

GODFREY OKOYE UNIVERSITY
FACULTY OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF ARCHITECTURE

**DESIGN FACTORS FOR AN ADAPTIVE AND CREATIVE TECH HUB IN ENUGU
METROPOLIS**

A PROJECT REPORT

**SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE, FACULTY OF NATURAL
AND APPLIED SCIENCES, GODFREY OKOYE UNIVERSITY, ENUGU.**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE
DEGREE OF BACHELOR OF SCIENCE (B.SC.) IN ARCHITECTURE.**

BY

IGWE CHUKWUDALU EMMANUEL

REG. NO.: GOU/U22/ARC/190

SUPERVISOR

ARC. AGU

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APPROVAL

This project report, titled "**DESIGN FACTORS FOR ADAPTIVE & CREATIVE TECH HUBS IN ENUGU METROPOLIS**," prepared and submitted by IGWE CHUKWUDALU EMMANUEL (GOU/U22/ARC/190), has been approved and accepted as meeting the requirements for the award of a Degree in Architecture in the Department of Architecture, Faculty of Natural and Applied Sciences.

ARC AGU

(Project Supervisor)

Sign: _____

ARC. DR CHUKWU CHINAECHETAM

(Head of Department)

Sign: _____

EXTERNAL EXAMINER

Sign: _____

CERTIFICATION

I, IGWE CHUKWUDALU EMMANUEL, declare that this project, "Design Factors for Adaptive & Creative Tech Hubs in Enugu Metropolis: The Design of a Tech Hub at Eswama Yard, Naira Triangle," is my original work and was conducted under the supervision of **Arc AGU** in the Department of Architecture, Faculty of Natural and Applied Sciences. All sources of information and literature used in this work have been duly acknowledged in the reference section.

IGWE CHUKWUDALU EMMANUEL

(GOU/U22/ARC/190)

Sign: _____

DEDICATION

This project is dedicated to God Almighty, the source of my strength, wisdom, and provision throughout my academic journey. I also dedicate this work to my family for their unwavering love, encouragement, and financial support, which made the successful completion of this degree possible.

ACKNOWLEDGMENT

My sincere gratitude goes to Almighty God for His unfailing grace, protection, wisdom, and strength throughout my academic journey. Without His guidance, the successful completion of this project would not have been possible.

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TABLE OF CONTENTS

Title Page	i
Approval	ii
Certification	iii
Dedication	iv
Acknowledgment	v
Table of Contents	vi
List of Figures	ix
List of Plates	x
List of Tables	xi
Abstract	xii
CHAPTER ONE: INTRODUCTION	1
1.1 Background to the Study	1
1.2 Statement of the Problem	3
1.3 Aim and Objectives of the Study	4
1.4 Research Questions	4
1.5 Significance of the Study	5
1.6 Scope and Delimitation	5
1.7 Organization of the Report/Thesis	5
1.8 Definition of Terms	6

CHAPTER TWO: LITERATURE REVIEW AND CASE STUDIES	8
2.3 Review of Related Literature	8
2.4 Case Studies	9
2.4.1 Local Case Studies	9
2.4.2 International Case Studies	14
2.5 Summary of Case Studies	18
CHAPTER THREE: THE STUDY AREA	20
3.1 Geographical Location And Setting	20
3.2 Site Selection Criteria	21
3.3 Brief History of the Study Area	21
3.4 Physiography, Climate, and Vegetation	22
3.5 Population, Culture, and Economic Development	23
CHAPTER FOUR: RESEARCH METHODOLOGY	24
4.1 Research Design	24
4.2 Data Needs and Sources	24
4.3 Population of Study and Sampling Procedure	25
4.4 Methods and Instruments for Data Collection	25
4.5 Methods of Data Analysis	26
CHAPTER FIVE: DESIGN SYNTHESIS AND DEVELOPMENT	27
5.0 Introduction	27

5.1 The Design Brief	27
5.2 Design Requirements for Activities/Planning Data	27
5.3 Schedule of Accommodation	28
5.4 Special Consideration	29
5.5 Site Inventory and Analysis	29
5.6 Data Analysis and Presentation	30
5.7 Design Concept and Design Proposal	30
5.8 Presentation Drawings with 3d	31
CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS	33
6.0 Introduction	33
6.2 Conclusion	34
6.3 Recommendations	35
6.4 Contribution to Knowledge	35

LIST OF FIGURES

- i. **Figure 1.1:** A modern tech hub interior showing an open-plan workspace
- ii. **Figure 1.2:** A tech workspace affected by power failure and dim lighting
- iii. **Figure 2.1:** The Facade of the iHub, Nairobi
- iv. **Figure 2.2:** The Facade of Station F, France
- v. **Figure 2.3:** The Facade of the CIRS building
- vi. **Figure 3.1:** Drone shot of the Naira Triangle
- vii. **Figure 3.2:** Workers mining coal in the colonial period
- viii. **Figure 3.3:** Climatic Data of Enugu City

LIST OF PLATES

- i. **Plate 2.1:** Facade and Signpost of the Enugu State Tech Hub
- ii. **Plate 2.2:** Facade of TechX Innovation Hub
- iii. **Plate 2.3:** Facade and Sign-Post of the Co-Creation Hub (CcHub)

LIST OF TABLES

- i. **Table 5.1:** Schedule of Accommodation and Spatial Requirements

ABSTRACT

The study aims to analyze the design criteria for an **ADAPTIVE AND CREATIVE TECH HUB IN THE ENUGU METROPOLIS** and propose an architectural structure that nurtures innovation, collaboration, entrepreneurship, and technological advancement within a flexible and sustainable built environment. Innovation spaces are needed to foster new companies, digital entrepreneurs, creative workers, research, and technology-driven businesses, as technology continues to transform economies and societies. The paper investigates the spatial, environmental, technological, and social considerations in the planning and design of modern technology hubs. The extensive literature review, analysis of relevant case studies, site investigation, and architectural design principles highlight key factors, including flexible spaces, a user-centered approach, accessibility, smart building technologies, environmental sustainability, collaborative spaces, and climate-responsive architecture. The results indicate that adaptive design approaches are significant for functionality, creativity, interdisciplinary design, and adaptability to future technological advancements. The proposed design incorporates flex spaces, incubation centers, digital laboratories, conference spaces, recreation spaces, green infrastructure, and smart building systems to create an environment that encourages innovation and is appropriate to the socio-economic and climatic conditions in the Enugu Metropolis. The study reveals that an adaptive and creative tech hub has the potential to drive technological innovation, economic growth, entrepreneurship, and youth empowerment in Enugu State. It thus calls for the use of sustainable design principles, flexible planning, and smart technologies in the planning of future innovation centers in Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

A tech hub can be a physical space that is filled with people who have software development skills, design skills, and entrepreneurial ideas, and even startups in the early stages, where they are able to exchange ideas, knowledge, and skills, and collaborate on creating technological solutions (Tranos & Nijkamp, 2013; Moriset, 2013; Abrahams, 2021). That, in this project, translates to a tech facility that is truly thriving and can't simply operate as a typical office block. The architecture of the proposed tech hub in Eswama Yard, Naira Triangle, Enugu Metropolis should cater to a diverse mix of activities from high-density software programming to hands-on hardware prototyping. The design needs to be attractive to young people, who will be using it, but also offer them opportunities to take their own ideas and make them into a viable tech product, particularly given its accessibility and strategic position.

