Implementing Green Building Strategies In The Design Of A 5 Star Hotel

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ABSTRACT
Hotels operations are known to have a major negative impact on the environment, considering the amount of natural resources consumed, the amount of pollution created, the amount of energy wasted and the amount of wastes generated contributing to global pollution. Adoption of green practices to mitigate pollution and their effects are steps to become more sustainable in hopes of lessening that impact. This study focused on green architecture which involves the practice of creating structures using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle. The study explores and evolves methods and techniques, which ensure the broad application of green architecture principles in five star hotel designs. To create awareness and enlighten hotel developers and users on the advantages of green building principle. Case studies were carried out both locally and internationally to have a good understanding of the topic. Findings highlighted various benefits of applying green building in hotels and how it can help to minimize energy, improve indoor air qualities and wellbeing of users at large. For energy efficiency, the hotel should be designed with the environment: passive cooling techniques such as natural ventilation, evaporative cooling, shading, landscaping and day lighting. In conclusion the application of green architecture will result to a more environmental friendly hotel, decreased running costs, and increased property values. For vivid illustrations, various Principles, Theories, Strategies, and Application Techniques were evaluated and reviewed. Also, various design considerations on hotels were made so as to ensure proper integration of the building with the site and the immediate neighborhood.

Keywords: Green building, Sustainability, Hotel operations, environmental preservation, Hotel Design Strategies, environmental friendly.

INTRODUCTION
The rising consciousness about the ecological harm by various hotel activities had prompted many hoteliers around the world to progressively endorse environment-friendly or green practices into their operations (Karatepe et al, 2022). Environmental issues have begun to become a thing of interest in relation to the hotel industry, according to research, 75% of environmental pollution are caused by operational activities of energy, fuel, which have a negative impact on the environment (Bohdanowicz, 2007). Teng et al., (2012) explained how hotels are considered to be among the biggest contributor of the global pollution and waste. Continuous operations in hotels make them one of the most emitters of greenhouse gases that results in atmospheric and environmental destruction (Al-Juboori et al., 2020). Strategies need to be adopted to reduce such emissions for environmental sustainability. Climate change is one of major environmental effect. In recent times, green practices in hotels deign have had a growing popularity and are laying a good foundation for many hotels’ business performance (Deraman et al., 2017). Due to the rising concern of stakeholders in the hotel industry about hotel’s social, economic and environmental impacts on the society, regional, and global levels and well-being (Rakicka, 2016). Previous studies conducted by
revealed that eco-friendly or green practices create a significant and positive influence on a hotel’s reputation and image contributing to a higher degree of consumer confidence and recognition with the hotel, which consequently leads to enhanced consumer contentment and allegiance. These studies also show that when sustainability in business operations is promoted, guests have a favorable opinion towards them. Dharmesti et al., (2020) highlighted how hotel guests responded, also their attitudes and behaviors towards sustainability and their willingness to pay for sustainability activities. Mao et al (2021) discovered that when tourists forgo their personal comfort, their sustainability behaviors are reduced. Dolnicar et al (2019) found that communicating the advantages of sustainability can alter travelers’ sustainable behavior. It is essential for the hotels to provide experiences to the guests that are sustainable and are aligned to protect natural, economic and traditional resources.

Green practices according to Teng et al. (2012) and Chan (2013) include promotion of hotelier’s efforts to reduce solid waste, save water and energy, reduce operational costs and protect the natural environment. (Ahn & Pearce 2007) state that green design and construction practices in the building sector includes, increasing efficiencies, thereby saving energy, water, and other resources as well as providing satisfying, productive, healthy, and high-quality indoor spaces. Hence using environmentally preferable materials and educating building occupants about efficiency and conservation. The impact of environment-friendly or green practices on consumer loyalty, revisit intention and on the recommendation to peers and friends has also been extensively researched in the past (Hu, Parsa, & Self, 2010). Hoteliers are aware of the environmental problems and showed their desire to purchase and consume green services and products (Foris et al., 2020). Hotel operators that want to be environmentally responsible for economic and financial efficiency as well as personal ethics are using green building principles (Bader, 2005) while designing a new hotel, the design team often concentrates on areas known to be highly related to these elements, such as the lobby, guest rooms, bathrooms, food and drinks, spas, the outdoor environment, and the artwork shown around the hotel (Heide & Gronhaung, 2009).

