You are All Highly Welcome to this presentation on Green Buildings

By

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Adopting Green Building Concepts In Housing Estate Development Projects In Abuja F.C.T., Nigeria: Exploring The Potentialities Of End-Users' Preferences.

W S B E

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H O N G   K O N G

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PRESENTATION OUT LINE

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INTRODUCTION - Background to the study

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➢ Housing conditions vs effects on the built environment.

➢ The need for modern infrastructure for present and the future.

➢ Population growth accompanied by massive resource consumption.

➢ These challenges gave birth to a new concept in design, construction / renovation, operation and maintenance of buildings in conformity with sustainable practices known as

Green Buildings

INTRODUCTION - Background to the study

➤ The relocation of various headquarters of Major corporations, banks, companies and businesses to Abuja FCT,

➤ further compounded the housing challenges for the end-users with the need for high taste and or high-end housing Estate developments in Abuja FCT;

➤ specifically houses with features that add to user comfort ability and save running costs etc. such feature are common in green building projects.

INTRODUCTION - Research Problem

- The problems of housing supply in meeting the ever increasing housing demand

- Over the years, many housing estates were developed by PPP in the Abuja FCT, But:

  - Were insufficient in terms of demands;

  - Do not reflect the desired housing needs of the end-users;

  - In most cases affordable but not qualitative;

  - Do not possess green building features;

  - Affected by insufficient electricity (power) and water supply for residential consumption

INTRODUCTION - Research Problem

➢ It is evident from some developers' attitudes, as they are not fully inclined towards constructing such projects due to:

➢ lack of comprehensive data about the financial obligations with regards to Incorporating green features into renovation or proposed projects,

➢ Premiums,

➢ Marketability,

➢ Ratings,

➢ Cost of renting, Operating and Recurrent costs,

➢ Cost – benefit from envisage energy and water savings

INTRODUCTION - Research Problem

➢ Incorporating green building features / elements are basically at the developer's disposal and may have a significant impact on the total development cost which in turn affects End-users / occupants in terms of:

- Rental value,

- Sales value,

- Envisaged savings due to green elements,

- Future asset value of the green building etc.

# INTRODUCTION - Research Aim

The aim of this paper is to:

Explore, ➤ **Potentialities,** ➤ **End-Users** ➤

preferences in adopting **GREEN BUILDING** concepts in housing estate development projects in Abuja F.C.T., Nigeria.

INTRODUCTION - Hypotheses

➢ **Null hypothesis (HO);** End-users preferences ***does not have*** any potential impact in adopting green building concepts in housing estate development projects in Abuja F.C.T., Nigeria.

➢ **Alternative hypothesis (HA);** End-users preferences **have** potential impact in adopting green building concepts in housing estate development projects in Abuja F.C.T., Nigeria.

RESEARCH METHODOLOGY
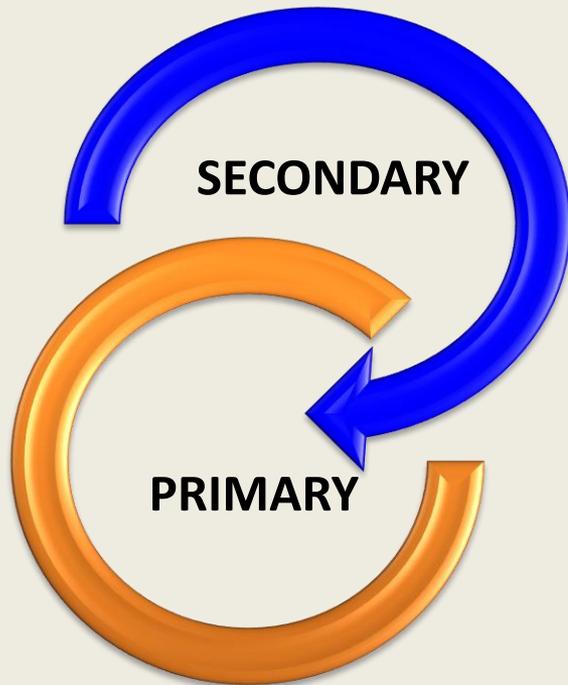
- ➤ *Secondary sources* of data such as journals, conference / seminar / workshop papers, text books, newspapers, magazines and internet sources etc. were used to review literatures the green building field which helps identify and narrow few environmentally sustainable passive and active elements in the particular context of Abuja, Nigeria.