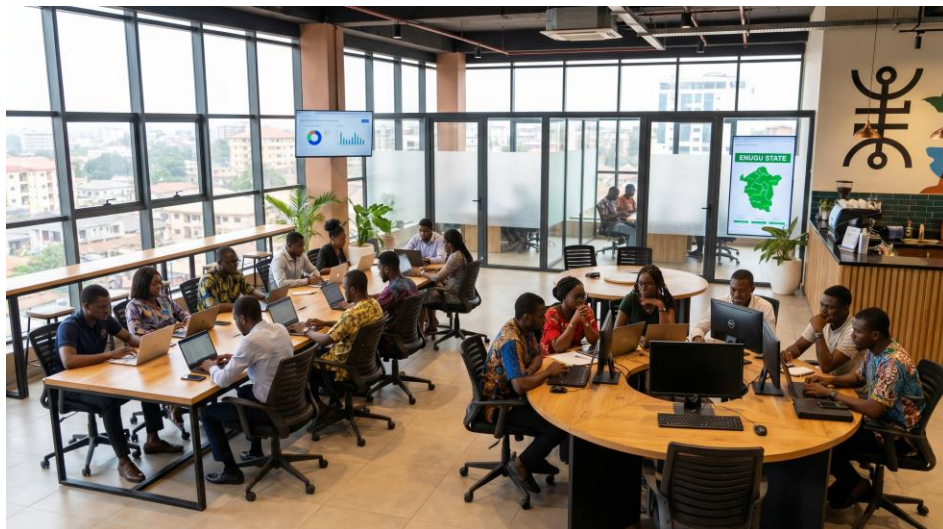


Figure 1.1: Modern tech hub interior with open workspace, young professionals working on laptops together. (Source: Tranos & Nijkamp, 2013)

DESIGN FACTORS OF CREATIVE TECH HUBS

The creative tech hub is committed to fostering places of digital creativity, innovation, and social interaction. The most important design elements for a creative area are open-plan designs, collaborative work stations, aesthetic connections between rooms, and inviting interior rooms (World Bank, 2020; World Bank, 2016; OECD, 2019). These design features are important as they make it easier to cross the physical divide and promote natural sharing of knowledge amongst the users. In the Eswama yard, that translates to providing a central atrium or open lounges for a graphic designer to bump into a software engineer, share concepts, and launch a company.

DESIGN FACTORS OF ADAPTIVE TECH HUBS

In contrast, an adaptive tech hub is structurally flexible and responsive, accommodating changes in environmental conditions and users' needs (Schmidt & Austin, 2016). The world of technology is rapidly evolving, and building spaces need to keep pace. Traditional buildings often have unchanging layouts and inflexible service systems, making it challenging to move around without having to add or remove structure and making an investment in the building (Kronenburg, 2007). remove structure and make an investment in the building (Kronenburg, 2007). This theory suggests that it is no longer necessary to design a computer training room that is static in the case of the project in Enugu. Rather, adaptive design elements should involve mobile spatial grids, flexible partition walls, and elevated access floors to facilitate the routing of cables. In addition, the ability to adapt applies to the environment. In addition to the inconsistent power supply, adaptive design factors include incorporating passive cooling, natural ventilation, and renewable energy (solar) systems to keep the building operational even if the building's power fails.

THE RELATIONSHIP BETWEEN ADAPTIVE AND CREATIVE DESIGN FACTORS

Taken together, adaptive and creative design factors create an extremely resilient and motivating architectural solution. To be creative, there needs to be a space that can physically accommodate the brainstorming process; to brainstorm, there needs to be something adaptable so that creativity is never stunted by the infrastructure. A room where open, creative collaboration is happening now may need to be divided into separate coding pods that are sound-dampening and quiet. The Eswama Yard tech hub will be a blend of design elements that encourage creative and adaptive innovation, making the space future-proof and innovation-friendly irrespective of changes in technology and fuel.

1.2 STATEMENT OF THE PROBLEM

Currently, there are two major problems hindering tech hub development in Enugu: the failure of traditional building designs to keep pace with rapid technological change, and infrastructural instability. The majority of existing buildings are constructed in rigid space systems and are not easily adaptable to the very fast pace of technological change, and thus are functionally obsolete or require costly structural alterations (Kronenburg, 2007).



Figure 1.2: Image showing a tech workspace affected by power failure, dim lighting, inactive computers, visible backup generators, and users experiencing disruption of work (Source: Robert Kronenburg, 2007)

At the same time, a tech-oriented workspace needs a constant power supply, effective cooling, and reliable Internet access. These are often poorly provided in Enugu, directly impairing user productivity and driving up hub managers' costs (World Bank, 2020). Finding a new yard in the Naira Triangle, at Eswama yard, will help solve these problems. If the architecture doesn't actually meet the demand for flexibility in space and the power grid is inherently unstable, then the building will not serve as an innovation source.

1.3 AIM AND OBJECTIVES OF THE STUDY

Aim

To design an adaptive tech hub in Enugu Metropolis that incorporates flexible and adaptable spaces capable of responding to changing technological and user needs.

Objectives

- I. To study adaptable spaces in institutional buildings.
- II. To study the design strategies for the effective use of adaptable spaces of institutional spaces in Enugu State.
- III. To design flexible and functional spatial layouts that meet acceptable architectural standards.

1.4 RESEARCH QUESTIONS

- I. What are the characteristics of adaptable spaces in institutional buildings?
- II. What design strategies can improve the effective use of adaptable spaces in institutional buildings in Enugu State?
- III. How can flexible and functional spatial layouts be designed to meet modern technological needs?

1.5 SIGNIFICANCE OF THE STUDY

The study examines the physical concerns that affect the performance of direct tech environments in Enugu. The research helps to understand the design elements required to be adaptable and creative for maintaining the functionality of the building in the face of infrastructural inadequacies, thereby giving architectural solutions for the same (World Bank, 2020).

The result of this research will help architects and developers to show them how to design buildings that can change without incurring unnecessary costs to reach early obsolescence (Kronenburg, 2007). In addition, the study's focus on Eswama Yard directly serves the youth and

digital entrepreneurs of Enugu State and provides a practical blueprint for a space that will enable the continuous innovation, collaboration, and learning that youth and digital entrepreneurs in Enugu are seeking.

1.6 SCOPE AND DELIMITATION

The study aims to design an adaptive and creative tech hub in the Eswama Yard of Naira triangle in Enugu metropolis. It includes flexible interior space design, modular building systems, and the design strategies to be used to minimize the reliance on the local power grid, including passive cooling and solar energy systems. The study is limited to architectural design considerations only. It will NOT include detailed engineering calculations, in-depth financial cost analysis, or government policy-making. The emphasis is on spatial planning, building form, and the architectural strategy for adaptability and creativity.

