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It has taken quite a long time in coming up with this edition of the NIAJ - this is highly regretted. This has been due to lots of challenges: ranging from the policy direction to take for this and future editions of the journal, production challenges and legal issues together with issues of how to make the journal self-sustaining. For this edition and future ones, we have come up with a new peer-review structure based on specialisation, which meets best practice.

The future of this journal is based on both theory (academic) and practice-based papers, with the academic being mostly review papers, qualitative and quantitative researches. The practice-based papers on the other hand, are based on as-built designs, supervision undertaken and post project assessments. This notwithstanding, overlaps are envisaged and will be assessed as they arise on their own merits. It is hoped that these will result in *'performance based'* architecture, which is the amalgamation of the two – theory (academic research) and practice.

In this edition, various theory papers are presented on architectural education, urbanisation, housing, building materials, building types, research methodology, and interestingly on day lighting. To some extent, a look into practice from an academician is also included.

In conclusion, it is hoped that in subsequent editions, practice-based papers and reports should make up at least forty percent of the papers published, which will not only serve as encouragement to our upcoming architects in practice, but also to encourage the *'performance-based'* architecture espoused the world over.

Thank you very much

TEXT OF NIA PRESIDENT'S GOODWILL MESSAGE TO THE 26TM ARCHIBUILT HOLDING AT LADI KWALI HALL, SHERATON HOTEL-ABUJA BETWEEN 17TM-21ST AUGUST, 2015



I am greatly delighted by the commendable results of efforts put towards hosting the 2015 edition of Archibuilt. I note with interest the build up on the gains of 2014 and the unique opportunity to further explore the apt theme: **'Solutions for everyday living'**.

As the nation frontally confronts rebuilding, the theme is a harbinger of great and desirable beginning. It is not only comprehensive but specific and practical. The Institute by focusing on 'Everyday Living' and seeking solutions (not quick fixes) has once again demonstrated foresight and

African Union of Architects (AUA) held her Congress between Thursday 6^{*} August and Friday 7^{*} August, 2015 at the Speke Resort Hotel, Kampala, Uganda. The members of the AUA Executive Council for 2015 - 2018 is listed below:

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Vice President (East)	Eudes Kayumba	-Kenya
with 3 Council members		
Vice President (South)	Claudien Mulimilwa	-
with 3 Council members		
Vice President (North)	Nabir Ghaly	-Egypt
with 3 Council members		
Vice President (Central)	Victor Miquel	-Angola

commitment to concrete nation building.

The content and worth of every man is dependent, defined and developed by each day's living. It is therefore comforting and commendable that we are concerned and determined to highlight challenges and sustainable solutions.

The present situation in the country is ideal for identification of what the best 'daily living' should be and the development of sustainable and culturally relevant solution(s). It is my greatest desire that each exhibitor and visitor will consciously explore and constructively analyze the products and services and jointly or individually proffer enhanced solutions that will not only transform our ways and processes but that, will lead to concrete economic, emotional and socio-cultural advancements.

By vibrant exchanges of ideas and ideals today and throughout the events the efforts of the Archibuilt Board, Archibuilt Team, our esteemed partners/ exhibitors and visitors would have been adequately rewarded.

Thank you all.

Arc Waheed Niyi Brimmo,
fhia President, Nigerian Institute of Architects

with 3 Council members

Chairman, Board of Education Research and Technology (BERT) Hoda Masery

Commonwealth Association of Architects (CAA) / RIBA organized Designing City Resilience Summit and the 21st General Assembly in London between 15^{*} and 19^{*} June, 2015.

The CAA's 50th Anniversary was commemorated by joining forces with Royal Institute British Architects (RIBA) to organize the inaugural Designing City Resilience summit. This global event aimed to lead the way in improving the understanding of resilience and in promoting closer collaboration between the many different professions involved in its delivery in urban environments.

The Honorary Secretary General, Arc Ibrahim Sani Khalil and Arc Folu Bademosi (Chair, International Affairs) were the official representatives of NIA. The duo led the delegation of 35 members to the summit and the General Assembly.

CITY RESILIENCE SUMMIT (16^{*} and 17^{*} June, 2015)
A 2-day event which was programmed to inform

participants on the latest resilient thinking also encouraged interaction.

City resilience describes the capacity of cities to function, so that the people who live and work there – particularly the poor and vulnerable – survive and thrive no matter the encountered stresses or shocks.

Cities from all over the world were invited to discuss the issues they face in the City Resilience Challenge workshop; the cities that have existed for centuries have demonstrated their resilience in the face of resource shortages, natural hazards, and conflict. The cities spotlighted taught us that urban design is no more kept a mere luxury, but had created resilience strategies to be implemented around the world, helping cities become more resilient to the challenges of urbanization, climate change and natural disaster.

The summit was rounded off with Election Court Dinner of the Worshipful Company of Chartered Architects

GENERALASSEMBLY

The 21st General Assembly of Commonwealth Association of Architects (CAA) held at the council chamber of Royal Institute of Architects (RIBA) on 18th June 2015 with Arc Ibrahim Sani Khali and Arc Folu Bademosi representing the Institute, Arc Mansur Ahmadu, the CAA Chair of Education and Council member and the Executive Secretary, Arc Abdulkarim Abdulrahim, as an observer.

The highlights of the meeting included;

- 1- Website - www.caalist.com - Specialist Architect Listing for architects of not less than 10 years' experience - was formally launched with one representative of member bodies standing together to signal the launch. The listing will cost \$50 annually but free listing until December 2015. Member bodies are to confirm the membership and financial status before listing any architect on the website.
- 2- Memorandum of Understanding between CAA and ACE, also RIBA and CAA on various relationships for capacity building for member institute, promotional services which will provide endorsement for national events of member organizations.
- 3- Presentation by the Chair of Communication on the CAA E-Journal and interactions on Facebook which will further enhance effective communication within the membership
- 4- Establishment of the following Work Groups for which nominations will be requested from the regions :
 - a. Designing City Resilience
 - b. Socially Responsible Architecture
 - c. Sustainability
 - d. Education
- 5- CAA Validation-A presentation supporting the future of CAA validation by the validation panel executive committee (ExCom) requested that the General Assembly of CAA endorse the following

recommendations;

- a. Note the Validation Briefing Document
- b. Recognise CAA Direct Validation as a core CAA activity and support the development of a business plan based on one of the options outlined
- c. Support the proposal to discontinue CAA Systems Recognition
- d. Mandate Council to convert the Validation Executive Committee (ExCom) to the Validation Committee whose Chair sits on CAA Council

The aftermath of the presentation was the request of the ExCom to resign the assignment and members after deliberations agreed that CAA validation must continue and that the General Assembly needed to provide direction to the CAA Council

- 6- National Building Specification & BIM tool kits – A presentation by Richard Waterhouse CEO, RIBA Enterprise on Building Information Modeling stating that there is a Digital Plan of Work (DPoW) to provide the resources, support and solutions in construction information management products from contract administration tools to full building and engineering specification. Visit www.bimtaskgroup.com, www.thenbs.com
- 7- Constitution Amendment – The incoming President presented the proposed amendment in the CAA constitution for discussion and approval of the General Assembly, it was however stepped down until further study is made by members, hard copies were handed to members and this will be considered at a later meeting.
- 8- There will be a regional conference in November 2015 at Malta Europe.

Elections

The election of the next Executive Council of CAA (2016 – 2019) went smoothly and the position of Vice President (Alternate) Africa Region was taken by Nigeria for which nomination is expected from NIA.

Arc Vincent Cassar from Malta is the New President. The new Council will be in place from 2016.

Conclusion

NIA is back in the reckoning of CAA with effective communication established between the secretariats of CAA and NIA; it will be a short while to derive all membership benefits for our members, schools and students.

We will continue to participate in the activities of CAA.



(INTERNATIONAL AFFAIRS COMMITTEE COUNCIL REPORT NO.04)

His Excellency, Arc (Dr.) Alex I Ekwueme, GCON, ppnia, parcon, on arrival for the first NIA Distinguished Lecture series held on Thursday 30^h April, 2015 at Shehu Musa Yar' Ardua Centre, Abuja. Arc G Y Aduku, ppnia looked on as Arc Ibrahim Haruna, ppnia shook hand with the Lecturer and Arc C O.Oiji, fhia waited for his turn.

The Distinguished Lecture Series according to Arc Waheed Niyi Brimmo, the current NIA President, was borne out of great commitment of the Institute to raise debates on key issues affecting the nation's built environment and proffer workable and sustainable solutions that will enhance our environment, create national identity, develop human capacity and address the alarming unemployment. The high profile annual lecture to be delivered by Past Presidents of the Institute is meant to kick-start activities of each year (preferably not later than February). The national political activities including elections this year led to its shifting to April.

The lecture series aims to project architectural perspectives of critical local, national and international issues and challenges, promote advocacies that project architecture and architects, create requisite rapport with policy makers and patrons of architecture .celebrate the Institute's collective history , encourage necessary bonding across generations and classes of members.

Arc (Dr.) Alex Ifeanyichukwu Ekwueme, GCON, ppnia who was the second President of the Institute between 1967 and 1968 and Vice-President of the Federal Republic of Nigeria between 1979 and 1984 delivered the first lecture titled ARCHITECTURE, MANAGEMENT AND PARTICIPATION OF ARCHITECTS IN NIGERIA'S POLITICAL PROCESS.

Arc Ekwueme, a founding member of the Institute, founded one of the first wholly indigenous firms of architects which arguably became the biggest in Africa before he assumed office as the Vice-President of Nigeria. He is a political titan and accomplished Architect. The well attended event featured presentation of his works and was preceded on Wednesday 29th April by the Institute's Executive Council Meeting and Pre-Lecture Cocktail.

'Appropriate materials positively eliminate maintenance cost'

(Extract from text of Interview of Arc Waheed Niyi Brimmo, pnia published in The Guardian, Monday April 6, 2006, pp30-31)

There has also been a call for the development of low cost housing in the country, what is your organization doing to ensure affordable housing, especially in creating low cost designs?

I am delighted you mentioned low cost design. I want design underlined. In the 80s the Institute made designs

available especially for those who could not patronize Architects as the devastating effect of lack of design began to be visible in the emerging urbanscapes. The rest is history and the results are staring us in the face. Some of our members have in research or practice made bold initiatives. However, as an Institute, we are willing to make available up to date and culturally-relevant solutions when approached with sincerity of purpose and determination for success by governments, her parastatals, corporate organizations or communities.

