

**IMPLEMENTING BIOMORPHIC DESIGN PRINCIPLES IN AN URHOBO  
CULTURAL MUSEUM FOR SAPELE, DELTA, NIGERIA**

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**JULY, 2024**

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**BY**

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**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE  
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COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT  
UNIVERSITY, OTA, OGUN STATE, NIGERIA**

**JULY, 2024**

## **ACCEPTANCE**

This is to attest that this dissertation carried out by EMUKPOERUO, RAPHAEL EJIRIE, has met the required standard for the award of the degree of Master of Science (M.Sc.) in Architecture and has been accepted by the School of Postgraduate Studies, Covenant University, Ota, Ogun State, Nigeria.

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**(Dean, School of Postgraduate Studies)**

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## **DECLARATION**

I, **EMUKPOERUO, RAPHAEL EJIRIE (21PCA02238)**, declare that I carried out this research under the supervision of Dr Eghosa N. Ekhaese of the Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria. I attest that this dissertation has not been presented wholly or partially for the award of any degree elsewhere. All sources of data and scholarly dissertation information used in this dissertation are duly acknowledged.

**EMUKPOERUO, RAPHAEL EJIRIE**

**Signature and Date**

## **CERTIFICATION**

We certify that this dissertation titled “**IMPLEMENTING BIOMORPHIC DESIGN PRINCIPLES IN AN URHOBO CULTURAL MUSEUM FOR SAPELE, DELTA, NIGERIA**” is an original research work carried out by **EMUKPOERUO, RAPHAEL EJIRIE (21PCA02238)**, in the Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria, under the supervision of Dr. Eghosa N. Ekhaese. This work is acceptable as part of the Master of Science in Architecture award requirements.

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**Signature and Date**

## **DEDICATION**

This thesis is dedicated to the Almighty God, who bestows all wisdom and direction—my family, friends, and anyone who finds purpose.

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## ABSTRACT

Biomorphic design principles are architectural principles that create objects, structures, and systems by taking inspiration from the natural world. The word “biomorphism” comes from the combination of the terms “bio,” which refers to life or living things, and “morph,” which describes form or shape. The biomorphic design aims to mimic, duplicate, or absorb the structures, patterns, forms, and functions present in the living world. The biomorphic design principles include Fluidity, Use of Natural Forms, Geodesic Considerations and Technological Advancements. On a global scale there has been growing awareness of biomorphism and its implementation has been greatly encouraged due to the trend of design steering towards sustainability and energy efficiency, whereas nationally in the Nigerian construction industry the implementation of biomorphism is not as widespread, and this phenomenon has affected the way buildings have been designed/constructed which also affects museums. The aim of this study was to identify the most efficient way to implement biomorphic design principles in the design of a museum to enhance user comfort/artefact preservation in Sapele, Delta State, Nigeria with the following objectives to help achieve this; Examine the factors that determine biomorphic design principles in cultural museums in Delta, Nigeria, Examine the biomorphic design principles that enhanced artefact preservation in cultural museums, Delta, Nigeria., Examine the biomorphic design principles that improve user comfort in the cultural museum design, Delta, Nigeria and to Design a cultural museum incorporating biomorphic design principles to improve artefact preservation and user comfort in Delta, Nigeria. The methodology employed for this study was the mixed-method approach, this was done through the use of questionnaires and an observation guide to be able to get the full perspective when carrying out field work. According to the data collected it was found in the study that Technological Advancements was the most important factor that determined biomorphic design principles, Fluidity was the most effective biomorphic design principle when it came to enhancing artifact preservation and the use of natural forms was the most effective at improving user comfort. The results acquired from this study was information that would adequately inform the design of an Urhobo cultural museum that embodies the biomorphic design principles. In conclusion this study shows the importance of biomorphic design principles and how it can be implemented in the design of museums and any other building type. This study contributes to understanding biomorphic design principles in museum design, sheds light on its challenges and opportunities in Delta State’s cultural context, and proposes a replicable model for its application in Africa. Questionnaires gathered data from residents of the study area, and case studies were used to collect information on selected museums.

***Keywords: Biomimicry, Biomorphic Design, Cultural Museum, Sustainability, Organic Design***