1.7 ORGANIZATION OF THE REPORT/THESIS

- I. Chapter One: The study is presented in the first chapter, which contains background, statement of the problem, aim and objectives, research questions, significance of the study, scope, and definition of terms.
- II. Chapter Two presents the literature review and case studies related to tech hubs, adaptive architecture, and similar projects.
- III. Chapter Three discusses the study area, including the location, site characteristics, and environmental conditions of the Naira Triangle in Enugu.
- IV. Chapter Four explains the research methodology, including data collection and methods of analysis.
- V. Chapter Five focuses on the design process, including the design brief, site analysis, concept development, and final design proposal.

VI. Chapter Six presents the conclusion, recommendations, and contributions of the study.

1.8 DEFINITION OF TERMS

- i. **Tech Hub: A physical**, collaborative environment for individuals engaged in technology – developers, designers, startups, and more – to learn, work, and develop digital solutions (Tranos & Nijkamp, 2013).
- ii. **Adaptive Tech Hub:** A tech hub that can adapt and change in the future due to technology, user needs, and environment. I
- iii. **Adaptability (in Architecture):** Quality of being able to be adapted or reused for a different purpose without extensive changes to the structure (Schmidt & Austin, 2016).
- iv. **Flexibility:** The design quality of a space's ability to be used for a variety of purposes or to be changed around as necessary.
- v. **Infrastructure Instability:** The situation in which basic services like electricity, cooling, internet, etc., are unreliable or inconsistent.
- vi. **Modular Design:** A design strategy that utilizes smaller components or sections of a building that can be easily added, removed, or moved.
- vii. **Passive Design:** A design approach that harnesses natural solar gain and natural ventilation in buildings.
- viii. **Tech Village:** A large development that combines different tech-related spaces such as work areas, training centers, and innovation hubs within one environment.

CHAPTER TWO

LITERATURE REVIEW AND CASE STUDIES

2.3 REVIEW OF RELATED LITERATURE

Tech hubs have been singled out as key environments that attract people, resources, and ideas and enable collaboration, and hence the development of startups (Tranos & Nijkamp, 2013).

These environments facilitate the sharing of knowledge and speed up technological progress through the interaction of different users. But the "added value" of such spaces depends heavily on the infrastructure. Poor electrical reliability and poor access to services that are stable and reliable are serious constraints to productivity and efficient operations in many developing areas. The World Bank (2020) states that an unstable power supply is also one of the main constraints; buildings that embrace strategies to minimize reliance on a steady electricity supply, by using passive design and alternative energy systems.

In addition, other scholarly research has shown that traditional designs in buildings are too inflexible to adapt to changes in function and technology. Robert Kronenburg (2007) makes the argument that such rigidity eventually results in the early obsolescence of buildings, which are not able to change use without significant modification. Conversely, flexible design solutions can help buildings serve their functions for the long haul with space and use modifications. Likewise, Schmidt and Austin (2016) assert that adaptability must be built into the system of buildings itself, so that buildings can change over time.

The literature that has been reviewed has proven that flexibility and adaptability in conjunction with strategies to deal with infrastructural restrictions are needed in the successful design of modern tech environments. This further drives the necessity to have an adaptive tech hub that can

continue to perform in unstable environments and can be responsive to any new technology developments.

2.4 CASE STUDIES

2.4.1 LOCAL CASE STUDIES

CASE STUDY 1: ENUGU STATE TECH HUB

Location: Independence Layout, No. 2 Upper Presidential Road, Enugu, Enugu State, Nigeria

Year Founded: 2020

Type: Government Agency

OVERVIEW

Enugu State Tech Hub is an innovation center established by the government to promote digital skills, entrepreneurship, and technology development among the youths in Enugu State. It offers a place to learn, brainstorm, and create tech solutions.



Plate 2.1: Image of the Facade and signpost of the Enugu Tech Hub (Source: Author, 2026)

MERITS

- i. Coding and digital skills training
- ii. Startup incubation
- iii. Co-working and collaboration
- iv. Entrepreneurship development
- v. Design Features
- vi. Multi-functional training rooms
- vii. Shared workspaces
- viii. Open and flexible layout

RELEVANCE TO STUDY

It demonstrates the dynamics of the tech hubs in Enugu and the types of spaces needed for training and innovation.

DEMERITS

- I. Dependence on stable electricity
- II. Limited flexibility in spatial use over time
- III. Lessons for Design
- IV. Spaces should support multiple activities
- V. Flexible layouts are necessary
- VI. Design should reduce dependence on unstable infrastructure

CASE STUDY 2: TECHX INNOVATION HUB

Location: 70 Nza Street, Independence Layout, Enugu, Enugu State, Nigeria

Year Founded: 2018

Type: Private Organization

OVERVIEW

TechX Innovation Hub is an exclusive tech space offering training courses, workshops, and collaboration opportunities for tech enthusiasts and startups in Enugu.



Plate 2.2: Image showing the Facade of TechX Innovation Hub (Source: Author, 2026)

MERITS

- I. ICT training
- II. Workshops and seminars
- III. Networking events
- IV. Design Features

- V. Open hall for training
- VI. Flexible interior arrangement
- VII. Simple functional spaces

RELEVANCE TO STUDY

It may depict smaller tech hubs in Enugu and exhibits the versatility of spaces for various activities.

DEMERITS

- i. Limited adaptability of spaces
- ii. Dependence on basic infrastructure

LESSONS FOR DESIGN

- i. Open spaces support multiple uses
- ii. Flexibility is important even in small hubs
- iii. A simple design can still be effective

CASE STUDY 3: CO-CREATION HUB (CCHUB), LAGOS

Location: 294 Herbert Macaulay Way, Sabo, Yaba, Lagos State, Nigeria

Year Founded: 2010

Type: Private / Non-profit Organization

OVERVIEW

Co-Creation Hub (CcHub) is one of Nigeria's top innovation hubs. It provides hand-in-hand collaboration and training to startups, entrepreneurs, and developers.



Plate 2.3: Image showing the Facade and Signpost of the Cc Hub (Source: Author, 2026)

MERITS

- I. Startup incubation
- II. Co-working
- III. Training and workshops
- IV. Research and development
- V. Design Features
- VI. Flexible workspaces
- VII. Indoor and outdoor collaboration areas
- VIII. Multi-use rooms

RELEVANCE TO STUDY

It gives an insight into how a thriving tech hub functions in Nigeria and how it can benefit various user groups.

DEMERITS

- i. High reliance on infrastructure
- ii. Need for adaptable spaces

LESSONS FOR DESIGN

- i. IISpaces should serve multiple users
- ii. Flexibility improves long-term use
- iii. Collaboration spaces are important

2.4.2 INTERNATIONAL CASE STUDIES

CASE STUDY 4: IHUB NAIROBI

Location: Nairobi, Kenya

Year Founded: 2010

Type: Private Organization

OVERVIEW

iHub Nairobi is one of the top tech hubs in Africa, offering a space for developers, startups, and innovators to collaborate.