Annually we organize expositions on building materials, components, equipment and processes with emphasis on local content and capacity-building. Through this we bring manufacturers, importers, contractors, researchers, investors, developers, architects and other consultants together to exchange ideas. This always translates to better understanding of materials and methods and ultimately design decisions are influenced leading to cost effectiveness. We are concerned with holistic concept of cost. For example appropriate selection of materials positively enhances lifespan and eliminates or reduces maintenance costs.

Our Continuous Professional Development Programs also include green designs/ sustainability and energy issues, development and application of new materials, application of new software that reduces design period and improve accuracy among other benefits. All these are key cost reduction factors.

How will you assess the synergy existing between the NIA and its Africa's architect's body and other sister organizations all over the world?

You are talking about African Union of Architects first and of course Commonwealth Association of Architects (CAA) and International Union of Architects (UIA).NIA is an active member of all these bodies. We are represented on their working groups/ committees and attend their general assemblies. Notwithstanding our independence as an institute we operate charters/ accords that are binding on members. It will interest you that at one time or the other our members have occupied high positions even as President in each of these bodies.. So there is the goodwill generously extended to us. Last November we were at the UIA Congress and in June we will be in London to participate in the General assembly and Conference which incidentally is the 50th anniversary of the association.

Looking at real estate agents today in Nigeria, what are the challenges that your association has identified and what are you are doing to face such challenges?

The greatest challenge is the non-recognition of the roles architecture must play from design conception to project execution. This is the principal reason why quality worsens while cost increases! Economy of means and margin of profits undermine best decisions. There is the

false believe in anything foreign is good or capital 'gift' or loan is development.

What we are doing is to insist that the right thing must be done and the right professional be employed from the seemingly small project to the multi-billion dollar (or naira) project.

Your organization has been talking about non-professionals handling your job, especially, draughtsmen. What are you doing to check their excesses?

It is important to make clear that whenever a draughtsman provides architectural services that is quackery. His limitation is to draw (draught) designs made by Architects. He has no capacity to design as he has neither gone through requisite training nor through 'licensing'. It is the Architect that is trained to design, draw and ensure the realisation of the design idea. The word design encompasses many things that most people who patronize draughtsmen do not understand desire or appreciate. The criticality of that ability explains the duration of formal instructions in schools of architecture and the compulsory period of pupillage and certification.

We have a three-pronged approach, 3Es, Enlightenment, Enforcement and Enhancement.

- 1) Enlightenment is targeted at the Clients (private, corporate and government). They need to know that patronizing quacks constitute a dangerous gamble with hard earned resources even life and a willful destruction of our built environment. The best of their services keeps their clients short changed.
- 2) Enforcement of the relevant laws through diverse legal means in concert with the regulatory organ Architects Registration Council of Nigeria (ARCON).
- 3) Enhancement is targeted at members. We encourage every member to constantly ensure that all services are best and timely.

As a follow-up to the above question, what are you doing to ensure that they fill their professional or technical deficiencies in a way that they would still remain in market?

You may clarify their job description before an informed advice can be given on deficiencies. I do not understand the desirability of their remaining in the market as they are not legally permitted in the field where they currently operate. The society need to be properly informed and guided to completely eliminate the menace. Any one desirous of becoming an architect should follow the universal laid down procedure.

Those who are CADD literate can seek employment in Architects' offices from where they absconded.

In other climes, architects as specifiers are the project managers. Here it is quite different. What is happening in the housing industry or is it how it has been structured?

Many current players in housing industry are business men, some driven by greed. Take time to critically assess the products and you will be able to differentiate the camps. Common sense dictates that the best interpreter of an idea is its owner. Of course, for some decades now professional 'fractionalization' and triumph of timelines and 'profitism' have propped up Project Management. It has its benefits where the architect is given his due roles. You should note however that increasing number of Project Managers had qualified first as architects.

NIA has been in existence for some time now, what will make your regime stand out from your predecessor?

In all modesty the way NIA is structured it is difficult to arrogate some developments to oneself. Some successes of today might have been in the pipeline for some time. I have tried to touch all areas of the Institute's activities in fulfillment of our vision to mobilize informed membership. However I have been greatly concerned with increasing reasonably memberships in all categories and the number of Chapters on one hand and improvement of members' welfare and sense of belonging on the other. All these require maintaining focus, mutual respect and co-operation in the Executive Committee and the Strategic Committee and proper functioning of the Secretariat.

Your first question touched on influencing government policies. Right? I have proposed the commencement of NIA Distinguished Lecture Series and it was well accepted by the Executive Council. The inaugural Lecture will by the grace of God hold on 30th April, 2015. The speaker is Arc. (Dr.) Alex Ifeanyichukwu Ekwueme, GCON, ppnia .It is an event that combines many goals and I am sure a new phase of our meaningful interrogation of national issues from architectural perspective will begin.

After leaving office, what would you want to be remembered for?

I want to be remembered as somebody who believes strongly that the Institute is bigger than individual interests or preferences and will outlast all. This simply means that the laudable goals of the Institute touching individual members, the nation and humanity must be constantly, selflessly and vigorously pursued by all.

ARCHITECTURAL EDUCATION IN NIGERIA: TOWARDS ADDRESSING THE CHALLENGES OF THE 21st CENTURY

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Abstract:

Architectural education in Nigeria has been based on past development needs. This evolution has gone through the past four periods of development – the pre-independence, the post-independence, the oil-boom era and the Structural Adjustment Period. The present, which is characterized by changes in technology and unemployment in both the public and private sectors, is proving very challenging and demanding for the crop of graduates from our schools of Architecture. This paper not only traces these developments by reviewing this evolution, but suggests a new path that has to be taken. It makes recommendations for government to

develop an overhauled plan for architectural education. It also goes further in recommending that schools of architecture should develop philosophies, improve pedagogy and develop curriculum toward specialisation. In conclusion, it reinforces the broad-

based training put forward by the National University Commission for the first five years and an additional two years of specialization which would produce architects to face the full challenges of not only the present economic dispensation, but brighter prospects in the not too distant future.

Keywords: *Philosophy, Pedagogy, Curriculum Development and Specialisation*

1.0 INTRODUCTION

Master masons and craftsmen can be said to be the first architectural educators in Nigeria. In the North the “Maginas” were there, in the West the Brazilian trained master masons were available while in the East some form of masons were also available. This was an informal training which was based on a form of pupillage cum hereditary system (Dmochowski, 1990). This form of education took place before the coming of the British.

During the colonial era (1914 – 1960), a form of structured training of building professionals took place. Arayela (2000) states that even though architectural training of young Africans took place in England during this era, no serious efforts were put into training them as full-fledged architects but as training officers for the colonial service.

The formal architectural education started in 1952, in the first School of Architecture in the then Nigerian College of Technology (N.C.T) Ibadan (Adeyemi, 1979). This act heralded the formal architectural education system which was based on the Royal Institute of British Architects (RIBA) programme.

2.0 HISTORICAL DEVELOPMENT

The development of formal architectural education in Nigeria can be classified into four:

—Pre-Independence Era (1914-1960)

—Post-Independence Era (1960-1973)

—Oil Boom Era (1973-1982)

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—Structural Adjustment Period Era (1982 – 1999)

1. Pre-Independence Era

The first School of Architecture established in Nigeria was set up in 1952 in the then Nigerian College of Technology, Ibadan. The school was then moved to the Nigerian College of Arts, Science and Technology, Zaria in 1955 (Arayela, 2000) where the first Architecture graduates (numbering four) graduated with Diploma in Architecture in 1961 (Alozie, 1991). This indicates that any architect in Nigeria before independence graduated from abroad. This shows the British, after a long stay in Nigeria had not set up any architectural education structure until towards the end of their stay.

2. Post-Independence Era

The post-independence era of architectural education started with the graduation of the first Diploma graduates from the Zaria School in 1961 (Arayela, 2000). The Diploma programme graduated only two sets – 1961 and 1962, whereby the programme was upgraded to a Bachelor of Architecture in 1963 (Arayela, *ibid*). During this era there was a strong relationship with the RIBA and most of the lecturers were British. The graduates of this programme were even exempted from the Parts I and II Finals of the RIBA Examinations. Notwithstanding, the creation of the Nigerian Institute of Architects in 1960, the relationship between the Zaria School with RIBA was sustained until 1969, when it was completely severed. With this severance came the end of the single tier system and the beginning of the two-tier system

architecture programme.

This era had its upheavals and affected not only the architectural education programme in the Zaria School but in the nation as a whole. The British teachers were accused of being colonial agents (Alade, 1988) and this resulted in the students' riots of 1960 and 1961 in the Zaria School. This arose as a result of the low number of students graduating and Alade (1988) recalls that even after the riots, new admissions only went up to 24 students with about 6-8 graduating eventually, after spending an average of six years. This encouraged the growth of new schools. By 1970, in a span of ten years, two more schools of architecture were established - the Department of Architecture, University of Nigeria, Enugu Campus (1963) and the Department of Architecture, University of Lagos (1970).

3. The Oil-Boom Era

The Oil-Boom era in Nigeria spanned between the beginning of 1973 and 1982. The Nigeria Government came into a lot of oil revenue which made the expenditure by the government to rise tremendously. Different programmes like Operation Feed the Nation (O.F.N) and Free Education at all levels of education came into being. During this era, a new Federal Capital of the Nation was proposed in 1976.

Architectural education too was affected by this boom. Foreign architectural educators flooded the country. The Zaria School had an influx of Polish, Indian and Ghanaian lecturers (Adeyemi, 1985). The Enugu School of Architecture had about 80% of their lecturers made up of expatriates (Chendo, 1991). New schools of architecture came into being during this era of unplanned prosperity. The Department of Architecture of Obafemi Awolowo University was established in 1977 and was also dominated by expatriate lecturers (Mills - Tetty, 1997). The schools of Architecture in the University of Jos, Rivers State of Science and Technology and Ambrose Alli University were established in 1979, 1980 and 1981 respectively. This brought to seven the total number of Universities offering architecture in the nation. All these Schools offered the two-tier system. The programme of these Schools were regulated or supervised by the National University Commission (N.U.C) and by the Nigerian Institute of Architects. During this era, architects had no problem with obtaining commissions either from the Federal Government, State Governments and the private sector. During this era a lot of parents wanted their wards to be architects as a result of the perceived affluence of architects. Unfortunately for the Nation, the result of its profligate expenditure caught up with it and in 1982, the then President, Alhaji Shehu Shagari announced a Structural Adjustment Programme

(S.A.P).

