EVALUATION OF THE ADOPTION OF SUSTAINABLE DESIGN STRATEGIES IN LARGE-SIZED HOTELS IN LAGOS, NIGERIA

OKORIGBA, REGINA KEVWE
(19PCA02012)
B.Sc Architecture, Enugu State University of Science and Technology, Enugu
M.Sc Architecture, Enugu State University of Science and Technology, Enugu

AUGUST, 2024

EVALUATION OF THE ADOPTION OF SUSTAINABLE DESIGN STRATEGIES IN LARGE-SIZED HOTELS IN LAGOS, NIGERIA

BY

OKORIGBA, REGINA KEVWE
(19PCA02012)
B.Sc Architecture, Enugu State University of Science and Technology, Enugu
M.Sc Architecture, Enugu State University of Science and Technology, Enugu

A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE IN ARCHITECTURE IN THE DEPARTMENT OF ARCHITECTURE, COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT UNIVERSITY, OTA, OGUN STATE, NIGERIA

AUGUST, 2024

ACCEPTANCE

This is to certify that this thesis has been accepted in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy (Ph.D.) in Architecture in the Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria.

Miss Adefunke F. Oyinloye
(Secretary, School of Postgraduate Studies **Signature and Date**

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies) **Signature and Date**

DECLARATION

I, OKORIGBA, REGINA KEVWE (19 PCA02012), declare that I carried out this research under the supervision of Dr. Isidore C. Ezema and Dr. Eghosa N. Ekhaese of the Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria. I attest that this thesis has not been presented either wholly or partially for the award of any degree elsewhere. All the sources of materials and scholarly publications used in this thesis have been duly acknowledged.

OKORIGBA, REGINA KEVWE

Signature and Date

CERTIFICATION

We certify that the thesis titled **"EVALUATION OF THE ADOPTION OF ENVIRONMENTALLY SUSTAINABLE DESIGN STRATEGIES IN LARGE SIZE HOTELS IN LAGOS, NIGERIA"** is an original research work carried out by **OKORIGBA, REGINA KEVWE (19PCA02012)** of the Department of Architecture College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Dr. Isidore C. Ezema and Dr. Eghosa. N. Ekhaese. We have examined the work and found it acceptable for the award of the degree of Philosophy in Architecture.

Dr. Isidore C. Ezema
(Main Supervisor) **(Signature and Date)**

Dr. Eghosa N. Ekhaese
(Co-Supervisor) **(Signature and Date)**

Prof. Adedapo A. Oluwatayo
(Head of Department) **(Signature and Date)**

Prof. Yomi M.D. Adedeji
(External Examiner) **(Signature and Date)**

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies) **(Signature and Date)**

DEDICATION

This research work is dedicated to the Triune God - God the Father, God the Son, and God the Holy Spirit; the two hearts of love - the most Sacred Heart of Jesus and Immaculate Heart of Mary; my all and all, the giver of wisdom, knowledge, and understanding. This can only be GOD. This work is also dedicated to my husband, Mr. Pius O. Okorigba, for his love and financial support, and to my adorable children: Urinrioghene, Ogheneruno, Ejokoghene, and Ebruphiyo, for their encouragement and love. In addition, the work is dedicated to my late father, Chief Dickson T. Ode, who desired that I attain the highest level of education, and to my ever-loving and most cherished mother, late Mrs. Mary Erhikarovwon Ode, who transited to glory as I was writing the first draft of this thesis, for her unwavering love and prayers.

ACKNOWLEDGEMENTS

I acknowledge my ever-living God because He lives. As a result, I can face tomorrow and can do all things through Him that strengthens me. I also appreciate God for the existence of Covenant University, Ota. I am extremely grateful for the spiritual upliftment that the Covenant University environment provided, which engendered the spirit of courage that enabled this work to be possible. I am also thankful to God for bringing out my inner strengths through the "Total Man Concept," which promoted spirituality and academic excellence. I acknowledge the hand and wisdom behind the Covenant University dream, the Chancellor of Covenant University, Bishop David O. Oyedepo. Accept my unreserved appreciation.