- ➤ These identified Features form the main body of the Questionnaire.

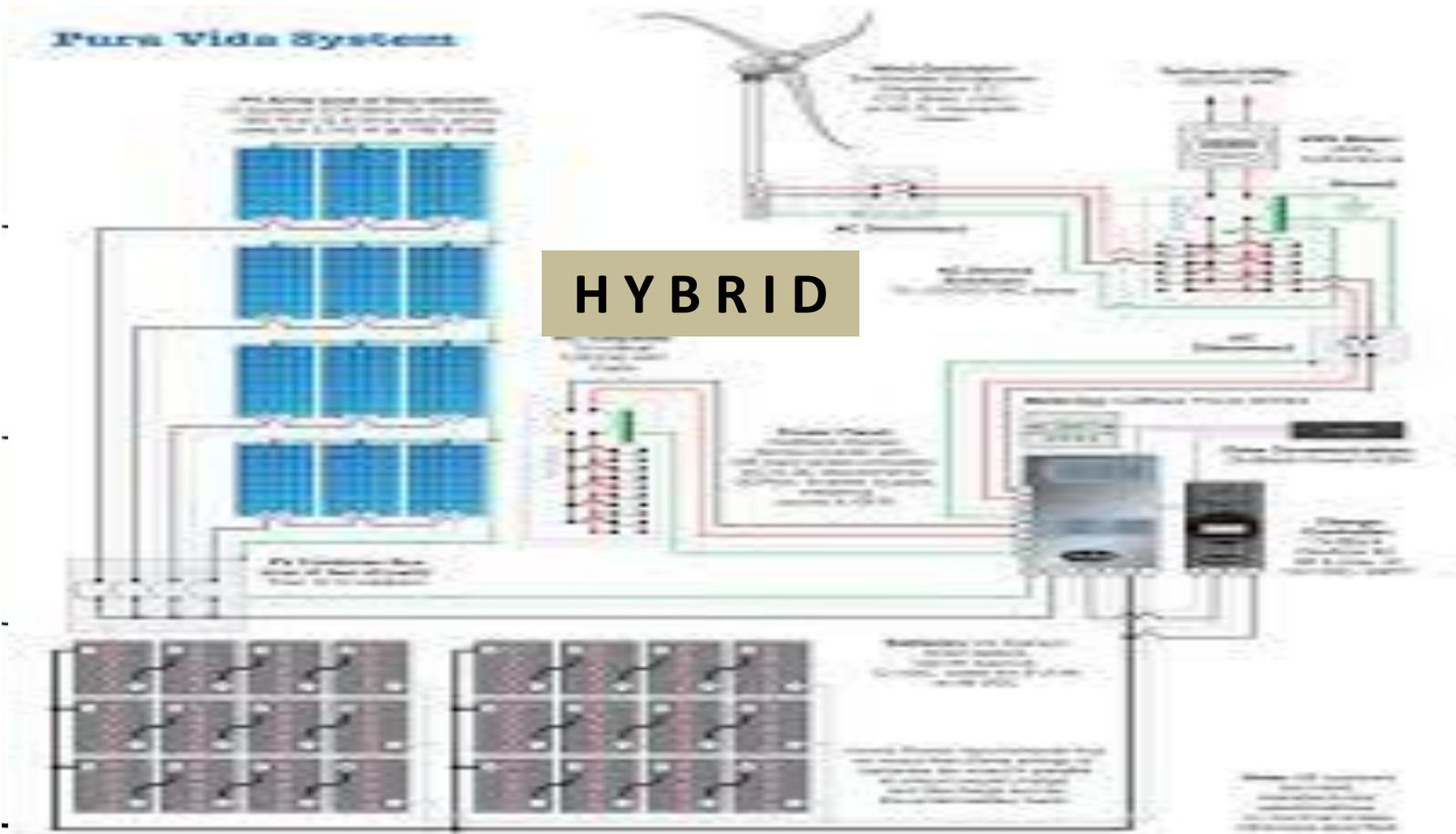| Identify | Questionnaire | Likert Scale | Project Professionals |
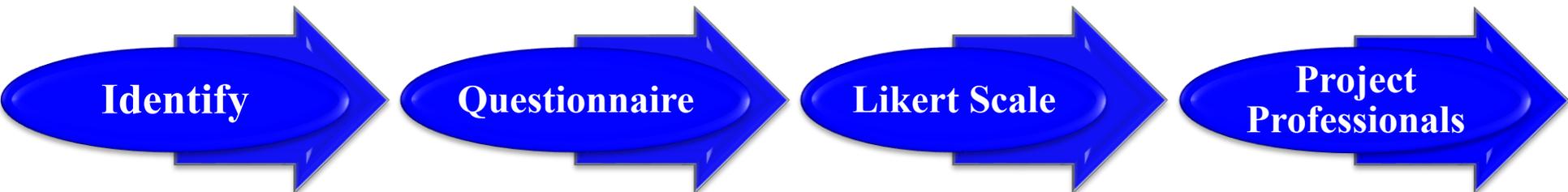
LITERATURE REVIEW