4. The Structural Adjustment Programme Era

This Structural Adjustment Programme era was received with disbelief by architects and a lot of allied professionals. Abandoned projects littered the whole country, grandiose plans with no finance to finish them. Unfortunately, for architectural education and the profession, this was the era when majority of the schools of architecture became established. Between 1982 and 1995, nine (9) Departments of Architecture were established in the country (Arayela, 2000). Besides the Universities, there were nineteen (19) Polytechnics offering National Diploma Certificates in Nigeria as at 1999 (Arayela, *ibid*). This scenario of no commissions versus increase in schools of architecture, became a recipe for disaster. Also with the decline in the economy, the experienced expatriate staff departed the country, only to be replaced by fresh architecture graduates with little or no experience of lecturing. Some of these graduates saw lecturing as a stop - gap before more lucrative employment. This culminated into some of the problems in architectural education in the country. Even though, the quality of staffing was a problem, it was not the only one.

3.0. PROBLEMS OF ARCHITECTURAL EDUCATION IN NIGERIA

Chukwuali (1988) made an interesting observation that those entrusted with running the Schools of Architecture (after taking over from the expatriate lecturers or as Heads of Departments) attempted to import the system under which they studied without regard to the role of the future architect under our peculiar socio-economic conditions (Chukwuali, 1988). This prevented the different schools of architecture from achieving what the UNESCO - UIA Charter for Architectural Education declares in Paragraph 1.2 "that architecture, the quality of buildings, the way they relate to their surroundings, the respect for the natural and built environment as well as the collective and individual cultural heritage are matters of public concern" (UNESCO/UIA, 1996). Some of these problems with their suggested solutions are:

I. Lack of Research in Architectural Education Research can have valuable contribution to both architectural knowledge and the profession. This can happen both at the Masters and Doctorate level. Professional practice generally tends to use, rather than produce knowledge. Architecture, through architectural education must develop and enrich its own knowledge base, evaluate itself and make its products testable.

2. Lack of Philosophy in Schools of Architecture Schools of architecture in the country at best have a proposed philosophy on paper for accreditation purposes. There is no philosophical direction to aid students who want to specialize in a particular field. This should be addressed, because the era of a “generalist” architect who is the “jack of all trades and master of none” is already over. The schools should channel their short and long-term plans, based on their proposed philosophies, into making them become citadels of research in their chosen fields.

3. Lack of Planning in the Supply of New Practitioners Architecture and architectural education are not unique in having these problems. The Nigerian Government has not been able to revise the fourth or any Development Plan with the realities in the economy. Consequently, there is no plan in the supply of architects into the economy.

4. Lack of Specialization (Non-Specialization in Education Training) Generally all the schools of architecture offer the two-tier system of architectural education with some difference in nomenclature. The Universities of Technology offer the Bachelor of Technology and Master of Technology in architecture, while the main stream Universities still offer the Bachelor and Masters programme of the early 1970s. The same “generalist” training which may have been adequate for the production of the architects of the oil-boom era is still being offered in the Universities in the less prosperous era of the first part of the twenty-first century. This generalist training has become archaic. According to the U.I.A. and Architectural Educator – Reflections and Recommendations (2002) the contents of architectural education should “... allow higher levels of knowledge or specialization through postgraduate programmes, multi-professional courses, research and take care not to be fixed, but respond to emerging forms of practice and to changes in the construction industry, in Universities and the society at large” (UNESCO-UIA Charter, 2002). This buttresses the fact that specialization is of extreme importance for architects of this century, to make them competent and competitive in their chosen areas.

5. Non-Retraining of Architectural Educators “Educating the Educators” is the way for new knowledge, techniques and processes to be disseminated to students. Lack of retraining of staff encourages redundancy, lack of job satisfaction, lack of knowledge, incompetency and vegetation of the mind. The inability to adapt to new technologies and ideas is a direct and inadvertent result of non-training of architectural educators. This produces in – breeding which leads to stultification of knowledge. To be able

to present papers in respectable journals becomes a major hurdle due to the obsolescence of knowledge and consequently research which is not only useful to the practice but also the way and means of rising in the hierarchy of the University becomes lacking.

6. Non-Availability of Specialists and Technologists The school of architecture in Zaria had a wind tunnel and an artificial sky which had never been used because only one individual was trained to use them. These were donated in the 1980s by some foreign organizations to aid in teaching climatology. Presently, new digital models of the same equipment have been acquired through the TETFUND with no training component. Architecture being a multi-disciplinary field can gain a lot by progress in other disciplines. A trained architectural educator in climatology, computer applications, statistics, costing and estimation, and much more will always be a better teacher to architecture students than a non-architect. This specialization cannot only be used in architectural education but can also be extended into architectural practice. With the sophistication in the world of architecture and the information technology revolution, specialists will always be in demand.

7. Inflexibility and Inability to Assess Progress in Curriculum Development The curriculum in most architectural schools has been based on the post – RIBA 1970 era with little or no change. New and changing technologies and systems are not reflected in the curriculum. Computer-Aided-Design (not computer drafting) and Building Design simulations are virtually non-existent. New subjects like Project Management and Research in architecture are undertaken without experienced lectures. The schools of architecture may solve this by retraining as earlier stated and going into alliances with schools of architecture in other parts of the world.

4.0 RECOMMENDATIONS

The world has undergone tremendous change since 1970 when the present two – tier (6 Years Programme) began. Consequently architectural education too is not left out. New materials, systems and techniques have been developed in the construction industry without commensurate changes in architectural education. With the revolution in information technology, the world has become a global village with little or no border in the dissemination and absorption of knowledge. How do we train our future generation of architects? This can be achieved by the following approaches:

1. The Government

The Nigerian government should come up with a

development plan for architectural education to be able to meet up with the standards in other parts of the world. The overall curriculum from elementary school to tertiary institutions should be overhauled. A plan similar to the Marshall plan undertaken by the US after the Second World War should be undertaken by government in respect to architectural education. The present belief of the citizenry is that architects are dispensable and an unnecessary expense when erecting private or semi-public buildings. Shelter is one of the basic needs of mankind. Researches and research centres should be encouraged by government to encourage specialization by architects which will go a long way in creating the ability to produce affordable and more energy efficient buildings. This will go a long way in developing new technologies which will not only be applied in Nigeria but globally.

2. The Universities

With the aforementioned development in architecture worldwide, the Architecture departments in the various Universities have to undergo changes – both in philosophy, techniques and curriculum.

Philosophy

The philosophies of different schools of architecture in the country should have a direction with a focus on the goals of that school of architecture. An example of a philosophy of one of the Schools states that it is;

“The provision of a high quality professional education system aimed at producing Architects with adequate knowledge, creative and specialized skills and leadership qualities who are capable of understanding and solving complex technical and environmental problems in a manner acceptable not only locally but to the international professional community”

From above, the philosophy lacks a sense of focus and is generalist in nature. Most of the philosophies in other schools are virtually the same. The Schools should fashion out philosophies which are not idealistic but achievable. They should be narrowed down to fields of study which are attainable, whereby a sense of direction can be gleaned by any prospective student. Areas of specialization should be defined and linkages with other Universities worldwide in that area should be encouraged. The staff too should be rightly motivated to share the aspirations set forth in the school's educational philosophy and should have a stake in preserving the system.

Pedagogy

Teaching “methods” should be revamped to come up to present day needs. The question of methods should not be confined to those of studio/design teaching

only. Both traditional and innovative new modes and techniques should be employed. Innovation and experimentation in teaching methods must be encouraged. Architecture is multi-disciplinary, hence the teaching of architecture must combine the methods from various disciplines of arts and the related professions. In order to meet the demands of changing social and urban needs, lifestyles and technologies, - teaching methods should involve a lot of the environmental subjects and emerging design tools like the computer. Architecture is wide ranging, in that an architect can easily transform into an automobile designer, an environmental researcher or even a special effects designer in the movie industry. This leads to the next change-curriculum development.

Curriculum Development

What kind of architect would we like to produce? This is the pertinent question which has to be answered by an architectural school and consequently by its architectural curriculum. The generalist approach of producing architects with the following capabilities of design, knowledge and skill has been or is still the theme of the International Union of Architects (U.I.A). The question to ask is how relevant is this theme to a developing economy like Nigeria? Are graduates from the schools of architecture fully employed? Unfortunately, statistics are not available to test the generalist training. According to Professor Adeyemi (1996), he is of the candid opinion that we are yet to identify the rate of an architect in a rapidly changing environment. Consequently, doubts about the idea of the five year two-tier programme achieving its aim is being mooted. If architectural knowledge is to develop in quality and increase in quantity, specialization is what is required.

A two-tier seven year programme is encouraged as proposed by the National University Commission. The first five years are for generalist training whereby students should be able to integrate a range of capabilities as listed below:

- (a) **Design** ● Ability to engage in imagination and think creatively. ● Ability to gather information, synthesize and formulate solutions. ● Ability to think three-dimensionally.
- (b) **Knowledge** ● Have an understanding of the culture and social habits of the clients, users and society. ● Have an ability to understand natural ecosystems, the built environments, conservation and waste management issues and the need for reduction in

energy consumption. • Have design and technical ability in design, structure, materials and

construction. • Be able to communicate ideas through collaboration, writing, drawing, modeling and evaluation.