**Statement of Architectural Problem**

The present standard of hotels shows they hardly meet today’s tourist lifestyle and rising as regards the quality. Due to poor planning and negligence in the maintenance of most hotel facilities in many well rated hotel failed to live up to their rating. Most hotels around the world seem to be highly synthetic. They depend so much on artificial means of lighting and ventilation paying less attention to tropical design principles. This has led to overall increase in the production of greenhouse gases (GHG) and sick building syndrome (SBS). Less attention is paid to proper landscaping of the environment in such a way that users will appreciate nature. They lack natural features like water bodies and greenery which help to cool the environment naturally. Also, most hotels are not properly integrated with the environment considering site terrain and climatic factors. It has increased impacts of building construction on ecological systems and biodiversity, while decreasing the ecological values of site.

**Aim**

The aim of this research is to promote the principles of green architecture in well-coordinated and appealing environment applying it to a hotel design to create an ecofriendly environment and to reduce negative impacts of buildings. Hence to accommodate international travelers for business tourists, conferences, recreation and entertainment.

**Objectives**

The objectives of this study are as follows:

1. To study and understand the concept of green architecture and its principles.
2. To study various benefits of applying green building strategies to a hotel design.
3. To discover ways green building principles could help to improve the health, wellbeing and productivity of hotel users.
4. To examine various principles and techniques associated with green building practices.
5. To investigate the needs, peculiarities and problems of the study environment with particular reference to hotel design.

**Scope of Study**

The green building movement encompasses a lot but the study will major on, examination of various principles and techniques associated with green building practices, the benefits of applying green
building strategies to a tropical hotel design and practical illustration of the application of green building strategies in hotels. It will explore various design and construction principles that minimizes energy consumption, improve indoor environmental quality, material usage, land use and site in hotels.

LITERATURE REVIEW
A hotel is a commercial establishment that provides paid lodging, food and other services to the public, usually on a short term basis. Thus, it provides the basic accommodation for visitors (Bello, 2015). Green Building often brings images such as natural materials, green roofs, green walls and rooftops and high tech gadgets (Lucuik et al, 2005). According to Lanjewar (2015), green hotels are referred to hotels that attempt to be more environmentally friendly in term of efficiency and minimal usage of energy, water, and materials while providing quality services. As hotel industry is known to cause negative effects towards the environment, many hotel operators now include green practice to give back to the nature (Tzschentke, Kirk, & Lynch, 2008). The first green hotel launched in 2008 was the Intercontinental Hotel Group (IHG). It was known as the world’s first hundred percent ecologically-friendly hotel (Pizman 2008). Businesses have to develop and maintain their own resources and capabilities in order to survive and sustain their operations. A firm’s unique resources and capabilities are the key sources of a sustainable competitive advantage (Hart, 1995; Wernerfelt, 1984). Literature stresses many challenges including lack of information, varied structure of the industry, seasonality, high cost, lack of government regulations for the tourism industry and not enough pressure from customers for go green have identified as barriers for adopting green practices in the hotel industry (Graci and Dodds, 2008). To overcome such challenges literature proposes to adopt different initiatives suit their hotel operations (Jamaludin and Yusof, 2013). In a very competitive global market, these resources and capabilities are important to enable businesses to obtain or sustain their competitive advantage (Hart, 1995; Hart & Dowell, 2011). Management approaches to environmental problems may vary for several reasons, including;

Cost
Green practices are often perceived as a cost-saving chance, but for many managers this is merely just an assumption and not a reality. Tzschentke et al. (2008) believes that many hotel managers are reluctant to implement green practices in their hotel due to a few cost related factors. Factors such as environmental auditing, certification fees and facilities improvement (Deraman, 2017). Aragón-Correa & Sharma, (2003) emphasized on managerial values, organizational resources and capabilities, and industry and market conditions. Harvard Business Review (2009) stated that green practice is not a burden on bottom lines that many managers believe it to be, but in fact becoming an environment-friendly business will reduce the operational costs and increase revenues. Most hotel managers in Malaysia oppose to this initiative as they claimed that there is high cost incurred in implementing green practice (Yusof and Jamaludin, 2013). Viney and Liu (1995) examined green practices among a few number of businesses and it has been found that most of the businesses aim for a quick and short-term payback.

