15, and 4.03 respectively. The implication is that cost associated with SDS and availability of adequate and right information were identified by design professionals and hotel managers in the combined descriptive statistics to be the most significant factors influencing the adoption of SDS in the hotels within the study context. The implication of the result is that there is a need for urgent creation of awareness for SDS adoption to provide adequate information on strategies for sustainable design and operation. Also, provisions should be made to encourage and support the drive for the adoption of SDS with respect to the initial cost of adoption of the strategies.



**Figure 1: Combined Factors (Design Professionals and Managers).**

**5. Discussions**

The investigation utilized thirteen factors extracted from the literature, which formed the basis of the questionnaire administration. The responses were analysed and then ranked based on mean score values derived from descriptive statistics. For the participating design professionals, five significant factors of influence were determined in the adoption of SDS for the large-sized hotels within the study area. These factors ranked from 1st to 5th, are: availability of adequate and accurate

information on SDS, level of technical expertise, stakeholder awareness, associated costs of SDS, and knowledge of retrofits.

From the foregoing, it can be observed that knowledge and skill based factors dominate the identified key factors, accounting for four out of the five factors. Cost of the strategies even though important, is not the key determining factor. Hence, the design professionals were more concerned with dissemination of critical information on SDS and the acquisition of the required technical knowhow rather than with costs. This finding aligns with previous studies such as [78], [79], and [80].

With respect to the hotel managers, the first six factors that had substantial impact on adoption of SDS by the hotels were identified as costs associated with SDS adoption, the level of government policy enforcement on building regulations, the level of organizational policies for environmental awareness, access to accurate and sufficient information on sustainable design strategies, stakeholder awareness, and general level of environmental knowledge.

From the foregoing, it can be deduced that cost of adoption is the most important factor. This is complemented by organisational and knowledge based factors. Incidentally, technical knowhow did not feature prominently among the factors that affect adoption according to the hotel managers. This underscores the fact that management is usually very interested in costs, especially when innovations are to be introduced. Technical knowhow is understandably within the competence of design and allied professionals. Notably, the costs related to the adoption of SDS in the study area encompassed initial implementation expenses and ongoing maintenance costs. This result aligns with previous studies such as [77], [79], [82], [86], and [92]. The result implies that while green practices are often perceived as cost-saving strategy in the long run, this assumption is often challenged in reality by costs associated with uptake. This finding also underscored the need for a balanced understanding of the financial implications of the adoption of SDS and the consideration of long-term benefits, as well as the commitment to environmental protection and enhanced human health associated with reduced carbon emissions.

When the responses by the design professionals and the hotel managers are combined, a clearer picture of the factors affecting the adoption of SDS in hotels emerged. The five main factors are: costs associated with adoption, availability of adequate information on SDS, technical knowhow, stakeholder awareness, and policies on building regulations. This is an indication that all the three categories of the factors identified in literature are at play. Hence, the five major factors cut across knowledge and skill factors, organisational factors and cost related factors. An integrated approach encompassing all categories of the factors is therefore necessary for effective uptake of SDS in hotels within the study context and beyond.

Of particular importance is the emergence of the 'availability of adequate and accurate information on SDS' as a critical factor influencing adoption of SDS in the study area from the perspective of both design professionals and hotel managers. This factor is pivotal for effective sustainable hotel practices as earlier posited by [78], [80], [86], and [90]. Hence, it is imperative that all stakeholders provide necessary support for the dissemination of relevant information to aid adoption of SDS in hotels. This can be achieved by facilitating access to government policies and regulations, fostering general awareness through continuous training programmes especially for staff, providing adequate information for guests, and engagement with other critical stakeholders. These initiatives are deemed crucial for the advancement of sustainable hotel practices within the hotel industry in Nigeria.