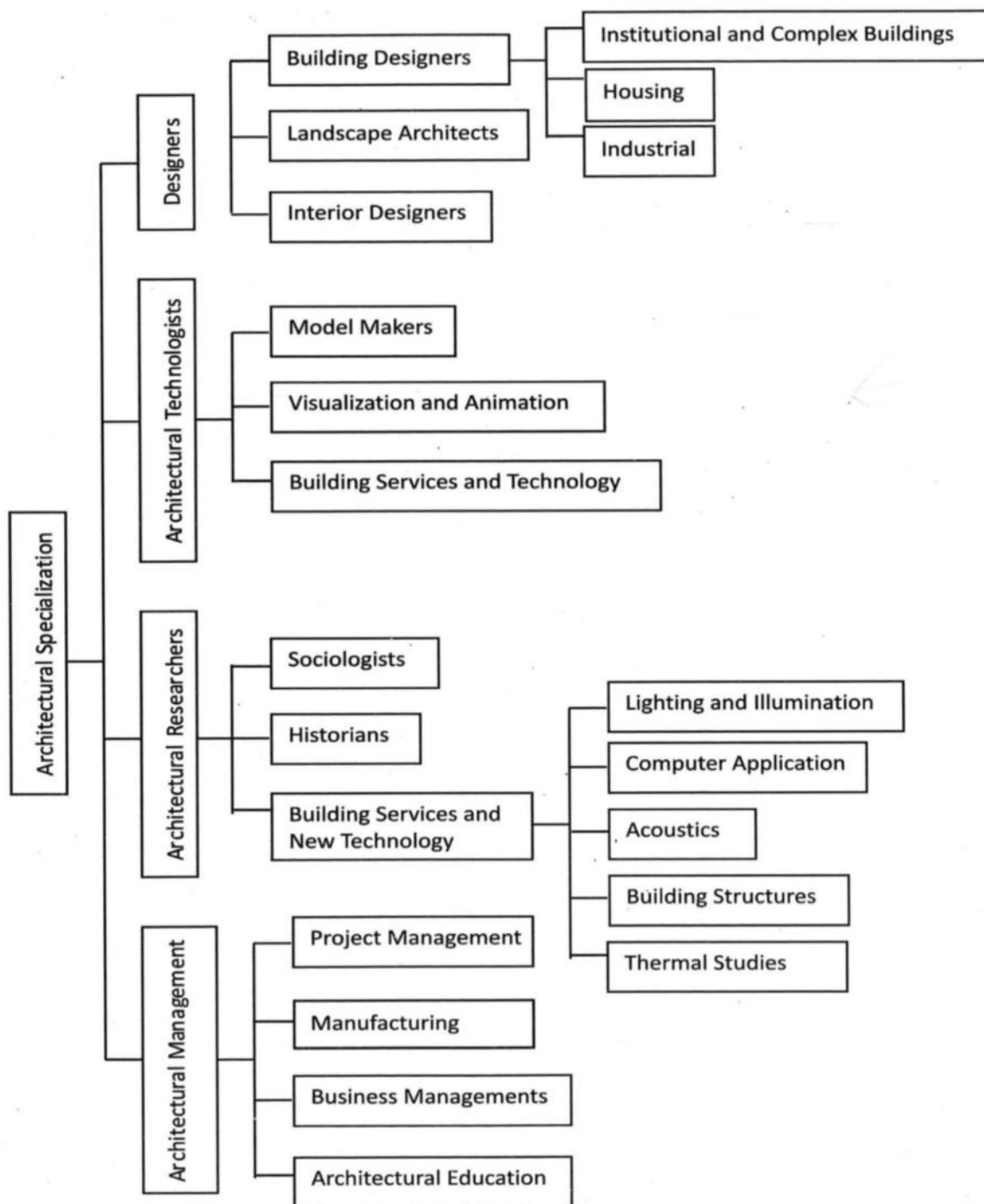


Figure 1.1 Scheme for Architectural Specialisation

The list above is broad based and this should be able to prepare the Architect for specialization in a chosen branch of architecture in the second stage. Architectural education at this stage should prepare the architect to become a specialist in a field of architecture. An example of this is in the medical field where specialization is the key for development.

Architectural specializations should form the basis of the second stage. Specific knowledge should be imparted at this stage which could also form the basis for a doctoral study. This stage should also consist of a research content which will be an in-house opportunity of airing and testing research findings and getting feedback from students.

5.0 CONCLUSION

The preceding discourse has been an attempt to trace

the development of architectural education, study the problems under prevailing economic conditions and to suggest the way forward. It is not exhaustive, but what is paramount is that it should be flexible enough to adapt to changes as they arise. A review system not exceeding five years should be put in place to fine-tune the philosophy, teaching techniques and curriculum development.

References

1. Adeyemi, E. A.(1979)/ *Conflicts and crisis in architectural education* – a key note address delivered at the Inauguration of the Architectural Association of Zaria Alumni at Lugard Hall, Kadima.
2. Adeyemi, E. A.(1985). *Towards survival of architecture as a profession*, presented during the launching of the N.I.A. Niger State Chapter.
3. Adeyemi, E. A.(1999). *The appropriate direction of architectural education in Africa region* in journal of architecture educators in Nigeria, Vol.1, No.2, January, 1996.
4. Alade, F.(1988). *Need for change in direction in architectural education in Nigeria*. N.I.A. Journal, 4(2), 10-11.
5. Alozie, E. O.(1991). *The problems of architectural education and training with special reference to Nigeria*. N.I.A. Journal, Plateau State Chapter, 1(2), 4-10.
6. Arayela, O.(2000). *Clinical management of architect's education in Nigeria in the twenty-first century*. AARCHES Journal, 1 (5), 78-84.
7. Chendo, I. G.(1993). *Nigerian architects for 'export' to Africa: Prospects, Problems and Strategies*. N.I.A. Journal, 8(1), 13-20.
8. Chukwuali, B. C.(1986). *The basic problems of architectural education: a Nigerian perspective*. In: U.O.Nkwogu(ed) *Architects and Architecture in Nigeria* (Pp.145-154), Akure: AARCHES.
9. Department of Architecture, Ahmadu Bello University, Zaria (2005). *Self-Study for the National Universities Commission*.
10. Dmochowski, Z. R.(1990). *An Introduction to Nigerian Architecture (Northern Nigeria)*. Volume One, Onikan: The National Commission for Museums and Monuments.
11. Mills-Tettey, R. N.(2000/ *Space, time and architecture*, a valedictory lecture delivered at Obafemi Awolowo University, Ile-Ife.
12. UNESCO/UIA (2002). *UIA and Architectural Education: Reflections and recommendations* retrieved, May 19, 2006 from UIA website: <http://uia@uia-architects.org>.

ISOLATED URBAN RAILWAY CORRIDORS: TOWARDS SUSTAINABLE GREENWAY DEVELOPMENT IN KANO

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Abstract

A pedestrian pathway near an active railway may seem absurd at first, but as communities seek alternatives to the automobile, greenway system may be a viable solution. Much of the planning for the greenway networks revolves around community input. Thus, this study aims to explore ways in which public needs can foster more sustainable development processes through greenway systems, as well as providing answers on how public need influences the development of urban greenway along active railway corridors. To facilitate the main study that will cover all the isolated corridors within Kano metropolis, a pilot study was earned using a purposive case of an urban railway system that runs through Nassarawa local government area in Kano metropolis. Population for the study includes corridors users and property owners along the corridors. Quantitative and qualitative methods of research were used to get a better understanding of site typology, site inventory, and future program requirements. Qualitative data was gathered by observing and analyzing the sites directly through observation checklist (spatial analysis) and structured questionnaire were distributed to the corridor users and property owners along the corridor. The study revealed that several factors that influence the development process along the corridor are the available railway right-of-way widths, connections to public spaces, and pedestrian routes.

Keywords:

Greenway, Kano metropolis, public needs, sustainable development, urban railway corridor

BACKGROUND OF THE STUDY

Trail systems within cities' urban fabrics are often disconnected (Bossert, 2011). Often they were not planned to develop as a city sprawled outward and the movement of people from places of living, work and play. Rather, they were developed along or near natural corridors, utility easements, canals, parkways, or wherever else they "fit," rarely straying into the vicinity of automobile right-of-ways (Bossert, 2011).

Consequently, "How can public need influence the development of urban greenway along an active railway corridor?" The idea came about from the idea of rails-to-trails, which involves *the rehabilitation of isolated railways into pedestrian greenways*. *Rails-*
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with-trails are similar concept, except a pedestrian corridor is created adjacent to an active rail line(s). Due to the difficulty of planning safe and efficient trails within existing city infrastructure, active rail line corridors may serve as an alternative for pedestrian routes. Railroad corridors often travel through the heart of cities, paralleling residential, commercial, and industrial areas, making them prime locations to create vital community connections within the urban fabric.

Railways are generally the first form of mass transportation, not until the development of the motorcar in the early 20th century, and had a virtual monopoly on land transport. The Nigerian Railway Corporation is 113 years old and it runs a unilaterally designed track system of 1067mm cape gauge. At the moment, the railway System has been undergoing some rehabilitation and modernization with the full political and financial support of the Federal Government through the Federal Ministry of Transport. Having completed its phases of rehabilitation of its vast assets, it is expected to play an increasingly pivotal role in the economic and social developments of the country in this millennium. (Nigerian Railway Corporation, 2013).

Utilizing spaces along railway corridors can provide direct connections to destinations, creating a more cohesive urban fabric. A pedestrian corridor can safely exist with an active railway corridor to improve the physical ties within a segregated portion of a city, while enhancing non-motorized transportation, and become an environmental, economic, and recreational resource. An efficient and safe pedestrian corridor design, using greenway development along a railway may decrease automobile use and benefit public health, local economics and transportation, community pride, and identity (Rails-to-Trails Conservancy: Benefits of Rail-Trails).

An inclusive definition as proposed by Ahem (1995) described greenways as "*networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use.*" Key characteristics of greenways as implied in this definition and distinguishing it from other landscape planning concepts are their primarily linear

spatial configuration, ability to provide linkages, multifunctional nature, and support of sustainable development. Given these fundamental characteristics, urban greenway typologies could be proposed based on spatial scale, landscape context, goals and planning strategies.

Greenways development can be categorized into three generations (Seams, 1995) according to their evolving functions, with each successive generation increasing in complexity and serving a multitude of objectives than the previous.

- I. Generation 1 greenways (pre-1700s- circa 1960) describe the axes, boulevards and parkways which simply link urban spaces.
- ii. Generation 2 greenways (circa 1960- circa 1985) are essentially recreational in nature. These trail-oriented linear parks provide access to rivers, streams, ridgelines, railbeds and other corridors in the urban fabric.
- iii. Generation 3 greenways (circa 1985 onwards) are multi-objective linear park functioning as wildlife preservation corridors, flood damage control and reduction, water quality, rail with trail system, (eg. providing alternative transportation forms), urban beautification and recreation.