Consumer support
Currently guests are more environmentally conscious and demanding the lodging industry, to be more responsible in preserving the environment. As a result, hotels begin to implement a simple green practice; recycling and reusing programs. Hence, this practice was then carried out in large scale where guests are encouraged to take part and involve in the programs to instill interest and awareness among them (Butler, 2008). Also, Bohdanowicz and Zientara (2008) found that hotel guests prefer to use the refillable dispensers in the toilet instead of bottle amenities. They feel it is more convenient and more environmental friendly reducing plastic waste from bottle amenities. Education can create awareness towards the guests and attract them to support green practices (Verbeek & Mommaas, 2008).

Employee support
In order to be eco-friendly staff, most hotel employees should be trained, educated and personally involved in conserving the nature. Their roles promotes the success of green programs. Most managers indirectly encourage environmental friendly behavior among the employees by purchasing eco-friendly products and use it during operation (Deraman, 2017). Employees among the younger and educated generation are more aware about green practices (Goodman, 2000). When there is lack of awareness, the benefits of green practices still can be obtained if the management spend more effort in communicating
the green practice goals to employees. Further supervision and training would be a great help and motivation for them to engage in green practices. Employees agreed that most of the green practices could reduce operating and utility costs although there are a few practices they oppose (Ninemeier, 1996). Greening a hotel is much more complicated since hotel industry which comes under the service industry cares perceived opulence, luxury and grandeur of their guests (Iwanowski and Rushmore, 1994).

2.1 Green Hotel Design Strategy

Ministry of Tourism (2014) defined green hotel as a hotel or resort that has policies and implementation of sustainable activities. These include implementation of environmentally hotel management, environmentally hotel operations, land efficiency, efficiency of the use of building materials, energy efficiency, air quality, water efficiency and waste management (Green Hotel Association, 2008).

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Green Building and Sustainability Practices

An architect’s approach to incorporate green design often starts with the decision to select sustainable building materials. Material sustainability is to be measured by the “true” cost (Benson, 2013). Starting from its manufacturing cost; the transportation cost, the wastage during construction, the material handling and installation cost during the building phase, longevity, maintenance throughout life and demolition cost, everything should be taken into consideration (ASHRAE, 2006; Perkins et al, 2006; Woolliams, 2001). Over the years green architects come-up with different principles of Green Architecture. The five basic principles issued by the LEED are:
(a) Energy efficiency
(b) Water efficiency
(c) Materials and resources
(d) Sustainable site
(e) Indoor environmental quality

METHODOLOGY
In this research, a descriptive/comparative method is be applied. The collected information from the primary and secondary sources will be analyzed. The case studies will be appraised based on the degree to which green architecture and implementation of energy efficiency.

Research Methodology
The study aims to carry out an assessment of how Green Building Strategies can be implemented in the Design of a 5 Star Hotel. However, it will be essential to note that this research is on green architecture and its possible enhancements. Thus, a good and updated study of energy efficiency and the benefits of green architecture is required. The phenomenon also requires, partially, an understanding of the social and cultural life of the people the hotel will serve. Given the issues raised, the qualitative research approach was adopted for this study. The approach is used to fine-tune the understanding of the text, the actual context, and the latent material, expecting that a document is above what the audience could see upon first glance (Graneheim & Lundman, 2004; Woods & Catanzaro, 1988).

Sources of Data
In this cause of study, the author will assemble data from essential and supplementary channels.

Basic Data Collection
The sources of primary data are:
- Discussions with coordinating lecturers.
- Information from case studies
- Conducting site studies; analyzing evidence and findings upon this planned project area.
- Taking photos of surveyed existing infrastructure and creating illustrations for demonstration purposes.

Secondary Data Collection
The author also collected data from other authors through literature review, articles, on subjects related to the study area published in the internet. These were used to gain a new insight into the information on the subject. The data collected were analyzed and used as the foundation for the study. The sources of secondary data are:
- Review of past related literature from the media; the author will collect books, journals, magazines, lectures, past projects and conference papers on the internet for more recent findings on the topic.