Figure 2.1: Image showing the Facade of the iHub (Source: Ray Munene, 2025)

MERITS

- I. Co-working
- II. Startup incubation
- III. Training programs
- IV. Community events
- V. Design Features
- VI. Open-plan layout
- VII. Flexible seating
- VIII. Shared workspaces

RELEVANCE TO STUDY

It demonstrates the benefits of collaboration for tech innovation.

LESSONS FOR DESIGN

- I. Open layouts support teamwork
- II. Shared spaces encourage innovation
- III. Community-focused design is important

CASE STUDY 5: STATION F

Location: Paris, France

Year Founded: 2017

Type: Private Organization

OVERVIEW

Station F is one of the world's largest startup campuses, housing thousands of startups and tech businesses.



Figure 2.2: Image showing the Facade of Station F, France (Source: Author, 2026)

MERITS

- I. Startup incubation
- II. Offices and co-working
- III. Event spaces
- IV. Design Features
- V. Large modular spaces
- VI. Flexible layouts
- VII. Scalable infrastructure

RELEVANCE TO STUDY

It demonstrates the ability of large tech companies to be flexible and scalable.

LESSONS FOR DESIGN

- I. Modular design allows expansion
- II. Flexibility supports future growth

III. Large spaces can still adapt

CASE STUDY 6: CENTRE FOR INTERACTIVE RESEARCH ON SUSTAINABILITY (CIRS)

Location: Vancouver, BC, Canada

Year Founded: 2011

Type: Institutional / University Research Facility

OVERVIEW

CIRS is an energy-efficient and environmentally friendly building that is sustainable and adaptable.



Figure 2.3: Image showing the Facade of the CIRs (Source:

<https://www.architectmagazine.com/project-gallery/the-centre-for-interactive-research-on-sustainability-550/>)

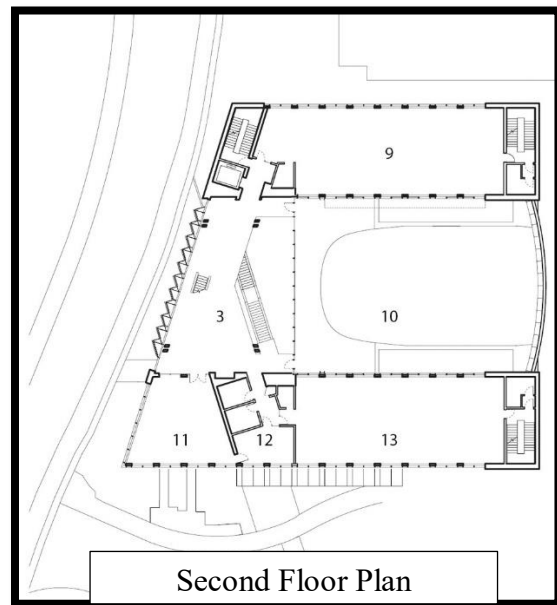
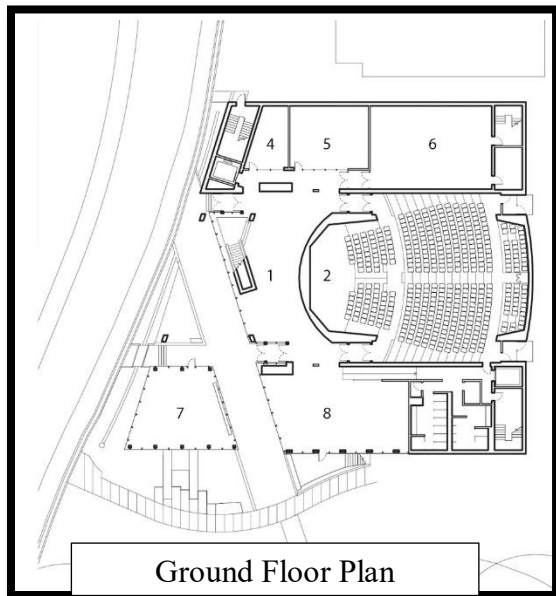
MERITS

I. Research and innovation

- II. Academic collaboration
- III. Design Features
- IV. Natural ventilation (passive cooling)
- V. Solar energy systems
- VI. Flexible interior spaces

RELEVANCE TO STUDY

It demonstrates the ability to operate buildings independently of the use of fragile infrastructure.



LESSONS FOR DESIGN

- I. Passive design reduces energy use
- II. Alternative energy improves reliability
- III. Sustainable systems support long-term use

2.5 SUMMARY OF CASE STUDIES

The case studies demonstrate the significance of tech hubs for innovation and collaboration. Local illustrations illustrate the importance of adaptable spaces and reliance on infrastructure. International examples show how adaptable and flexible a building can be, and how sustainable systems enhance building performance.

These studies led to the following important design issues:

- i. Enhanced capacity and flexibility in the operation of the space.
- ii. Reduced dependence on unstable infrastructure
- iii. Flexible areas that are capable of future changes.

CHAPTER THREE

THE STUDY AREA

3.1 GEOGRAPHICAL LOCATION AND SETTING

Enugu is a large city in southeastern Nigeria and the capital of Enugu State. It is an administrative, commercial, and educational hub of the region. The city is located between latitudes $6^{\circ}20'N$ and $6^{\circ}30'N$ and longitudes $7^{\circ}20'E$ and $7^{\circ}40'E$. The proposed site is in a strategic position within the Naira Triangle of the Enugu Metropolis, in the urban core area with good connectivity to major road networks. This level of accessibility facilitates movement and enhances the site's suitability for a public-oriented development such as a tech hub.



Figure 3.1: Image showing the drone shot of the Naira Triangle (Source: Onismate, 2024)

The surrounding context of the Naira Triangle is a combination of residential, commercial, and institutional uses, making for regular human activities and urban interactions. This setting will help

create an environment where a technology-based facility relies on accessibility, visibility, and engagement with the user.

3.2 SITE SELECTION CRITERIA

Clearly defined urban and functional criteria form the criteria for the selection of the Naira Triangle. The high accessibility of the site is achieved by the fact that it is located near the main transportation routes, thus facilitating the use of the site. It is located in the heart of the city, making it a relevant public and innovation center. However, enough land area is available to build a tech hub or tech village. The area is also surrounded by urban activity, which brings a constant stream of users and interactions due to nearby residential and commercial developments. The site is also well-suited for future expansion and development to meet ever-evolving technological needs.

3.3 BRIEF HISTORY OF THE STUDY AREA

The city of Enugu was established in colonial times as a coal mining community and has since grown into an important administrative and commercial center. The urban expansion has, over the years, created planned areas like Independence Layout and the surrounding areas, including the Naira Triangle, as significant components of the metropolis.



Figure 3.2: Workers mining coal in the colonial period (Source: Uchendu, 1965)

In recent years, there has been a surge of interest in technology and innovation in Enugu, marked by the establishment of tech hubs, digital training centers, and entrepreneurial endeavors. This trend indicates a growing need for purpose-built spaces to effectively support technological activities and innovation.