Greenways are increasingly recognized as an integral part of public infrastructures. For example, they enhance citizen's mobility by enabling more pedestrian and bicycle safe areas. They provide linkages between neighborhoods and existing parks adding venues for community networking and recreational opportunities. Greenways enhance scenic views, increase awareness of historical areas, and protect ecologically sensitive areas within the city setting where they exist (Little, 1990). These networks also facilitate urban infrastructure redevelopment such as abandoned railways and roads (Marcus and Francis, 1998).

Ecological benefits of greenways range from protecting biological diversity of species to abiotic benefits. By fostering connectivity, genetic stagnation is alleviated through reduction of island population and the resulting inbreeding (Little, 1990; Noss, 1987). Greenways benefit other ecological processes by helping sustain water quality, abate pollution, deter soil erosion and facilitate the exchange of energy and nutrients within the system (Jongman, 2003; Noss, 1987).

However, this corridors which people commute to on a regular basis in most Nigerian cities, have poor

ecological interactions due to some activities like the waste disposed along the corridor, some portion of the corridors serve as criminal hide outs, poor connectivity to community resources such as schools, open spaces and places of work.

Hence, this paper aims to explore ways in which public needs can foster more sustainable development processes through greenway systems. The specific objectives of this study are to:

1. Assess the perception of the corridor users and property owners on the interactions of community resources with it landscape.
2. Assess the impact of the corridor's current status on community livability

RESEARCH METHODOLOGY

The proposed site for the study is located along an active railway corridor that travels through Nassarawa Local Government area of Kano Metropolis comprising of four isolated communities i.e. Badawa Community, Yankaba Community, Kawaje-Jigirya Community, and the Nassarawa G.R.A Community (Figure1 &2).



Figure 1: Terrain map of Kano metropolis

Source: Google Earth 2014



Figure 2: Neighborhood Map

Source: Google Earth 2014

Quantitative and qualitative methods of research were used to get a better understanding of site typology, site inventory, and future program requirements. Purposive and convenient sampling approaches were employed in selection of the respondents from the population of the study, which compose of corridor users and property owners (Table1 & 2). The population of the corridor user is made up of four (4) travel modes.

TABLE 1: POPULATION PROPORTION OF CORRIDOR USERS

S/N.	CORRIDOR USERS	POPULATION PROPORTION (%)
	BICYCLIST	25
	WHEELBARROW PUSHER	8

Source Authors, 2014

TABLE 2: POPULATION OF PROPERTY OWNERS ALONG THE

CORRIDOR to the Questionnaire.

S/N.	PROPERTY OWNER ALONG THE CORRIDOR	NUMBER
2.	SCHOOLS	3
4.	INDUSTRIES	1

Source: Authors Reconnaissance survey, 2014

Two (2) research instruments were used in conducting this study. These are structured questionnaire and observation checklist. The structured questionnaires were distributed both to the corridor users (24) and property owners (17) along the corridor. The questionnaire was designed as series of questions to achieve the research objectives. Being that the corridor is a mixed use neighborhood; the questionnaire is of two versions (English and Hausa language) where the Hausa version is for those who do not understand English. The response rate of the questionnaire was 87%. While qualitative data was gathered by observing and analyzing the sites directly through observation checklist (spatial analysis). The checklist was designed to answer research question three (3). It is a micro-space checklist survey, designed to reinforce findings from public involvement activities and planning analysis. Descriptive statistics was used in analyzing the data from the questionnaire while the data from the checklist was analysed using factor of analysis/segments matrix.

DATA ANALYSIS AND FINDINGS

Data generated from this study through structured questionnaires were analyzed in this section. The analysis and findings are arranged in line with the research objectives as follows:

Objective No. 1: To assess the perception of the property owners and corridor users of the interaction between the corridor activities and its landscape

The variables required to achieve this objective are respondents perception on: developing mobility access, facilities to develop or improve, most important

issue to be addressed, intense of accessing community resources, why people do not access the corridor and type of preferable walking path to use when accessing the corridor.

Property Owners Response on Interaction between Corridor Activities and it Landscape

From Table 3 it shows that 17 property owners

TABLE 3: PROPERTY OWNERS QUESTIONNAIRE DISTRIBUTION

S/N	Neighborhood	Respondents
a)	Resident	10
b)	Commercial advocate	2
d)	industry owner	1
	Total	17

Source: Authors Field Work, 2015

Table 4 summarized the property owners' response regarding developing mobility access along the corridor. The finding indicates that the greenway development should, encourage more of pedestrian access (47%) than automobile (17.7%).

Table 4: RESPONDENTS OPINION ON DEVELOPING MOBILITY ACCESS

S/N	Travel Modes	Respondents	%
b.	Bicycle	6	35.7%

Source: Authors Field Work, 2015

On facilities to develop or improve the property owners (see Figure 4), which ranges from: i- pedestrian walk and crosswalk, ii- street furniture, iii- transit stop/shelter and iv- pedestrian light and signal. From the responses as shown in Figure 4, E- received highest response with 35.2%, C- received higher response with 29.4% then, and D- received high response with 23.5%.

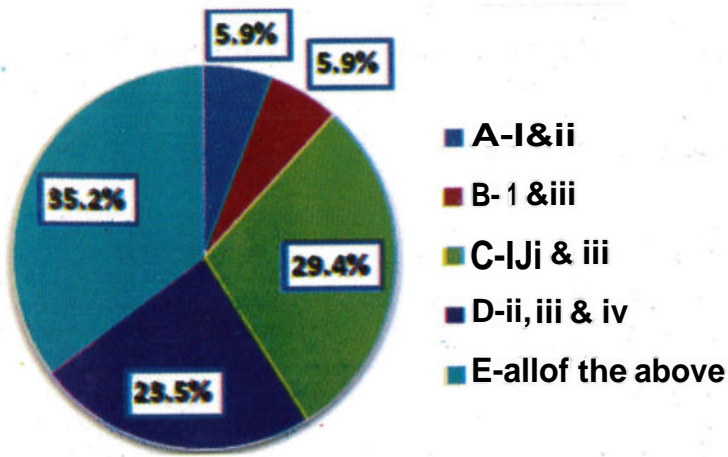


Figure 4: Respondent Views on Facilities to develop or improve
Source: Authors Field Work, 2015

The Figure 5 shows respondents view on their biggest concern for the corridor improvement. From the pie chart, the response received reveals that the respondent's high priority/concern was accessibility with 41.7% and the Medium priority/concern was safety with 33.3% then, the low priority/concern was Beautification with 25%.

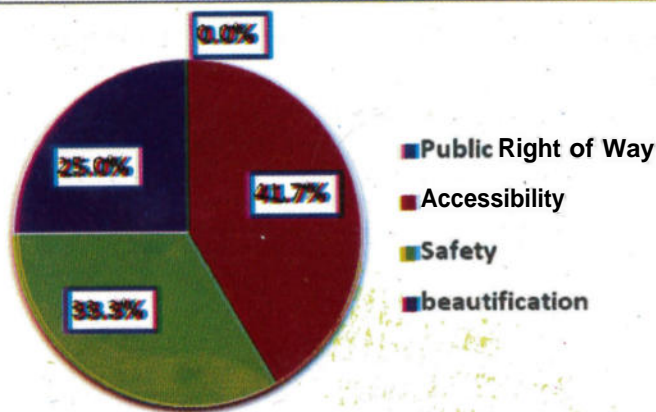


Figure 5: Respondents View on Their Biggest Concern for the Corridor Improvement
Source: Authors Field Work, 2015

Table 5 below, reveal the responses obtained when the respondents were asked about the most important issue to be addressed. Accordingly, the study unveils that "Hazardous condition" and "unattractive surrounding" were most ranked #1 as the most important issue to be addressed as they both received 35.2% response rate while health condition was rated #2 with 47% response rate. Also lack of path and unattractive surrounding were both ranked #2 with 41.2% response rate respectively.

TABLE 5: RESPONSE ON THE MOST IMPORTANT ISSUE TO SEE ADDRESSED

Reasons	Rank #1	Rank #2	Rank #3	Rank #4
a. Hazardous condition (crime/ darkness)	6 35.2%	5 29.4%	2 11.8%	4 29.4%
b. Unattractive surroundings	6 35.2%	7 41.2%	4 29.4%	0 0%
c. Lack of paths/connections	4 29.4%	7 41.2%	4 29.4%	2 11.8%
d. Health condition(debris, waste disposal)	3 17.7%	8 47%	4 29.4%	2 11.8%
e. Difficult intersections and crosswalk	2 11.8%	6 35.2%	4 29.4%	5 29.4%

TABLE 5: RESPONSE ON THE MOST IMPORTANT ISSUE TO SEE ADDRESSED

Corridor Users Response on Interaction between Corridor Activities and it Landscape

Table 6 shows 24 corridor users responded to the questionnaire.

TABLE 6: CORRIDOR USER QUESTIONNAIRE DISTRIBUTION

S/N	Users	Respondents
a)	pedestrian	12
b)	Bicyclist	6
c)	jogger/trainer	4
d)	wheelbarrow pusher	2
	Total	24

Source: Authors Field Work, 2015

Table 7 reveal the response obtained when the respondents were asked about accessing community resources through the corridor. From the table, over a half of the respondents (54.2%) reported using the corridor in the course of going to their work places daily, while 41.7% reported they use the corridor to school daily. About a third (33.3%) reported they use the corridor for social visit frequently. Over a third of the respondents (37.5%) reported that they use the corridor for exercise once a week.

From Table 8 below, the following were obtained when the respondents were asked on why people do not access the corridor. From the table, the study reveals that “Lack of path/connection” and hazardous condition” have the highest rate of #1 with 41.7% and 29.2% responses respectively. While unattractive surrounding and health condition were ranked #2 with 25% and 29.2% response rates respectively.

Table 9 shows response received on type of walking path preferred. The study reveals that respondents were nearly evenly divided on their preferred walking paths, Unpaved and paved paths both received 25% of responses each, and sidewalk received almost 42% response rate.

FROM TABLE 8: RESPONDENTS VIEWS ON WHY PEOPLE DO NOT ACCESS THE CORRIDOR.