My appreciation also goes to the Vice-Chancellor of Covenant University, Prof. Abiodun H. Adebayo, for his words of encouragement, the Deputy Vice-Chancellor, Prof. Olujide A. Adekeye, and the Acting Registrar, Mrs. Regina A. Tobi-David, for their managerial support. I also express appreciation to the Dean of the School of Postgraduate Studies, Prof. Akan B. Williams, and the entire management and staff of the School of Postgraduate Studies. I acknowledge the administrative support from the Dean of the College of Science and Technology, Prof. Timothy A. Anake, which was dispensed promptly.

I am deeply indebted to the Head of the Department of Architecture, Prof. Adedapo A. Oluwatayo, for her consistent encouragement and support, which helped in shaping and completing this work. Thank you very much, Ma. My sincerest thanks and profound appreciation to my supervisor, Dr. Isidore. C. Ezema, and Dr. Eghosa N. Ekhaese, for their guidance, support, commitment, and motivation throughout this research. I also appreciate the members of the staff of the Department of Architecture, Covenant University. Specifically, I want to appreciate Dr. Anthony B. Sholanke for his insightful contribution to the realisation of this work, and Dr. Egidario B. Aduwo, Dr. Bukola A. Adewale, and Dr. Daniel O. Babalola for their positive contributions to the work. I appreciate Dr. Adedotun O. Akinola, Dr. Olufunmilayo C. Adetoro, and Dr. Omoniyi O. Olagunju, for their encouragement in the course of this research work. I am grateful to you all.

I also want to appreciate all participants (names are kept confidential) from Eko Hotel & Suites Victoria Island, Lagos Continental Hotel Victoria Island, Golden Tulip Festac, Radisson Blu Anchorage Victoria Island, Four Points by Sheraton Victoria Island,

Southern Sun Hotel, Ikoyi, Lagos Marriott Hotel Ikeja, Ibis Lagos Airport Hotel, Orchid Hotels Lekki, Hotel Ibis Ikeja, BON Hotel Stratton Asokoro Abuja, Rockview Hotels, Apapa, Radisson Blu Ikeja, Novatel Hotel Lekki, Sheraton Hotel Ikeja, Lagos Oriental Hotel, Swiss International D'Palms Airport Hotel, Beni Hotel Lagos, and Etal Hotel & Halls Apapa for allowing me access to their facilities. I also appreciate the professional architectural firms for participating in this research. Without their help, this research work would not have been possible. May the Almighty God bless and reward you in all your endeavours, Amen.

My unreserved appreciation goes to my husband, Mr. Pius O. Okorigba, for his encouragement and for repeatedly telling me that I am a strong woman who can make it at this level. I thank him for supporting and financing this work. My deepest thanks go to my lovely children; Elthel Urinrioghene, Sydney Ogheneruno, Favour Ejokeoghene, and Dean Ebruphiyo Okorigba, for believing in me and for their prayers. I love you all. My deepest and sincere appreciation goes to my bosom friend, Mrs. Henrietta Onamejere, for her emotional support and prayers toward the completion of this work. To my ever-loving friend, Agatha, thank you very much for your unconditional love, support, and encouragement throughout the period I was carrying out this research work.

My appreciation also goes to my elder brother, Mr. Joseph Ode, who, at this moment, is in the final stage of his Ph.D. thesis. May the Almighty God bless and keep you for being there for me. To my father, the late Chief Dickson T. Ode, a builder in the construction industry and a mentor who provided the pedestal upon which I stand today as an architect, I say thank you. Finally, I acknowledge my mother, the late Mrs. Mary Erhikarovwon Ode, who transited to glory as I was writing the first draft of this thesis. Thank you Mummy for teaching me to go ahead to achieve what I set my mind to do and accomplish. Indeed, I am grateful.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF ABBREVIATIONS AND SYMBOLS