3.4 PHYSIOGRAPHY, CLIMATE, AND VEGETATION

The topography of Enugu is relatively flat with low hills and plains, offering the advantage of providing relatively level sites for construction activities. The topography is fairly level in the Naira Triangle area, but it is still important to have proper drainage design with the seasons.

The City's climate is tropical, with two distinct seasons: rainy season (April to October), and dry season (November to March). The year-round weather is warm with an average temperature range of 25°C – 32°C. The climate requires the use of passive design elements such as natural ventilation, shading elements, and building orientation, in order to maximize thermal comfort and minimize the use of mechanical air conditioning systems.

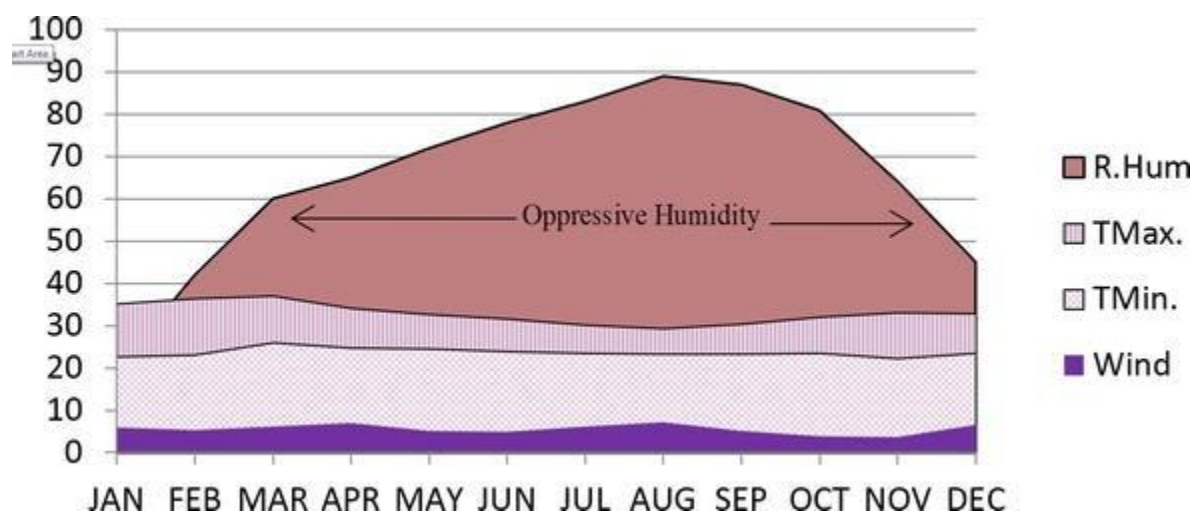


Figure 3.3: Climatic Data of Enugu City (Source: NIMET, 2017)

The vegetation cover in Enugu is mainly tropical rainforest with a significant alteration due to urbanization. However, there is still time to incorporate landscaping and green infrastructure into the design of new development projects, creating more beautiful and healthier environments and experiences for the users.

3.5 POPULATION, CULTURE, AND ECONOMIC DEVELOPMENT

Enugu is steadily increasing in population with a high number of young people. The demographic profile also increases the need for environments that foster learning, innovation, and job creation, particularly in the technology industry.

The city is popular for its cultural richness and ability to bring people together, foster creativity, and be involved in the community. These attributes contribute to fostering a collaborative, knowledge-sharing, and innovative environment for a tech hub.

Enugu's economy is based on trade, education, governance, and, at present, digital industries: technical skills & entrepreneurial capacity development (universities & training institutions). However, with the growing interest in digital technology and innovation, the need for an effective, efficient, and flexible tech hub for sustainable economic and technological growth is growing.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 RESEARCH DESIGN

The research design adopted in this study was qualitative. The research method is mainly literature review, case studies, and site surveys.

I. Literature Review:

Relevant books and journals were read, and online information was used to get insight into tech-hubs, adaptive architecture, and flexible design strategies.

II. Case Studies:

Tech hubs in both domestic and international locations have been analyzed to gain insights into their operations, design characteristics, and obstacles.

III. Site Survey:

A physical and visual examination of the Naira Triangle site at Nnamdi Azikiwe International Airport, Enugu, was carried out to determine the state, access, and environment of the site.

This approach is suitable because the project focuses on design and spatial solutions rather than numerical data.

4.2 DATA NEEDS AND SOURCES

Data Needs

The following information was needed for the study:

- i. Information on tech hubs and their functions

- ii. Design principles for adaptive & flexible buildings
- iii. Work site conditions (site location, climate, accessibility)
- iv. People's needs and activities in tech hubs

Sources of Data

Primary Sources:

- i. Site observation
- ii. Case study with fellow students.

Secondary Sources:

- i. Books
- ii. Academic journals
- iii. Online articles
- iv. Previous research works

4.3 POPULATION OF STUDY AND SAMPLING PROCEDURE

Population of Study

- I. Users of tech hubs (students, developers, entrepreneurs)
- II. Staff and administrators of tech hubs
- III. Visitors and participants in tech-related programs

4.4 METHODS AND INSTRUMENTS FOR DATA COLLECTION

The following methods were used:

- i. Observation Schedule: Doing a physical observation around the existing tech hubs and the project site, kind of like a ground-level check, to see what is already there and how it is set up, then understand the key details.
- ii. Literature Review: Research information from books and the internet.
- iii. Case Study Analysis: Research of selected tech-hubs and understanding their design and operation.

INSTRUMENTS FOR DATA COLLECTION

- I. Notebook and writing materials
- II. Phone camera (for site documentation)
- III. Internet sources

4.5 METHODS OF DATA ANALYSIS

- I. The data collected was analyzed using qualitative methods.
- II. Information from literature and case studies was reviewed and compared
- III. Site data was analyzed based on location, climate, and accessibility
- IV. Findings were interpreted to guide the design decisions

CHAPTER FIVE

DESIGN SYNTHESIS AND DEVELOPMENT

5.0 INTRODUCTION

This chapter is concerned with the synthesis of the research findings, site analysis, and conceptual frameworks discussed in the preceding chapters in order to arrive at a functional architectural solution. It takes the design principles of adaptive and creative tech hubs to the physical level of space arrangements, culminating in the design proposal for the tech hub at Eswama Yard, in the Naira Triangle, Enugu.

5.1 THE DESIGN BRIEF

The design brief requires an adaptive and creative tech hub to be a premier place for digital innovation, learning, and entrepreneurship in the Enugu Metropolis. The space must facilitate different technological activities, including coding bootcamps and/or hardware prototyping. Most significantly, the brief requires the building to be efficient in the context of the infrastructural instability within the area, including the need for passive design elements, natural ventilation, and flexible layouts to cater for rapid technological advances into the future.

5.2 DESIGN REQUIREMENTS FOR ACTIVITIES/PLANNING DATA

The design is a strict adherence to the standard ergonomic and architectural planning data (Neufert Architects' Data) based on the tech hub's operations.