	Reasons	Rank#1	Rank #2	Rank #3	Rank #4
a.	Hazardous condition (crime' darkness)	7	5	6	4
		27.2%	20.8%	25%	16.7%
b.	Unattractive surroundings	6	7	3	9
		25%	27.2%	12.5%	37.5%
c.	Lack of paths/connections	10	4	5	4
		41.7%	16.7%	20.8%	16.7%
d.	Health condition! debris, waste disposal)	5	6	13	0
		20.8%	25%	54.2%	0%
e.	Difficult intersections and crosswalk	6	5	5	8
		25%	20.8%	20.8%	33.3%

Source: Authors Field Work, 2015

TABLE 7: RESPONDENTS OPINION ON INTENSE OF ACCESSING COMMUNITY RESOURCES THROUGH THE CORRIDOR.

	Never	Rarely(Less Than Twice A Month)	Sometimes (Once A Week)	Frequently (3-4 Times Per Week)	Daily(5-7times Per Week)
Exercise	2	6	9	6	1
	8.3%	25%	37.5%	25%	4.2%
Social visit	3	6	4	8	3
	12.5%	25%	16.7%	33.3%	12.5%
Work	2	1	3	5	13
	8.3%	4.2%	12.5%	20.8%	54.2%
School	5	2	3	4	10
	20.8%	8.3%	12.5%	16.7%	41.7% ^c
Other	2	6	7	3	6
	8.3%	25%	27.2%	12.5%	25%

Source: Authors Field Work, 2015

TABLE 9: RESPONSE RECEIVED ON TYPE OF WALKING PATH PREFERRED TO USE

S/N	Factors	Respondents	%
a)	Unpaved paths	6	25%
b)	Paved multi-use paths	6	25%
c)	Sidewalk and crosswalk	10	41.7%
d)	Othets	2	8.3%

Source: Authors Field Work, 2015

Objective No. 2; To assess the impact of the corridor’s current status on the community livability

The factors of analysis required to achieve this objective are; vegetation, drainage, topography, land use, traffic condition, accessibility/circulation, pedestrian amenities, sidewalk condition, lighting condition, and signage.

Figure 6 below, shows spatial delineation of the corridor. There are three primary segments in the neighborhood corridor as shown in the map.

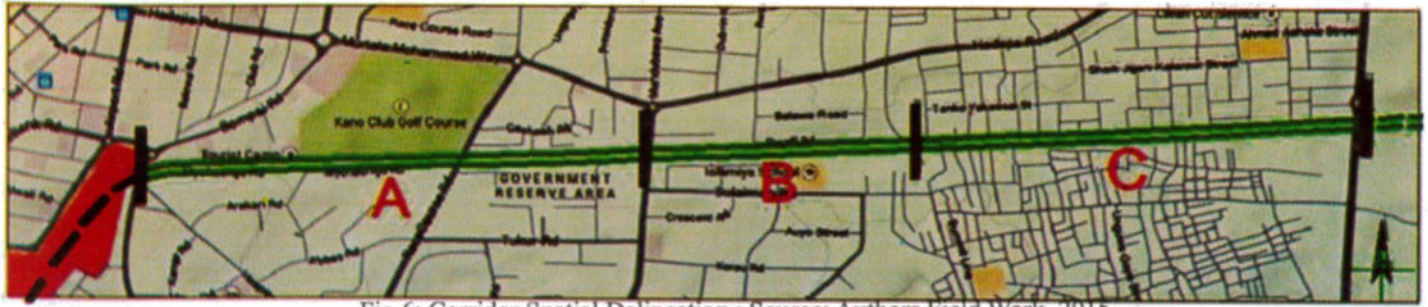


Fig 6: Corridor Spatial Delineation : Source: Authors Field Work, 2015

Segment A (west end) cover from railway yard/AuduBako road to Ahmadu Bello road, segment B(central section) cover from Ahmadu Bello road to “gwado-gwado” stream/Badawa bus stop and segment C covers from “gwado-gwado” stream to ring road eastern by pass.

Table 10 shows a summarized micro-space checklist survey of the entire corridor accompanied by a brief description of the factors of analysis on the checklist and findings from the corridor.

From Table 10 above, the findings reveals that segment A has an average dense tree along adjacent road with fair ground cover at golf course, while segment B has Fair tree vegetation around buildings with no plantation along the rail track and segment C is void of plantation that expose the area to extreme harsh weather condition. For drainages of these segments, the finding unveils that in segment A drainage of water is natural as it drain into constructed surface channels while at the

golf course runoff water is left to drain naturally while for segment B waste water is channelled underground into individual residencesoakaway pit and for segment C no good drainage for the collection of surface water. Comparison of the level of land-use from Table 10 shows that in segment A, recreational and commercial activities are at high level with almost 50% of the land-use, while segment B is strictly residential area with commercial activities at its higher level along the major road,s and segment C high density residential area with open space like football pitch, cemetery, and juma'at mosque. In terms of accessibility and circulation, Table 10 reveals that segment A has good accessibility from adjoining roads with fair circulation,then segment B has Fair accessibility from rail track with fair circulation. Lastly segment C has Fair accessibility from rail track with poor circulation. Lighting, sidewalk and pedestrian amenities are considered most essential in greenway with trail design where these facilities were in poor state in the entire segments.

Summary of Findings

This section summarizes issues on general findings from the questionnaire and the checklist survey conducted. This summary is arranged in research objectives format.

For the first objective, the research unveils that the top priority travel modes for improvement along the corridor were pedestrian and bicycle routes (47% and 35.7% response rate) against the automobile (17.7% response rate). The study further reveals that the type of walking path preferred by both property owners and corridor users were sidewalk and crosswalk (41.7%) and paved path (25%). Furthermore, findings from the study as revealed by the questionnaire administered to the corridor users on the intense of accessing community resources through the corridor, reveals that

over a half of the respondent reported using the corridor to work daily (54.2%),while almost half of the respondents (41.7%) use the corridor to school daily. And about a third of the respondents use the corridor for social visits frequently (33.3%).

For the second objective, checklist survey reveals that the corridor in the study is void of pedestrian amenities with poor signage and lighting condition. The topography of the corridor was relatively flat land with eroding coast eastward of the corridor while for drainages, runoff water is left to drain naturally and absorb into soil where place like Badawa community with slump population density has no good drainage channels. On traffic condition, the study also reveals average pedestrian movement along the rail corridor early in the day and late evening. Last but not the least,

TABLE 10: SUMMARIZED MICRO-SPACE CHECKLIST SURVEY OF THE ENTIRE CORRIDOR.

s/ N	FACTOR OF ANALYSIS	SEGMENTS		
		A	B	C
	<i>Vegetation</i>	Average dense trees along adjacent road with fair ground cover at golf course	Fair tree vegetation around buildings with no plantation along the rail track	The area is void of plantation that expose the area to extreme harsh weather condition
	<i>Drainage</i>	Drainage of water is natural as it drain into constructed surface channels while at the golf course runoff water are left to drain naturally	Waste Water are channeled underground into individual residence soak away pit	No good drainage for the collection of surface water .
	<i>Topography</i>	The area is relatively flat land with undulation/saddle slope at the golf course	Relatively flat land	Relatively flat land with eroding coast toward the east.
	<i>Zoning/ Land - Use</i>	Recreational and commercial activities are at hi [^] t level with almost 50% of the land use	Strictly residential area with commercial activities at it higher level along the major roads.	High density residential area with open space like football pitch, cemetery, and junta'at mosque
	<i>Traffic Condition</i>	High pedestrian movement along the rail track earlier in the day and late evening with high vehicular movement along the major roads	Average pedestrian movement with access along the major roads	High pedestrian movement along the rail track earlier in the day and late evening as many are closing or going to school, place of work etc
	<i>Accessibility/ Circulation</i>	Good accessibility from adjoining roads with fair circulation	Fair accessibility from rail track with fair circulation	Fair accessibility from rail track with poor circulation
	<i>Pedestrian Amenities</i>	The area is almost void of pedestrian amenities	The area is void of pedestrian amenities	The area is void of pedestrian amenities
	<i>Sidewalk Condition</i>	Inadequate sidewalk with poor connection	Inadequate sidewalk with poor connection	Poor sidewalk
	<i>Lighting Condition</i>	Fair lighting condition	Street lights are in state of repair	Street lights are not in good state
	<i>Signage</i>	Inadequate provision of sign post	Fair rail/ road crossing signage	Street name and sign post are hardly visible

Source: Authors Field Work, 2015

the vegetation and the corridor are void of plantation especially adjacent the the rail track except the golf course with fair ground cover and scanty tree plantation around some buildings westward of the corridor.

The study reveal that there are many green spaces throughout the corridor, but they are mostly connected through sidewalks next to roadways. These green

spaces include parks, recreation areas, golf courses and other linear trail, which are avenues for moderate physical activity such as walking and biking, for quick daily errands may be answer to a healthier society.

CONCLUSION:-

Designers and planners would potentially work with community residents, the railway authority, law

enforcement officials, adjacent landowners, transportation officials, and public transit, parks and recreation, and health departments to create a design and build strategy. Finally, the study suggests that the presence of trees and vegetation creates a more pleasant environment and that people are more willing to spend money at such locations. This information can be utilized as an incentive for greener streetscapes in

.REFERENCES

Arcata Rail with Trail Connectivity Project (2010). **Initial Study & Draft Mitigated Negative Declaration.**

Baschak, L., Robert, D., (1995). An Ecological Framework for Planning: Design and Management of Urban River Greenways: *Landscape and Urban Planning* 33, 211 – 225.

Benedict, M., Edward, T., (2000). *Green Infrastructure: Smart Conservation for the 21st Century.* Washington D.C.: Sprawl Watch Clearinghouse Monograph Series.

Bossert A., (2011). *Isolated spaces and places: a rail with trail solution.* North Dakota State University, Fargo ND.

Constitution of the Federal Republic of Nigeria (1999). *Social Objectives.* Lagos: Federal Government Press, 12.

Flink, Charles A., Kristine Olka, Robert M. Seams, and Rails-to-Trails Conservancy. (2001). *Trails for the twenty-first century: Planning, design, and management manual for multi-use trails.* Washington, DC ; London: Island Press

Griffin, S. (2005). **Study of methods for greenway acquisition in city planning.** Texas A&M University.

Jim, C.Y., (2002b). *Planning strategies to overcome constraints on greenspace provision in urban Hong Kong.* Town Plan.