The Green building elements and features considered in this work are limited to the following:

☐ Energy Efficiency systems

☐ Water Efficiency systems

☐ Day Lighting systems

☐ Indoor Environmental Quality (IEQ) systems.

☐ The Building Envelope
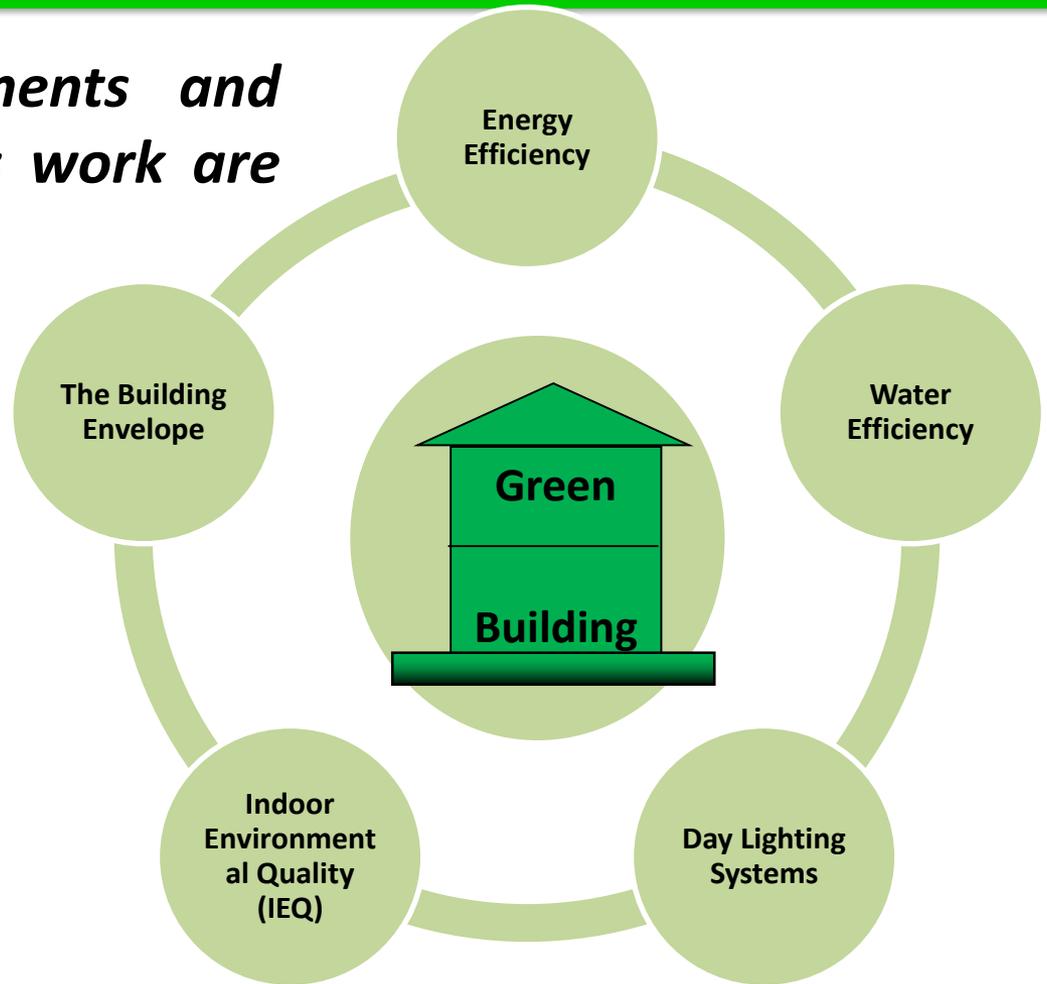
Solar panels Wind turbines DC Inverters Solar-water-heaters