- i. Workspaces and Co-working Zones: 5-7 m² per person of workspace and equipment, ergonomic seating, and circulation area.

- ii. ii. Training Centers: Spatially designed to provide an unobstructed view of the instructor and screens, and flexibility in seating to accommodate lecture and collaborative group work.
- iii. iii. Circulation: Corridors and lobbies need to be wide enough for heavy use, and have to be large enough to accommodate the not-so-planned social space, as well.
- iv. Lighting and Ventilation: Workspaces should be well-lit, with good control of glare to ensure the use of the screens without any hassle, plus cross-ventilation routes to minimize the use of mechanical cooling systems.

5.3 SCHEDULE OF ACCOMMODATION

SITE PLAN:

- i. The principal proposed building is in the middle.
- ii. Designated outdoor canteen area.
- iii. Reserved area to be expanded.
- iv. At the entrance, there is a security post.

GROUND FLOOR:

- i. Central landscaped courtyard serving as a focal point and ventilation core.
- ii. Main entrance lobby and reception area.
- iii. Dedicated Training Centers for skill acquisition.
- iv. A Library for research and quiet study.
- v. Exhibition spaces to showcase tech products and startups.
- vi. Convenience areas (Restrooms) located strategically for easy access.

UPPER FLOOR:

- i. Flexible workspaces and upper lobbies.
- ii. Circulation paths overlooking the central courtyard.
- iii. Additional convenience facilities.

5.4 SPECIAL CONSIDERATION

A couple of special considerations were incorporated into the design as if they had always been there to help achieve the goals of adaptability and infrastructure resilience:

- i. Passive cooling: The thermal chimney is the central open courtyard. It draws in cooler air via those cool radiating wings and pushes the warmer air up and out. This will make air conditioning much less necessary.
- ii. Modular grid: structural system adopted, interior partition walls can be removed relatively easily, which can be replaced or moved in the future as the space requirements of the tech hub evolve.
- iii. Acoustic control: The areas requiring more concentration (such as libraries, coding rooms, etc.) are separated from the bustling co-working areas, and so the acoustic environment remains productive and calmer.

5.5 SITE INVENTORY AND ANALYSIS

The site is located in Eswama Yard in Naira Triangle, a place that looks like it's quite reachable in Enugu Metropolis.

- i. It is situated near some main road corridors, so for both vehicles and people, it's easier to move in here without too much detouring around. This is very much reflected in the site plan, which suggests clear entry and higher-order parking.

- ii. The building orientation will help to move away from direct solar impacts, particularly the longest facades, for the climate aspect. Deep roof overhangs combine with sun-shading devices to protect the large glazed openings from that fierce east and west sun.
- iii. The flat land of the Naira Triangle provides a wide horizontal building footprint, which is the perfect setting for universal accessibility.

5.6 DATA ANALYSIS AND PRESENTATION

The compilation of the theoretical framework and site data directly resulted in the choice of a radial building form. A model of a centralized hub was used, rather than a linear office block. The numbers suggest that tech workers need quiet spaces for themselves, as well as intense collaborative areas. The central node is about community and interaction. Concurrently, the branching wings create separate areas that are individually configured for particular uses such as training, exhibition, research, and the like, without affecting the remainder of the area.

5.7 DESIGN CONCEPT AND DESIGN PROPOSAL

The main architectural idea is the "Radiating Innovation Node".

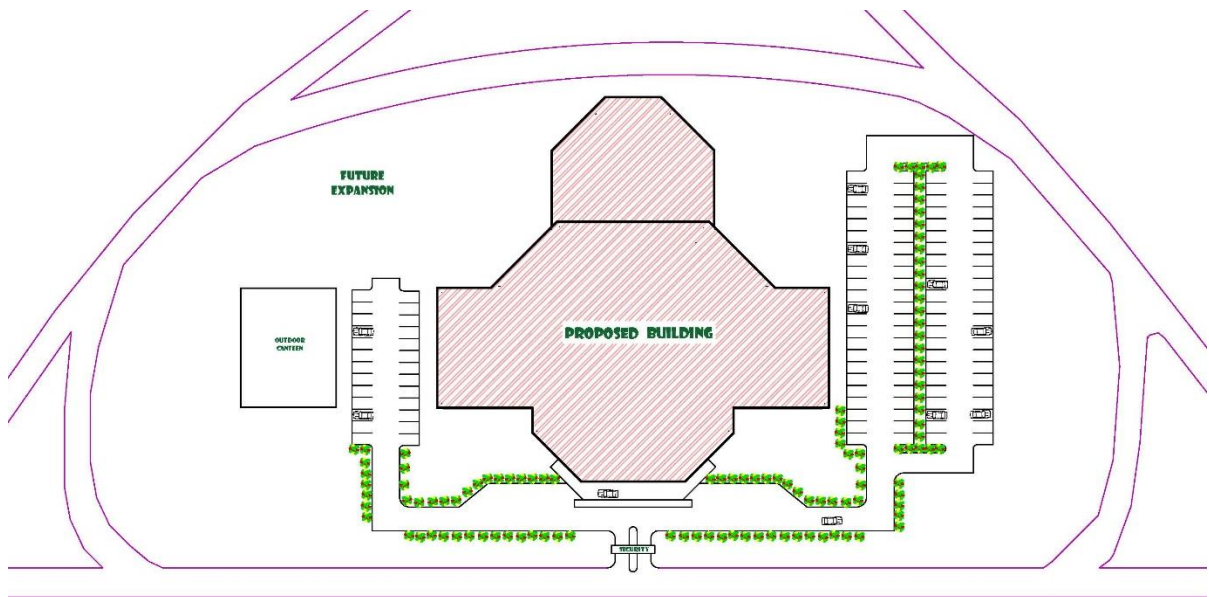
- i. Form and Massing: The building's plan has an octagonal form with radiating wings. This is a geometry that naturally pulls the users towards a common space of meeting - the courtyard/lobby - and spreads them to dedicated areas.
- ii. Creative and Adaptive Integration: The central courtyard is designed to facilitate visual and physical interaction between all users, which contributes to the factor of creativity. Meanwhile, the unique and geometric wings embody the "adaptive" design factors and are used as modules that can be easily reused.

- iii. **Roofing and Elevations:** The building features a prominent complex pitched roof system that covers the radiating wings, which offer good shade and protection from heavy tropical rain. The elevations (Approach, Right, Rear, and Left views) show the use of horizontal strip windows and curtain walls that allow for maximum daylighting and the elimination of the visual barrier between the indoor tech environment and the outdoors.