Jongman, R., (2003). *Ecological Networks and Greenways in Europe: Reasoning and concepts.* *Journal of Environmental Sciences* 15, 173 – 181.

Lindsey, G., (2003). *Sustainability and Urban Greenways: Indicators in Indianapolis.* *Journal of the American Planning Association* 69, 165 – 180.

Little, C. E. (1990). *Greenways for America.* Baltimore & London, The John Hopkins University Press.

cities: the more desirable a place is, the more likely it will be visited, and in turn, money spent.

Therefore, the findings of this study will go a long way to facilitate the main study towards exploring the perception of the public (users) needs as one of major inputs towards sustainable greenway development along the isolated urban railway corridors in Kano Metropolis.

Lotze W., (2007). **Reclaiming forgotten corridors: an urban greenway System utilizing secondary watercourses,** the University of Arizona

Lusk, Anne C. (2002). *Guidelines for greenways: Determining the distance to, features of and human needs met by destinations on multi-use corridors.* Ph.D. diss., University of Michigan.

McGuckin, C., Brown, R., (1995). *A Landscape Ecological Model for Wildlife Enhancement of stormwater Management Practices in Urban Greenways: Landscape and Urban Planning* 33, 227 – 246.

Nigeria Railway Corporation: information. Retrieved April 2014, from [http:// www.nrc.com](http://www.nrc.com).

Rude M., (2011). *Urban greenway retrofit: a design for alternative transportation, community, and environment.* North Dakota State University, Fargo ND.

Searns, Robert M., (1995). “The Evolution of greenways as an adaptive urban landscape form”, in *Landscape and Urban Planning*, 33: Pp. 65-80, by Elsevier Science Publishers B.V.

Strom, C. (2006). *Look around downtown: Fargo heritage discovery walk.* Fargo: Fargo Historic Preservation Commission. The High Line, New York City.

Tajima, K., (2003). *New estimates of demand for urban green space: Implications for valuing the environmental benefits of Boston's Big Dig Project.* *Journal of Urban Affairs* 25, 641 – 655.

Yun H.C. (2006). Greenway controversies :Land use and implementation issues in urban greenways planning. M.Sc. Urban Planning Thesis, Columbia University.

CURRICULUM EVALUATION OF REVISED AHMADU BELLO UNIVERSITY ARCHITECTURE PROGRAM (2012-2015): FEEDBACK FROM MSc STUDENTS

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Abstract

Architecture curriculum and education in Nigeria has come under criticism in recent years regarding the quality of graduates inadequately unable to carry out work relating to design and practice to meet the challenges of changing societal needs. To this end, the curriculum at Ahmadu Bello University (ABU) was reviewed in April 2012 to address these and related concerns. Specifically, the curriculum proposed specialization at postgraduate levels by introducing elective courses in areas of specialization. This study evaluates the relevance and impact of the curriculum on design employing feedback from MSc students in ABU. The mixed methodology employs survey questionnaires targeting the 85 students in MSc II to elicit information regarding the relevance and impact of courses on design via 5-point likert scale statements. Results are analyzed in IBM SPSS version 21 for means, standard deviations, coefficient of variation, 95% confidence intervals, t-statistics as well as effect

sizes. Interviews were also conducted with 7 MSc students and 2 senior academic members of staff for further explanations and suggestions towards improving the curriculum. Results reveal that practice-related courses have the highest impact on the MSc curriculum from the students' perspective and at present, the modified curriculum is not effectively achieving the target of specialization compared to cognate courses, which had the highest overall impact on design. The study therefore recommends a greater collaboration between academia and practice, teaching courses in practice related ways, intensive orientation at the beginning of the program to increase awareness of the goals of the program, improving physical infrastructure and teaching quality as well as frequent curriculum evaluations and a research focus on current problems/issues pertinent to the architectural profession.

Keywords: Architecture curriculum, design and practice, impact, MSc, ABU

INTRODUCTION

Curriculum design and implementation is a fundamental part of formal education delivery and reform. Curriculum usually involves the sum total of all experiences provided to learners under the guidance of a school (Bishop, 1985). These form part of activities, actions and recommendations by policy makers with the intention of improving formal education or to "put right faults or errors in the provision of education" (Syomwene, 2013, p. 80). Considering the vital role curriculum plays in education, regular evaluation and research for feedback ought to be the norm. In practice, this is often not the case. Altrichter (2005) notes that there is very little specific investigation of curriculum research and implementation activities. "It seems that the study of the process of curriculum implementation has virtually dissolved to become one element of the more general field of innovation research and theory" (ibid, p 35). Architecture curriculum is not exempt from this trend.

In recent years, studies have emerged evaluating architecture curriculum and education notably student performance (Afolami, Olotuah, Fakere and Omale, 2013; Adewale and Adhuzo, 2013), curriculum design and professional competence (Abdulkarim, 2011; 2009) as well as the relationship between architecture education and practice in Nigeria (Dare-Abel, Alagbe, Aderonmu, Ekhaese and Adewale, 2015). Studies assessing the impact of courses in the architecture curriculum on design in Nigerian Schools of Architecture are rare. Such research is important because architecture education curriculum is designed around the design studio (Bashier, 2014; Nazidizaji, Tome and Regateiro, 2014; Ibrahim and Utaberta, 2012). Feedback from stakeholders such as students, staff and architects in practice is necessary if improvement and progress is to be made in educating future architects.

This paper reports such a study in the Department of Architecture, ABU Zaria employing feedback from

Master of Science (MSc II) students on the impact of courses taken as part of the architecture education curriculum on design. The study is part of a larger research aimed at evaluating the architecture curriculum via feedback from various categories of stakeholders such as students, staff and architects in practice. The department of Architecture in ABU was chosen because it is the pioneer School of Architecture in the country. It also implements a modified curriculum since 2012 geared in part towards specialization at postgraduate levels. The study poses two research questions. First, which courses most impact design and practice at MSc level? Secondly, is there a difference between impact levels of Electives in areas of specialization, Core and Cognate courses?

The paper is structured along 4 sections after the introduction. The literature reviews the relationship between architecture education and architectural design studio as well as the new curriculum at ABU in section 2. Section 3 presents an overview of the mixed methodology employed for the study while major findings are reported in section 4. The paper concludes with recommendations and areas for further research in section 5. These are followed by references cited in the study.

ARCHITECTURE CURRICULUM AND DESIGN

Architecture Education and Architectural Design Studio (ADS)

The design studio is the core of the architecture curriculum and design studio-based courses are central to architectural education programs in most universities worldwide (Nazidizaji, Tome and Regateiro, 2014). Other theoretical and technological courses support the main goal of the design studio, which is to prepare architectural students to deal with open-ended design problems and find creative and innovative solutions to the design problems (Ibrahim and Utaberta, 2012).

The ADS is a revised American version of the atelier training system established in the Ecole des Beaux-Arts in 19th Century Paris (Kuhn, 2001). Prior to the French revolution in the late 18th Century and the emergence of the Ecole des Beaux-Arts, architecture

was initially taught within a guild framework. "The famous old masters theorized and wrote extremely sophisticated treatises but as far as we know did not instruct their apprentices to the knowledge the treatises contained through formal courses" (Tzonis, 2014, p. 478). The history of formal architectural education has been traced back to the 15th Century *Accademia Platonica* in Florence, which originated from a dispute between Lorenzo de Medici and Leon Battista Alberti (Mahmoodi, 2001). "This academia soon became a viable alternative to the existing training trends of students working under the supervision of master artists, painters, architects and sculptors" (ibid, p. 15). It is believed that the Italian renaissance models inspired the French in establishing the *Academie Francaise* in 1635, the precursor of the *Academie Royale d'Architecture* as the root of the present concept of architectural education (ibid). This in turn inspired the foundation of the Ecole des Beaux-Arts in 1819 after the French revolution. Characteristics of the Beaux-Art school, some of which are still evident in most architecture curricula today include the division of students into ateliers run by patrons; teaching of young pupils by older students and practicing architects; the design exercise was the core of the educational program with students commencing design studies immediately upon entering the atelier; the systematic resolution of design problems starting with the *esquisse* and development of a competitive spirit as a pedagogic tool (ibid). The main disadvantage of this system was the distance created between theory introduced during the Renaissance and practice in the design studios (ibid; Tzonis, 2014)

The legacies of the Ecole des Beaux-Arts were adopted in varying degrees in other countries notably Britain, Germany and America. The British pupilage system which flourished from the 18^h to early 20^h Century involved young pupils paying to work with a master while occasionally attending lectures which frequently incorporate trips to Europe (Mahmoodi, 2001). During this period, professionalism fostered the need for more formal educational programs. The Architectural Association (AA) and registration of the Royal Institute of British Architects (RIBA) laid the foundations for the establishment of Britain's first recognized School of Architecture in Liverpool (ibid). This system was later

exported to colonies where the British eventually set up architecture schools, Nigeria inclusive.

The German Bauhaus, which later influenced the American system of architecture education, was founded upon the Arts and Crafts movement of 1880s in Britain and sought to stem the threat of individual expression and craftsmanship. "The dominant tendency in the Bauhaus way of teaching was the emphasis on experimentation with abstract forms . . . the positive influence of Bauhaus today lies in encouraging appreciation for the role of material, techniques and construction in architectural schools" (ibid, p. 20). Some of these traditions, alongside classical traditions through influences of the Beaux-Arts influenced American architecture education especially after the Second World War.

American architecture education developed its own character over the years, the most enduring legacy today being the course credit or unit system adopted by many Schools of Architecture worldwide with ADS at the core of the curriculum. Other courses support learning in the design studio. Mahmoodi (2001) notes that problems associated with the course credit system largely revolve round the adaptation of the system in local contexts of architecture schools.