AMR: Automated Meter Reading

BREEAM: Building Research Establishment Environmental Assessment Method

CASBEE: Comprehensive Assessment System for Built Environment,

CO2: Carbon dioxide

COVID 19: Corona-virus Disease Infectious Disease 2019

CSR: Corporate Social Responsibility

DECoRuM Domestic Energy, Carbon Counting, and Carbon Reduction Model

EEP: Energy Environmental Prediction Tool

EMAS/ EUROPE: The EU Eco-Management and Audit Scheme-

ERS: Energy Reduction Strategies

GBCN: Green Building Council of Nigeria

GDP: Gross Domestic Product

GeSBC: German Sustainable Building Council

GHG: Greenhouse Gases

GSTC: Global Sustainable Tourism Council

HQE: High Environmental Quality

HVAC: Heating, Ventilation, and Air Conditioning

IPCC: Intergovernmental Panel on Climate Change

ISO: International Organisation for Standardisation

ISO 14001: International Organisation for Standardization 14001

ISO 14004: International Organisation for Standardization 14004

ITF: Industrial Training Fund

LED: Light- Emitting Diode

LEED: Leadership in Energy and Environmental Design

R&D: Research and Development

SBTOOL: Sustainable Building Tool

SCP: Sustainable Consumption and Production

SDGs: Sustainable Development Goals

SDG 6: Sustainable Development Goal 6

SDG 7: Sustainable Development Goal 7

SDG 11: Sustainable Development Goal 11

SDG 12: Sustainable Development Goal 12

SDG 13: Sustainable Development Goal 13

SDS: Sustainable Design Strategies

UN: United Nations

UNSDGs: United Nations Sustainable Development Goals

UNWTO: United Nations World Trade Organisation

USEPA: United States Environmental Protection Agency

VOCs: Volatile Organic Compounds

WCS: Water Conservation Strategies

WGBC: World Green Building Council

WMS: Waste Minimisation Strategies

WTO: World Trade Organization

WTTC: World Travel and Tourism Council

ABSTRACT

Hotels as part of the physical components of the built environment are increasingly embracing practices that promote environmental sustainability in design and operations. In Lagos, Nigeria, hotels are growing in large numbers in response to economic indices. It has been observed that the hospitality industry is energy-intensive, consumes large volumes of water, and generates huge amounts of waste with attendant effects on the ecological environment. A potent way of promoting sustainability in the hotel industry and reducing the adverse environmental impact of hotel buildings is the adoption of Sustainable Design Strategies (SDS). This study evaluated the adoption of SDS in large-sized hotels in Lagos, Nigeria, to identify the factors that influenced this. A mixed-method research design was employed for the study. A comprehensive literature review was done to ascertain the predominant SDS adopted in hotels. This formed the basis for the design of the questionnaire administered to 140 Hotel Managers drawn from 20 large-sized hotels and 60 Architects from 16 registered architectural firms involved in the design of the hotels. These were complemented with data sourced from oral interviews, field observations, and photographic instrument of data collection. The quantitative data were analysed using descriptive statistics and mean ranking using Statistical Package for Social Sciences (SPSS), Version 20. while content analysis was used to analyse the qualitative data. The study identified 37 SDS with the reuse programme being the most commonly adopted strategy in the design of hotel buildings reviewed. In the study area, it was observed that about 93 % of the design professionals who designed the hotels investigated were very much aware of energy reduction strategies, 86 % were aware of water conservation strategies, and 91% were aware of waste minimisation strategies. In contrast, about 70% of the Hotel Managers sampled were aware of energy reduction strategies, 45 % aware of water conservation strategies, and 67% were aware of waste minimisation. Further, about 91% of the design professionals have adopted energy reduction strategies, 73% have adopted water conservation strategies, and 46% have adopted waste minimisation strategies. For the Hotel Managers, 65 % have adopted energy reduction strategies, 40% have adopted water conservation strategies, and 61% have adopted waste minimisation strategies. This study also revealed that both the design professionals and Hotel Managers ranked energy-saving bulbs, low-flush toilets, and placement of dustbins as the most adopted strategies for energy reduction strategies, water conservation strategies, and waste minimisation strategies, respectively. Alternative energy sources, watering green spaces at night, covering swimming pools, and reuse programme/recycling ranked the least adopted strategies for energy reduction strategies, water conservation strategies, and waste minimisation strategies for both design professionals and Hotel Managers, respectively. Even though, the result on the level of awareness corroborates that on the extent of adoption of SDS, the cost associated with SDS and the availability of adequate and right information were identified as the most significant factors that influenced the adoption of SDS in the survey. The lack of space for solar panel installation, and difficulties in obtaining permits for retrofitting the buildings played a crucial role in the extent of adoption of SDS in the existing hotels in the study area. The study, therefore, concludes by suggesting strategies for improving the level of the adoption of SDS, encouraging retrofitting, and raising awareness of SDS as a framework for enhancing the sustainability of hotel buildings both in design and in operation.

ywords: Adoption, Built environment, Design Professionals, Hotel buildings, Hotel Managers Survey, Sustainable design strategies