The results of this study also imply that green practices especially in the hotel industry are difficult to implement if critical stakeholders are not environmentally conscious and knowledgeable. Hence the level of environmental knowledge on the part of the critical stakeholders is necessary for increased uptake of the innovation. This finding is consistent with previous works such as Lammi and Tesfaye [80]. Knowledge dissemination within the context of organisations should be intentional and well planned. This suggests a well articulated organisational approach to the acquisition and dissemination of knowledge and critical information regarding sustainable options available to the organisation. The organisational approach

should integrate participatory principles where all stakeholders are involved. This study therefore recommends that hotels should entrench organisational policies that facilitate continuous training in innovative processes associated with sustainability of the Nigerian hotel industry in order to keep pace with international best practices.

Closely related to the foregoing is the need for the requisite expertise. Expertise helps to put the knowledge into practice. Level of expertise or knowhow was earlier reported as a major factor in the adoption of sustainable environmental technology in the hotel industry [83]. The results of this study are largely in agreement with the findings in [83] as both the design professionals and the combined findings emphasized the key role of technical knowhow or expertise in the adoption of SDS in the hotel industry. This finding also aligns with other previous studies such as [80] and [82].

The role that government can play in the adoption of SDS for hotels needs to be underscored. Government, through appropriate regulations can improve the uptake of sustainable practices in the hotel industry. Government policies on sustainable waste management practices can be pivotal in this respect especially in a developing country context like Nigeria where waste management is still at rudimentary level as earlier observed by [33]. Also, energy efficiency regulations have been associated with improved energy performance of hotel buildings [34], [35].

The broader conclusion from literature is that despite the benefits of SDS adoption, many hotels in Nigeria, as in other countries, are hesitant to adopt such practices as highlighted by [37]. The low level of adoption was also associated with low pro-environmental activity of hotels in Nigeria [25], [37]. In order to reverse the trend, a good understanding of factors that can facilitate increased adoption of sustainable practices in hotels is necessary. Even though five key factors have been identified, other factors are equally important though a lesser degree.

## **6. Conclusions**

The study examined the factors that affect the adoption of sustainable design strategies at the design stage of hotels within the context of Lagos, Nigeria. The key strategies that can be adopted at

the design stage of hotels were identified as energy reduction strategies, water conservation strategies and waste minimization strategies. Also, thirteen variables were identified in the literature as the possible factors that frame the adoption of sustainable design strategies in the hotel industry in general. These factors were grouped into three namely: knowledge and skill factors, organisational factors and cost factors.

A survey research design investigated these factors of adoption in the hotel industry in Lagos, Nigeria using design professionals and hotel managers as key respondents. While the design professionals identified knowledge and skill based factors as the key determinant of adoption, the hotel managers considered cost and cost related factors as the most important. A combined analysis of the responses by the design professionals and the hotel managers revealed five key factors of adoption.

These factors are:

- i. Costs associated with adoption of SDS
- ii. Availability of adequate and right information on SDS
- iii. Availability of Technical knowhow
- iv. Stakeholder awareness of SDS
- v. Government policies on building regulation.

The costs associated with adoption of SDS are not only limited to initial costs. Ideally they include life cycle cost covering such aspects as maintenance and disposal costs. Adequate information and appropriate dissemination of same is important for adoption of any innovation including SDS. Technical knowhow is important to put into practice the knowledge and information available. The overall goal of knowledge and information dissemination is to create increased awareness among stakeholders in the hotel industry with respect to SDS. Lastly, government policy acts as a push or incentive to adopt SDS. Every corporate organisation strives to be a good corporate citizen, so positive response to government regulations confers good standing status on the hotels. Government regulations can also come in form of incentives to encourage adoption.

From the foregoing, it is evident that the main factors of adoption cut across the three major categories of factors outlined earlier. It therefore implies that for improved adoption of SDS in hotels within the study area, a suite of strategies becomes

necessary. Apart from cost, awareness and availability of the right information, the place of policies was also highlighted. At the organisational level, sustainable policies should be properly entrenched. Of particular importance is the role of government policies and regulations. Government regulations often laced with appropriate incentives have been shown to act as catalysts to innovation adoption in many other spheres of human endeavour. This can also be extended to the hotel sector.

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