Data Analysis
The data on selected Hotels were analyzed to show the extent to which each of them applied the elements of green architecture and energy efficiency, characteristics of the place, using descriptive-analytical methods. The literature review provides theories, evidence of practice and the link between hotels and green architecture. A prehistoric review of the project to identify the most influential and frequently cited texts in hotels and green architecture was done. The case study research uses three Text and Documentation Analysis methods and data collection analysis to study the link and provide:
- Relevant information required to understand the importance.
- Degree of use.
- Sustainability issues.
- Contribution of existing case studies to development.

DATA PRESENTATION
Information gathered from every design precedence are analyzed and represented as various patterns: photographs, tables, and diagrams.
Photographs of Existing Hotels (Plate)
Pictures of the existing Performing arts theatre studied are taken and documented, showing the building forms, its facilities, how green architecture elements are applied, and to what extent.

Figures; Information from design precedence will be recorded as diagrams, like the site layout.

**Criteria for Design Precedence Collection**

Variables

Independent variables: these are the variables examined:

1. Building forms used, Plan shape and size.
2. Facilities, scope and Spatial Planning.
4. Motifs, Sculptures, etc., are broken into building components.

Dependent variables: Building performance, efficiency and features.

**Case study 1: ABUJA SHERATON HOTEL AND TOWERS**

**Project Information**

Abuja Sheraton Hotel and towers, is classified under a five Star grade. It is sited in Wuse district of the federal capital territory, Abuja on Ladi Kwali way with a view of the scenic hills of Abuja and the central mosque. Designed by Lanre Towry Coker Associates, Lagos. The structure of the hotel is built with the overhang principles made of reinforced concrete structure. It is designed for the tropics with the provision of courtyard within the design with well-planned gardens. A frame of this landscape garden is made with three pairs of long rectangular concrete structure.

![Fig. 3.1: Waterbody and Landscape elements in Sheraton hotel Abuja. Source: Researcher's Fieldwork, 2023](image)

**Architecture (Building materials and Technology)**

**Thermal Mass**

Sand Crete blocks with concrete panels are the most dominant materials used in Sheraton hotel construction. The concrete board is predominantly found on roofs and some wall panels. Concrete panels are “thermally” heavy as they retain heat or cool for a more extended period.
Assessment of the application of principles of green architecture

a) Building Form
Sheraton hotel has simple rectangular forms that define the longer and shorter sides of the building. Rectangular forms in the building provide a smaller surface area exposed to solar radiation, decreasing the quantity of sun powered heat acquires entering the structure.

b) Openings, Windows and Vents
The building was provided with predominant single glazing panels to encourage infiltration. The guest bedrooms and suites have one-side ventilation with wall to wall glazing, which opens to the balcony and provides overhangs that shade the bedroom from the sun's rays.

c) Sun Shading devices
The accommodation areas are with overhangs that serve as a sun-shading device. The central atrium also assists in shading, and it provides stack ventilation which helps to suck out used air out of the building. There are also balconies at the external façade of the building and the central atrium located in the accommodation wings.

d) Landscaping
In Sheraton hotel, landscaping is one of the main features around the environment. There are different varieties of vegetation, trees, green grasses and gardens. The trees help to create shading and a buffer to the buildings and add to the hotel's aesthetic. There are also water bodies within the central atrium which helps in evaporative cooling.

Deductions
- Composite nature and fascinating types of these inns draw in numerous visitors.
- There is an overhang in all visitor rooms, permitting visitors to associate with the common habitat.
- Varieties of rooms and cafés are qualified as a 5 star inn since it offers more decisions and fulfillment.
- The inn offers a few sporting offices, and thus, meets travelers and vacationers.
- The semi-shut properties of the page will stifle the climate straightforwardly with the weather conditions impact.

