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**Submission date:** 24-Mar-2019 08:27 PM (UTC+0200)

**Submission ID:** 1096540985

**File name:** Complete\_Msc\_thesis.docx (13.28M)

**Word count:** 41550

**Character count:** 263247

**EXPLORING GREEN DESIGN STRATEGIES IN A PROPOSED  
BENUE INTERNATIONAL CARGO AIRPORT, NIGERIA**

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**17PCA01617**

**7**  
**A DISSERTATION SUBMITTED TO THE SCHOOL OF POST  
GRADUATE STUDIES, COVENANT UNIVERSITY OTA, OGUN STATE,  
NIGERIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE AWARD OF MASTER OF SCIENCE DEGREE (MSc) IN  
ARCHITECTURE**

**MARCH, 2019**

## DECLARATION

I hereby declare that the thesis entitled “**Exploring Green Design Strategies in a Proposed Benue International Cargo Airport, Nigeria**” has been composed entirely by me as a sole result of my research work under the supervision of Dr. I.C. Ezema of the department of Architecture, Covenant University and <sup>109</sup> has not been submitted partially or wholly for the award of any degree or professional qualification elsewhere. I am aware of and i understand the University’s policy on plagiarism, as such, due references have been provided on all supporting literatures and resources.

**Chen, Sonter John**

(Student)

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(Signature and Date)

## CERTIFICATION

<sup>146</sup> This is to certify that the thesis entitled “Exploring Green Design Strategies in a Proposed <sup>7</sup> Benue International Cargo Airport, Nigeria” submitted to the school of postgraduate studies, Covenant University in partial fulfilment of the requirements for the award of master of science degree in Architecture <sup>36</sup> is an original research work carried out by **Chen, Sontar John** with matric number **17PCA01617** <sup>145</sup> under my guidance and supervision. The research work embodied <sup>86</sup> in this thesis has not been previously submitted for the award of any degree in Covenant University or any other institution.

### 1. Supervisor

Dr. I.C. Ezema

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(Signature and Date)

### 2. Head Of Department

Dr. A.A Oluwatayo

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(Name)

(Signature and Date)

## DEDICATION

I dedicate this project to God my father, the author and finisher of this work for giving me the wisdom and understanding needed to complete this study and to my beloved mother Mrs. Christiana Chen, for your unwavering support.

## ACKNOWLEDGEMENT

The accomplishment of this dissertation is not the outcome of my sole efforts. I wish to take this opportunity to acknowledge everyone who has made an impact on this journey.

<sup>2</sup> First and foremost I would like to express my utmost gratitude and appreciation to God, Father as your word says in Luke 1:37, 'For with God nothing will be impossible', the actualization of this feat is premised on your sufficient grace in my life and I return all the glory to you alone.

To my parents, Dr John Chen and Mrs. Christiana Chen, I am extremely grateful for your love, prayers, support and sacrifices in preparing me for the bright future ahead. Also, special thanks to my siblings, Judith, Joy, Joseph and Christian for their support and love.

I want to deeply and sincerely extend my gratitude to the Chancellor of Covenant University, Bishop David Oyedepo <sup>36</sup> for the vision and mission of the University and for your expository teachings which have enriched and strengthened my faith.

I remain thankful to my supervisor, Dr. I.C Ezema for giving me the opportunity to work under him and providing invaluable guidance throughout this journey. Sir, I have been hugely inspired by your dynamism, vision, sincerity and great sense of humour. My appreciation also goes to the Head of department, Dr. A.A Oluwatayo, Prof. E.O Ibem, Dr. E.B. Aduwo, Dr. O. Alagbe and the entire staff and students of the department of Architecture, may God reward you all for the continuous encouragement and critiques.

To my friends Mimidoo and Ayomide who contributed to the content and editing of this work, you are greatly appreciated. Also, many thanks to my class mates for the good times and finally to everyone who has supported me directly or indirectly in the course of this journey.

In recent years, there has been a substantial growth in the agricultural products from Benue state which can be harnessed to foster the upkeep of the nation's teeming population as well as increase revenue generation through export. One viable way to enable these products get to other parts of the world is by air; air cargo refers to the transportation of goods via aircraft. Airport operations are associated with negative environmental impacts which include resource consumption, gas emissions, noise nuisance, waste production, poor local air quality, water contamination and biodiversity loss. As a result of this, researchers are looking for ways to reduce the overall consumption of resources and production of waste to increase profit earnings and mitigate the negative impacts of airports on the environment. Going by this premise, the aim of this research is to undertake an in-depth study of green design strategies in view of designing a sustainable international cargo airport for Benue state. The research was carried out to answer questions of existing green design strategies in literature, green design strategies adopted in Nigerian airports, sustainability awareness of airport workers and the current indoor environmental conditions of Nigerian airports. In achieving the objectives of this study, a mixed method of research was adopted. The sample size was drawn systematically from a study population of all the airports in Nigeria. Data was collected via four strategies namely; review of pertinent literature, case study survey, observation of green design metrics and questionnaire surveys issued to airport workers and users to ascertain their level of awareness and evaluate satisfaction of indoor environmental conditions respectively. The data obtained was analysed with a combination of content analysis and SPSS statistical package, descriptive statistics was used for result presentation. Results revealed that the use of Alucobond was consistent in all the airports while water conservation, alternative energy sources and natural ventilation were grossly neglected. The airport workers are fairly aware of the sustainability strategies and users of airports reported that indoor environmental conditions of Nigerian airports are satisfactory. From a sustainable perspective, this study emphasizes the need to take into account green strategies in the design of airports and it reveals a number of strategies that can be easily implemented to curb environmental degradation and circumvent operational cost of airports.

**Keywords:** Cargo airport, Environmental impact, Green strategies, Sustainability awareness, User perception

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