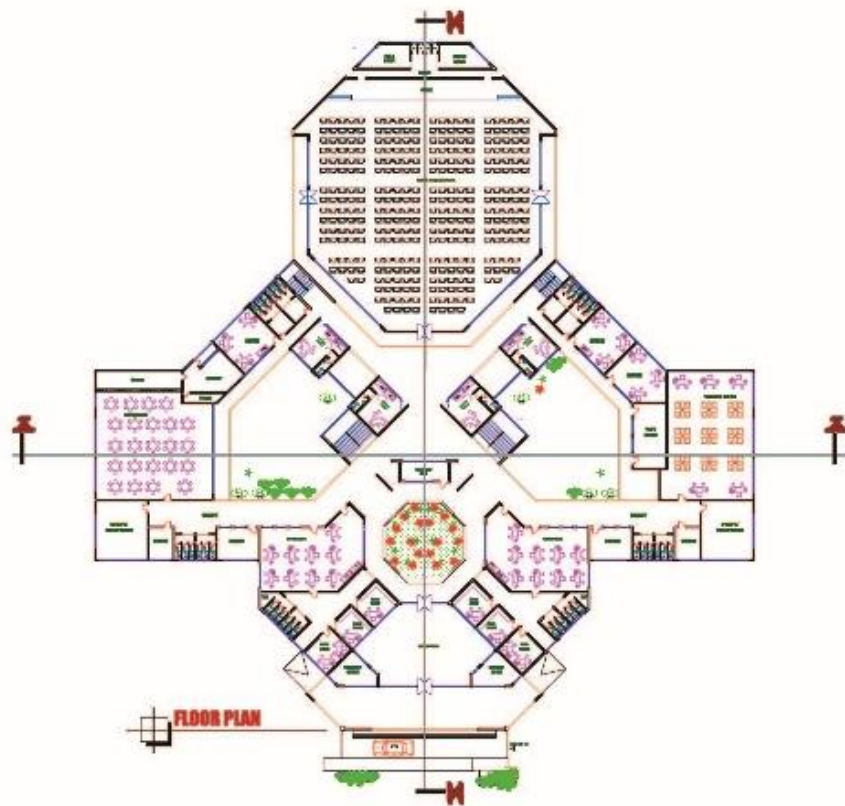
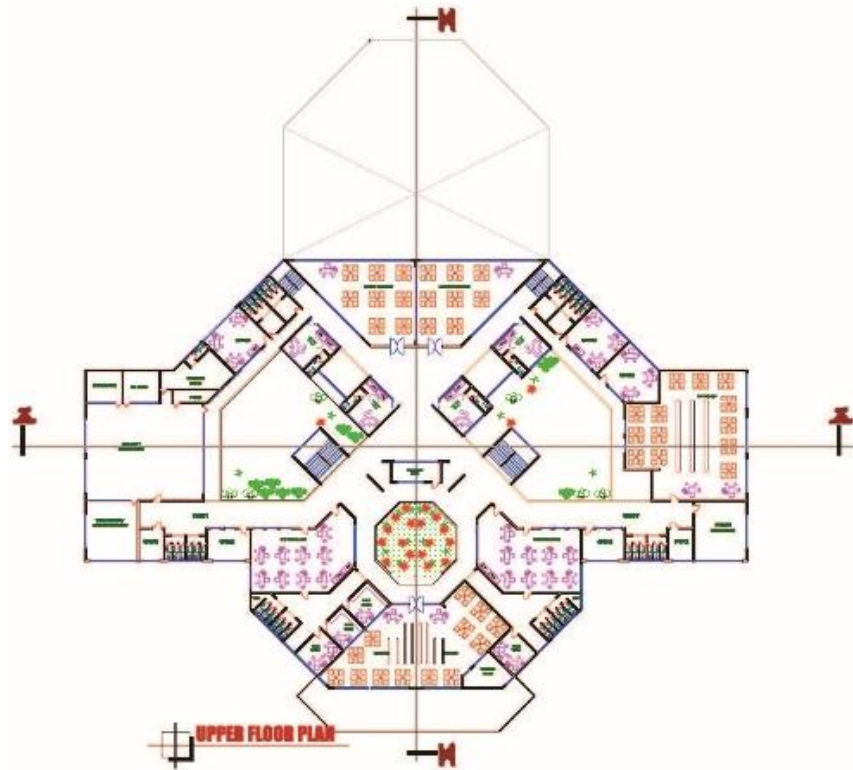
5.8 PRESENTATION DRAWINGS WITH 3D

The final solution is documented in detailed architectural drawings, which illustrate spatial and structural solutions.

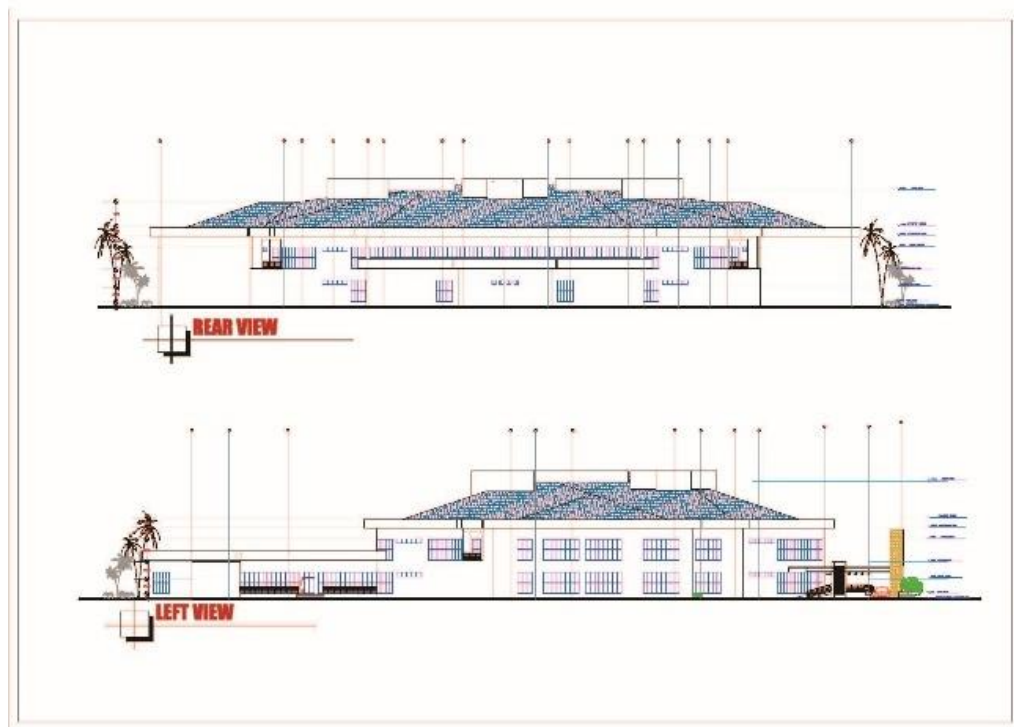
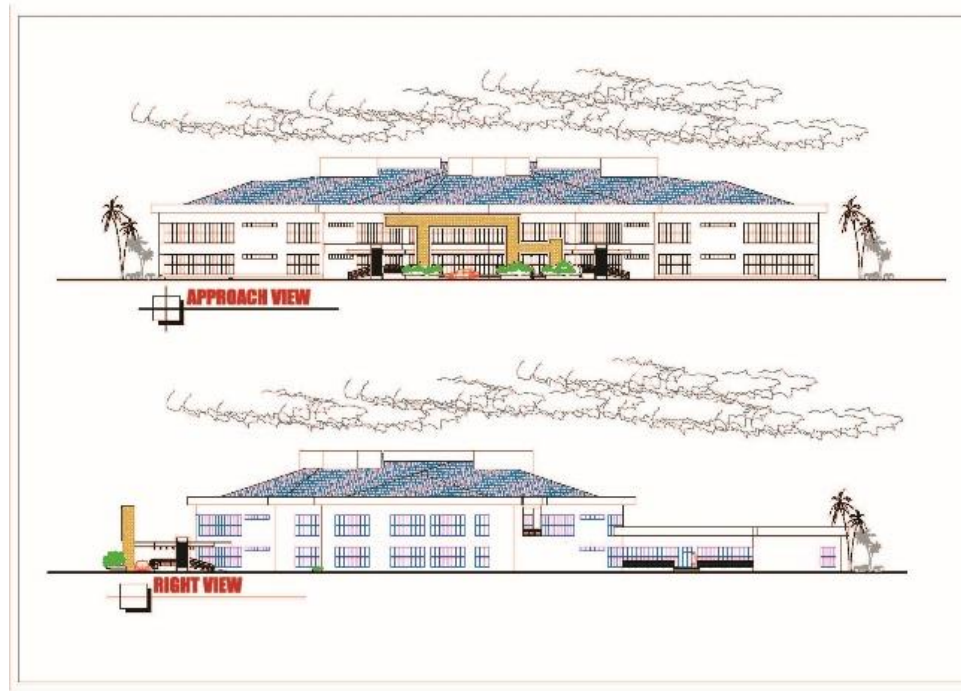
- i. **Site Plan:** Draws a plan of the building site, the outside canteen, secure points, and plans for future expansion.