H Y B R I D

LITERATURE REVIEW - WATER EFFICIENCY SYSTEMS

Grey & Black Water Systems

Water use in a home with a grey water system

grey water reuse system

treated grey water

wastewater to sewer

Water Conserving Appliances and Technologies

40%

60%

Rainwater Harvest

DAY LIGHTING - Clerestories

❑Day lighting is achieved through the use of Clerestories
(Side, Top and Skylights)

DAY LIGHTING- SWITCHABLE GLAZING

❑SPECTRAL GLAZING   e.g. PHOTO CHROMIC GLAZING

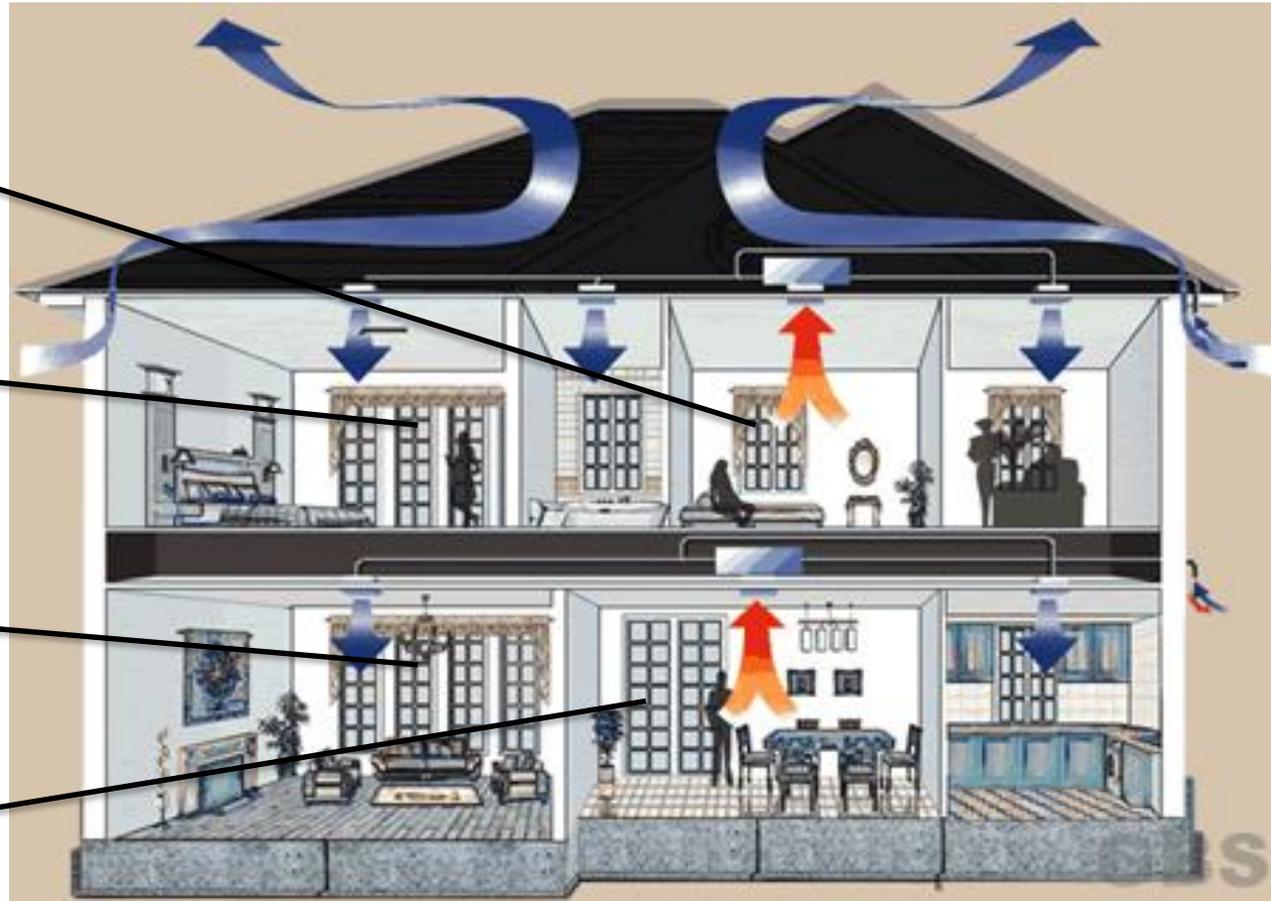# DAY LIGHTING- SOLAR TUBES

Indoor Environmental Quality (IEQ)

❑ People spend up to 90% of their time indoors.

Indoor Air Quality

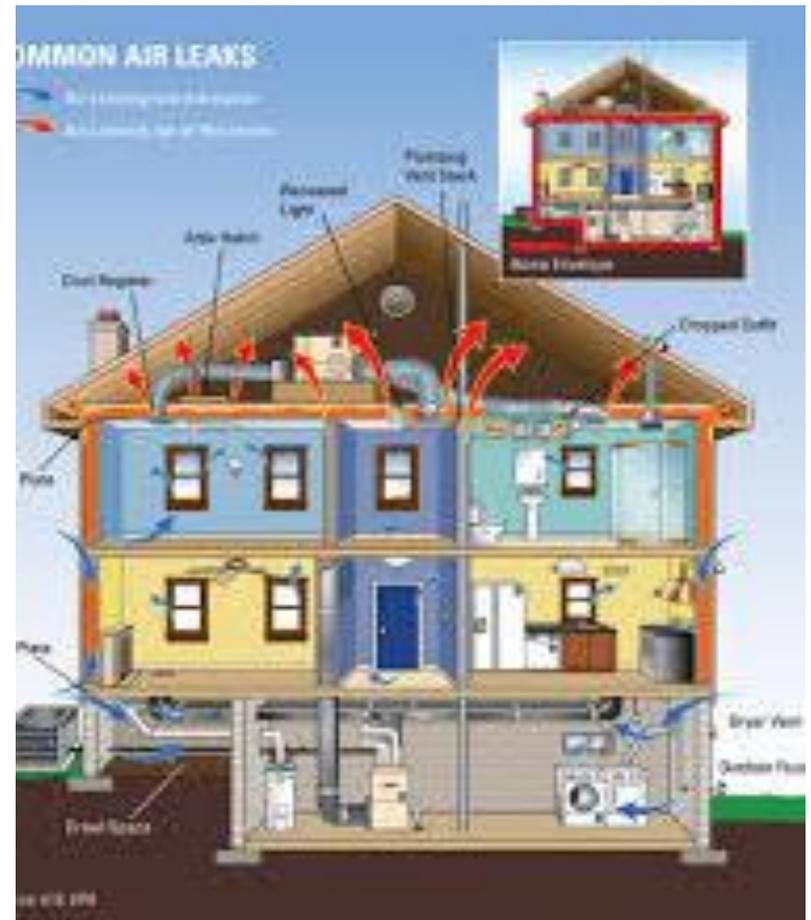**Lighting (N&A)**

Thermal Comfort

Acoustics

Cumulatively they increase Comfort and productivity.