Case study 2: Songjiang Hotel, China

Project Information
Designed by the Atkins group, the hotel design is a five-star resort hotel set within a beautiful water-filled quarry in the Songjiang district close to Shanghai in China. It has a stunning concept designs inspired by the natural water and landscape features. The hotel is an integral part of the design of a new city on the outskirts of Shanghai for 500,000 people called Songjiang Garden City (Bello, 2015). This involved the development of a conceptual master plan using garden city philosophy and sustainable design principles. The site was an abandoned quarry until the proposal by Atkins Architects made proper reuse proposal for it (Boettcher, 2006).
Assessment of the application of principles of green architecture

a) Energy Efficiency: The entire hotel is to be covered in a green roof, while the building will use geothermal energy for its electrical supply and heating as shown in Plate LXII. The quarry will also provide a good source of heat control and shelter from the environment (Chapa, 2007).

b) Sustainable Site: The reuse of an already existing site means that the environmental impact will hopefully be smaller. Before the proposed hotel, the quarry was just an abandoned site. The hotel is a low-rise, sustainable garden city concept, existing landscape is laced with waterways and is generally flat. The layout builds on these natural qualities to create a unique identity, using linear parks and a major central park as delineating forms in the master plan (E-Architects, 2006).

c) Materials and Resources: The architect says that most likely a custom design on In situ concrete substructure will occur - however, they will investigate suitable single source systems. (Velazquez, 2010)

DISCUSSION

There is a competitive advantage. Due to the rising costs of energy and the growing concern for the environment, there may one day be a requirement for the hotel to be more sustainable. If this is the case, hotels that took the “green” initiative early on will have an advantage over those hotels that have not. A sustainable hotel can benefit from customer loyalty; becoming “green” has developed into a lifestyle over the years. Typically location and amenities are what people look for when choosing a hotel, but customer loyalty may develop when they see all of the environmentally conscious changes the hotel implements. There is now a market for the “green” traveler; marketing a hotel as sustainable attracts this type of traveler which leads to higher profits and it has been shown that environmentally conscious travelers are willing to pay about 20% more to stay in a sustainable hotel (Wolff, 2009).

April of 2009 saw the launch of the Green Hotels Directory, the first online reservation system for the green traveler. The site allows travelers to find hotels that are sustainable or are using green practices in their hotel. There are a number of options the hotel industry can take to become more sustainable; from simple measures like implementing a towel and linen reuse program to using sustainable materials and strategies. A hotel cannot just implement sustainable features with a guarantee that it will be successful, education is an important part of the process, and without it the program will not work. It is very important to realize that Green Architecture can demonstrate a vision, and become an inspiration for what a society may entail. In trying to move construction to work with the forces of nature, a far greater equity will be possible within society. This will lead to fairer access to resources, better health, improved productivity levels, and decreased running costs, and increased property values, while ensuring that resources and planetary systems are protected for future generations to come. The use of large openings for sufficient ventilation, shading devices, overhangs, green roof reduces heat generation in a build which results to little or no need for artificial cooling and lighting. This makes the building more energy efficient.

Rain water catchment and recycling of grey water makes the hotel water efficient. Verticality is used against horizontality and the use of porous paving allows rain water to penetrate into the ground. Energy
conservation is mostly practiced probably because most respondents have been trained from both at home and at the work place to always ensure that energy is put on, only when it is necessary and of when it is not in use (Moise et al., 2021).

RECOMMENDATIONS AND CONCLUSION
The exploration shows that applying green structure procedures in lodging configuration will go quite far in diminishing overreliance on mechanical frameworks of ventilation. These systems will assist with working on indoor natural quality, in this way decreasing the level of “debilitated building disorders” and further developing the prosperity and soundness of clients.
To guarantee that green structure methodologies are carried out in hotel plan, a coordinated exertion is expected from all, more particularly Architects and Engineers who are at the front of building development. The principles and techniques outlined in this research do not apply to hotel design and construction alone but to any built environment. Since sustainability is not a one-man effort, the Government in every region of the world has a role to play. Finally, Hotels that are environmentally conscious should be encouraged through laws making and enforcement.
The conclusion drawn from these findings are:
1. If hotels are designed with principles of green architecture applied, it will be a more human friendly environment and this will make the occupants more comfortable resulting to better overall output.
2. Cost of running and maintaining the hotel will be cheaper and the building will have a longer life span. This automatically will make the prices of hotels cheaper.
3. The value of the property (hotel) will increase.
4. The world will be less polluted and hence reduce the effect of global warming.
5. And most importantly green ratings should be made mandatory as part of the planning process.

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