- ii. **Floor Plans (Ground and Upper):** Provide a description of the interior floor space, such as relationships between the central octagonal courtyard and the connected spaces of the training centers, the library building, the exhibition spaces, and the lobby.



- iii. **Elevations:** The Approach, Rear, Left, and Right views showcase the building's contemporary facade, roof pitch, and fenestration patterns.



- iv. **Sections (X and Y):** Exposes the vertical spatial relationships, really emphasizing the floor-to-ceiling heights, how the central courtyard relates upward to the upper floors, and the structural depth of the roof, because that part feels more “hidden” until you look at it carefully.



CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 INTRODUCTION

This final chapter brings together the results of the research conducted through the literature review, the case studies, and the architectural synthesis. It presents the overall lesson learned from this study, followed by a set of suggestions for how to develop future tech hubs in developing cities, and then a breakdown of how this project contributes to architectural knowledge.

6.1 SUMMARY OF FINDINGS OR MAIN ISSUES

The study on the design considerations of adaptive and creative tech hubs in Enugu Metropolis revealed some very salient issues, architectural and infrastructural, among them include:

- i. The current tech spaces in Enugu are encountering serious practical issues due to the poor reliability of the power grid as well as the relatively high operating costs, particularly in mechanical cooling. If you do not put alternative energy in place, the standard buildings just struggle to sustain the steady operations that tech-driven work actually needs.
- ii. Fixed Static Spaces: The rigid architecture leads to early obsolescence. Many of the building typologies that are currently accommodating technology initiatives are still built in static, fixed spatial structures. These same layouts are difficult to adapt to the quick evolution of technology, as well as changing user requirements, and thus lead to expensive changes or to early obsolescence, as Kronenburg (2007) states.
- iii. Comprehensively, digital creativity relies heavily on intentional spatial factors, as detailed by Tranos and Nijkamp (2013): Creative innovation relies on sharing, social mixing, and inter-disciplinary cooperation within spatial environments. Elsewhere, with no open-plan

layouts, transparency, and such-that meeting pockets (courtyards or lounges, for example), collaborative innovation on the whole gets slowed or even blocked.

- iv. Strong urban connectivity: Naira Triangle (Eswama Yard) is a strategic location with strong urban connectivity. However, in order to optimize the use of such a site, the design must respond naturally to the tropical climate of the site, particularly in terms of solar orientation and cross-ventilation. Concurrently, the land should be conserved for future development of physical expansion.

6.2 CONCLUSION

The study leaves it to the conclusion that an effective tech hub in Enugu Metropolis must be designed within an integrated architectural framework that must also give consideration to the creative spatial factors, as well as the adaptive structural systems.

Naira Triangle's design, which places the center of its design at Eswama Yard, showcases that in areas where infrastructural deficits pose difficulties, resilience in architecture can be achieved. The solution created by the proposal is based on the radial-pod design of a multi-wing structure focused on a green garden courtyard, which addresses the challenges. It serves the creative need as an open collaborative software mixing place for developers, entrepreneurs, and designers. At the same time, the radiating wings, housing the training centers, exhibition halls, and workspaces, integrate adaptive design features like flexible partition systems and modular planning grids.

The Eswama Yard tech hub, for instance, can break off from the local infrastructure's shortcomings, thanks to its passive cooling system in the central thermal courtyard, its large daylighting system via strip windows, and the solar energy systems on the pitched roof structures.

The building is more than just a structure; it is a future-proof and flexible innovation hub capable of rising to the challenges of the digital economy in Enugu.

6.3 RECOMMENDATIONS

The following recommendations are made based on the results of research and design synthesis:

- i. Passive-First Design should be the first consideration for Architects designing Public and technological buildings in developing cities before mechanical HVAC design elements, such as Building orientation, Courtyard thermal chimneys, Solar protection, etc.
- ii. Modular Interior Frameworks: Implementing, Avoid fixed load-bearing internal walls in collaborative areas within the developers and tech hub administrations. Rather, they should rely on modular, raised-floor gridding and mobile acoustical partitions for the ability to easily reconfigure as technology changes and costs come down.
- iii. Decentralized Renewable Energy Policies: Urban planners and government authorities in Enugu State must make it mandatory for public innovation centers to adopt decentralized renewable energy systems (like solar PV arrays) as the main power source and not as standby power systems.
- iv. Incorporation of Landscaped Outdoor Zone for Collaborations: Future tech hubs need to include landscaped outdoor collaboration areas, including an outdoor canteen and courtyard, as suggested in this scheme, which can help foster well-being, informal networking, and natural air flow.

6.4 CONTRIBUTION TO KNOWLEDGE

The present study has a significant theoretical and practical contribution to the subject of architectural design:

- i. Contextualizing Adaptive Architecture in Southeastern Nigeria: Adaptive architecture is very well documented in Western Climate Zone (WCZ) Countries (such as in Canada), but in this study, the theories of architectural adaptability are contextualized in the socio-economic and infrastructural realities of Enugu Metropolis.
- ii. Synthesis of Creative and Adaptive Design Factors: This study connects two disciplines of spatial psychology (creative hubs) with structural resilience (adaptive architecture) and thereby creates a single design typology that addresses both user requirements for collaboration and infrastructure shortages.
- iii. This architectural design proposal, Eswama Yard, is a prototype for developing urban centers that can be replicated in other developing countries that are experiencing similar urban challenges and need to build youth empowerment and technology centers.

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