BUILDING ENVELOPE

❑ It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control.
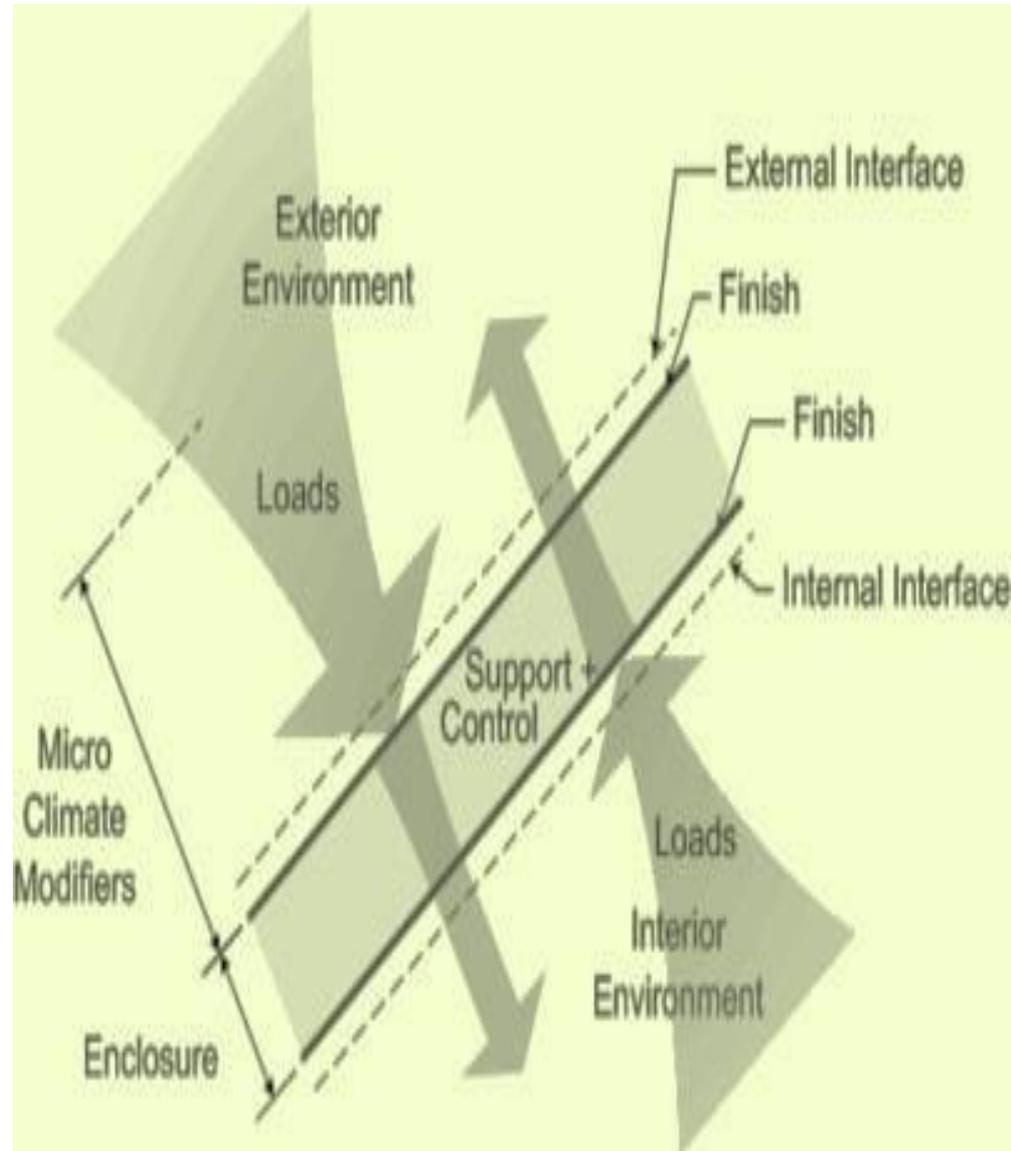
BUILDING ENVELOPE

The envelope must balance requirements for:

- ☐ Ventilation
- ☐ Daylight
- ☐ Thermal and moisture protection

appropriate to the climatic conditions of the site.

PRESENTATION OF DATA AND ANALYSES

Questionnaires	End-users		Developers	
	Frequency	Percentage	Frequency	Percentage
Returned & Usable	500	71.43%	20	71.43%
Non-Returned	192	27.43%	8	28.57%
In-complete	8	1.14%	0	0%
Total of Questionnaire Administered	700		28	

PRESENTATION OF DATA AND ANALYSES

To ascertain the end-users' preferences of green building features a 5-point Likert scale was used as follows:

- ➢ Highly preferable=5,

- ➢ Preferable=4,

- ➢ Neutral / Undecided=3,

- ➢ Less Preferable=2, and

- ➢ not preferable at all=1

The Mean Item Scores was computed for Remark and to Ascertain Whether it is Adoptable or not

PRESENTATION OF DATA AND ANALYSES

GREEN BUILDING FEATURES	Mean Item Score for End-users	Mean Item Score for Developers	Remark
Energy Efficiency			
Solar panels	4.79	5	*Adoptable*
Wind turbines	3.09	1	*Not Adoptable*
DC Inverters	4.82	4.1	*Adoptable*
Solar-water-heaters	4.5	3.6	*Adoptable*

PRESENTATION OF DATA AND ANALYSES

GREEN BUILDING FEATURES	Mean Item Score for End-users	Mean Item Score for Developers	Remark
Water Efficiency			
Grey & Black water systems	**2.72**	**2.35**	***Not Adoptable***
Water saving appliances	**4.98**	**4.8**	***Adoptable***
Rainwater harvest	**4.85**	**4.25**	***Adoptable***

PRESENTATION OF DATA AND ANALYSES

GREEN BUILDING FEATURES	Mean Item Score for End-users	Mean Item Score for Developers	Remark
Day light			
Clerestories	**4.16**	**4.4**	*Adoptable*
Spectral Glazing	**3.12**	**2.9**	*Not Adoptable*
Solar-tubes	**4.14**	**4.7**	*Adoptable*

PRESENTATION OF DATA AND ANALYSES

GREEN BUILDING FEATURES	Mean Item Score for End-users	Mean Item Score for Developers	Remark
Indoor Environmental Quality			
Indoor Air Quality	**4.6**	**4.7**	*Adoptable*
Accoustics	**4.73**	**4.85**	*Adoptable*
Adequate Lighting (Artificial-lighting+Nat Lighting)	**4.33**	**4.5**	*Adoptable*

PRESENTATION OF DATA AND ANALYSES

GREEN BUILDING FEATURES	Mean Item Score for End-users	Mean Item Score for Developers	Remark
Building Envelope	3.62	3	*can be Adoptable*

PRESENTATION OF DATA AND ANALYSES

Hypotheses Testing

STAKE HOLDERS	MEAN	STANDARD DEVIATION	N	D F	Tcal	$Ttab_{0.05,\ 13}$	Decision
1. END-USERS	4.17	0.72	14	13	6.10	-1.77	Reject Ho, Accept H_A
2. DEVELOPERS	3.87	1.17	14	13	0.199	-1.77	Reject Ho, Accept H_A

With 13 degrees of freedom (DF) and 5% level of significance each, the T-test tabulated ($Ttab_{0.05,\ 13} = -1.77$) is less than T-test calculated for both the end-users and the Developers; as such, the **Alternative hypothesis was accepted**; which states that **"End-users preferences have potential impact in adopting green building concepts in housing estate development projects in Abuja F.C.T., Nigeria".**

CONCLUSIONS

➢ From the limited green building features used in this study, it can be observed that both the developers and the End-users

- *Highly preferred,*

- *preferred,*

- *remain neutral and*

- *Less preferred and on certain green building features in terms of their Preferences and interests in estate development projects in Abuja.*

➢ This affirms that both shared almost the same preferences regarding the features of green buildings; which is further attested by the T- statistical test by accepting the Alternative hypothesis.

CONCLUSIONS

The following features as shown in table above can align the interests of both the stake holders since they were preferred by the end-users and are adoptable by the Developers:

➢ Solar panels**,** DC Inverters and Solar-water-heaters under ***Energy Efficiency systems.***

➢ Water saving appliances and Rainwater harvest under ***Water Efficiency systems***

➢ Clerestories and the use of solar tubes under *Day-lighting strategies.*

➢ Indoor air quality, Acoustics and Adequate Lighting (Artificial lighting + Natural Lighting) under ***Indoor Environmental Quality.***

➢ The End users are in between "neutral/undecided" and "agree" regarding ***Building envelope*** whereas, The Developers' are "neutral/undecided". This indicates that **Building envelope can also be adoptable.**

RECOMMENDATION

- Estate Developers in Abuja (including other cities in West Africa, the Whole African continent and the world at large) need to conduct or sponsor a lot of researches frequently on **end-users requirements, preferences choices**, **operability**, and **additional needs in terms of qualitative** or high end housing especially **Green buildings.**

- This will expose features that will enhance the market value of the housing estates.

- Other **green building features/components/elements** should also be considered and researched on, so as to expose many **features that may align the interests of both stakeholders**

NAGODE, MIYETTI

谢 谢

THANK YOU

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GREEN BUILDING IS THE FUTURE FOR CONSTRUCTION &

ENVIRONMENTAL

SUSTAINABILITY

GREEN GLOWS & GROWS