Architecture education in Nigeria was introduced in 1952 with the establishment of the first School of Architecture at the Nigerian College of Science and Technology, Ibadan. The school was then transferred to Zaria in 1955 as a 5-year program culminating in the award of a Diploma qualifying the student to write the RIBA final exams (Maina, 2008). This program was later converted to the Bachelor of Architecture (B. Arch) program when the college was upgraded to ABU. A committee recommendation in 1968 resulted in a curriculum change to the 2-tier BSc/MSc model. With the introduction of the 6-3-3-4 National Policy on Education, all undergraduate courses were converted to the 4-year course-credit system based on 2 semesters per academic year from 1988. Abdulkarim (2009) asserts, "the most serious problem facing the course-credit system . . . is the poor academic performance leading to non-graduation of students" (p. 144-145). Others relate to administrative problems notably inadequate infrastructure, facilities and equipment;

insufficient qualified and dedicated academic staff especially at senior levels to lead and inspire younger staff (top empty and bottom heavy syndrome); insufficient guidance/counseling for students in selecting controlled elective courses as well as delays in administering, compiling and computing continuous assessments and examination results (ibid). Findings from the study largely formed the basis for a proposal of a new curriculum of architecture based on faculty structure to the address the challenges of the 21st Century facing architecture characterized by social, economical, technological changes such as ICT, search for sustainable environments and balance between theory and practice.

Architecture curriculum in Ahmadu Bello University

The new curriculum in ABU targets two new areas-the entrepreneurial base of architecture as a discipline and specialization, the latter especially at postgraduate levels (Revised Programmes for the Proposed Faculty of Architecture, 2012). Important highlights of the review with respect to postgraduate courses include **increasing studio hours, eliminating duplications/wastages in theory courses, introduction of specialization at MSc level through compulsory elective courses as well as architectural workshop practice to improve hands on skills in design and production of building materials/building components (ibid). Core courses focus on developing design, construction and structural skills; cognate courses address thinking, technical writing, professional practice and managerial skills while elective courses in areas of specialization aim at equipping students to face challenges of globalization and changing societal needs.**

The methodology for Abdulkarim's study (2011) employed likert scale questionnaires and student records to assess curricula and professional competence of graduates. These were then subjected to descriptive and inferential statistics. Results were used to quantitatively establish the fit of three categories of curricula against current requirements and expectations for graduates of the Department of Architecture in ABU. Dare-Abel et al. (2015) on the other hand, employed a qualitative interview based

approach and content analysis to address the relationship between the practice environment and its effect on architecture education as well as to ascertain the extent the quality of graduates of architecture impact professional practice.

Quantitative methods offer objective results based on replicable procedures. They unfortunately rarely provide holistic explanations on empirical research findings. Conversely, while qualitative methods proffer quotes and explanations numerical data analysis rarely capture, results are often considered subjective, depending on the researcher's interpretation. They are consequently difficult to replicate (Bryman, 2012). To mitigate deficiencies observed for both quantitative and qualitative methods, Sidawi (2014) employed a mixed methodology of survey questionnaires and interviews to assess hindrances and drivers for innovation in the design studio as well as to compare communication routes and techniques students use to get innovative ideas under certain social settings of design studios. "Each questionnaire survey was followed by interviews. The aim of the interviews was to explore the hidden causes behind the issues considered of significance by the respondents, to validate the questionnaire survey results and to clarify ambiguous points" (ibid, p. 277). This approach employing the quantitative paradigm supported by qualitative data was therefore employed in the present study.

METHODOLOGY

To evaluate the implementation of the current modified curriculum at MSc level, 85 questionnaires targeting 100% of MSc II students at the Department of Architecture, ABU were distributed in March 2015. The questionnaire solicited 3 categories of information. The first relates to demographics (gender, age and previous design experience) while the second sought relevance of each course in the curriculum. The third section ascertains the degree to which each course impacts design on a 5-point likert scale (with 5 denoting high impact to 1, no impact). Additionally, informal interviews were conducted with 2 senior members of staff and 7 students who were willing to proffer explanations regarding the impact of courses on

design studio and suggestions for improving the current curriculum. Questionnaire responses were quantitatively analyzed with IBM SPSS® version 21.

In response to the first research question regarding which courses most impact design, results were quantitatively analyzed for relevance (in %), means (M), standard deviations (SD), coefficient of variation (CV%) and 95% confidence intervals (CI) for means. Relevance is computed as a percentage of the total number of students who checked a course as being relevant. The mean, M is the average impact score of a course on design. The SD reveals the spread of individual scores around the mean; a low SD relative to the mean score denotes most students rated a course close to the mean score while a high SD denotes variability of student ratings away from the mean score. The CV% is the ratio of the mean and SD expressed in % (Westgard, 2014) while "a confidence interval for the mean is a range of scores constructed such that the population mean will fall within this range in 95% of samples" (Field, 2013, p. 59). This range is typically stated as upper and lower boundary scores. For the purpose of this study, courses with means above or equal to 4.0; CVs less than or equal to 25%; CIs with upper boundaries approaching 5.0 and lower boundaries approaching 4.0 as well as being at least 50% relevant are deemed to most impact design from the MSc student perspective.

To address the second research question regarding whether differences exist between mean scores of Electives in areas of specialization, Core and Cognate courses, two hypotheses were set up. The first tests the null hypothesis that no difference exists between means (M) of Core courses and Electives in areas of specialization ($H_0: CoreM = ElectivesM$). The second tests the null hypothesis that no difference exists between means of Cognate courses and Electives in areas of specialization ($H_0: CognateM = ElectivesM$). The test statistic, M and SD of Core, Cognate and Electives in areas of specialization were employed to compute Cohen's effect sizes (d) of differences between means. This is given as: $d = \frac{CoreM - ElectiveM}{ElectivesSD}$ for H_01 and $d = \frac{CognateM - ElectiveM}{ElectivesSD}$ for H_02 respectively (Field, 2013 p. 80). Effect sizes were interpreted based on the

following criteria: $d = 0.2$ (small), 0.5 (medium) and 0.8 (large). "An effect size is simply an objective and (usually) standardized measure of the magnitude of the observed effect" (ibid p. 78). In this context, the effect size is a standardized measure (based on the standard deviation) of the observed difference between means of Core or Cognate courses over Electives based on student ratings. Qualitative data in form of direct quotes from interviews proffer additional explanations on observed results and suggestions on ways to improve the curriculum at the MSc level. Findings are presented and discussed in the next section.

Statistics such as CVs are not known to have fixed or standard benchmarks but are interpreted on the basis of the study context (Westgard, 2014).

FINDINGS AND DISCUSSIONS

Table 1: Summaries of demographic data for MSc students

Variable	Category	N	%
Gender	Male	28	70
	Female	11	27.5
	Missing	1	2.5
Age	21-25	15	37.5
	26-30	22	55
	31-35	3	7.5
Previous design experience	UG (Undergraduate) design	7	17.5
	UG design + NYSC (National Youth Service Corps)	2	5
	UG design, NYSC, Govt, work + Private Practice	1	2.5
	UG design + Private Practice	15	37.5
	UG design + SIWES (Students Industrial Work Experience Scheme)	5	12.5
	UG design, NYSC + Private Practice	3	7.5
	UG design, Govt work + Private Practice	2	5
	UG design, NYSC, Govt, work + SIWES	1	2.5
	UG design, NYSC, Private Practice, SIWES + Teaching	1	2.5
Missing	3	7.5	

With respect to which courses most impact design at MSc level from the student perspective, 8 courses were initially revealed to have means (M) equal to or above 4.0.

Table 2: Student rating on relevance and impact of MSc courses on design and practice

Rank (based on M)	Course	Category	Relevance		Impact on design		
			N	%	N	M	SD
1	Professional Practice I & II	Cognate	37	92.5	39	4.85	0.709
2	Detailing and Specification Writing	Elective	32	80	22	4.64	0.727
3	Advanced Building Construction	Core	32	80	38	4.58	0.858
4	Design Development	Elective	20	50	19	4.47	0.612
5	Sustainable Architecture	Cognate	37	92.5	35	4.37	1.087
6	Life Project	Core	13	32.5	21	4.14	1.236
7	Sustainable Arch Design	Cognate	37	92.5	24	4.13	0.85
8	Advanced Building Services	Cognate	36	90	32	4.06	0.759

Research Findings

Out of the 85 questionnaires distributed, 40 representing 47% were returned. This low rate notwithstanding, the demographics reveal that 70% of the respondents are male while 27.5% are female (Table 1). This finding on the enrolment of male and female students is validated by results from previous studies involving students and graduates of architecture especially in ABU (Abdulkarim, 2011). Most respondents were within the age range of 26-30 years. 37.5% of the respondents have private practice and undergraduate design experience. 17.5% had only undergraduate previous design experience (Table 1).

9	Project and Site Management	Cognate	30	75	33	3.79	1.023
10	Building Systems and Energy	Elective	21	52.5	16	3.75	1.291
11	Contemporary Nigerian Arch	Elective	13	32.5	15	3.6	1.056
12	Housing Development	Elective	27	67.5	27	3.59	0.694
13	Technical Report Writing	Cognate	23	57.5	31	3.58	1.089
14	Cost Monitoring	Cognate	32	80	35	3.54	1.12
15	Advanced Research Methods	Cognate	26	65	29	3.48	1.153
16	Thesis Design Seminar	Cognate	17	42.5	22	3.45	1.224
17	Thesis Design Project	Core	18	45	20	3.4	1.429
18	Thesis Design Writing	Cognate	14	35	25	3.4	1.225
19	Architect as Project Manager	Elective	25	62.5	26	3.35	1.294
20	Adv. Building RC Steel Structures	Core	23	57.5	33	3.27	1.257
21	Restoration Studies	Elective	16	40	28	3.11	1.066
22	Digital Fabrication	Elective	10	25	12	3.08	0.996
23	Environmental Design Simulation	Elective	23	57.5	15	3.07	0.961
24	Advanced Lighting	Elective	20	50	16	3.06	0.772
25	Urban Forms and Processes	Cognate	13	32.5	23	3.04	1.107
26	Contemporary Arch Theories	Elective	15	37.5	16	2.94	0.854
27	Advanced Steel Structures	Core	23	57.5	13	2.92	1.115
28	African Settlement and Arch	Elective	10	25	13	2.92	0.954
29	Tourism and Recreational Facilities	Elective	9	22.5	10	2.9	0.876
30	Advanced Wooden Structures	Core	9	22.5	16	2.88	0.957
31	Glass Plastic Structures	Elective	8	20	15	2.87	0.834
32	Contemporary Urban Forms and Structures	Elective	13	32.5	12	2.75	0.754
33	Classical Architectural Theories	Elective	3	7.5	13	2.46	1.127
34	Urban Ecology	Elective	9	22.5	11	2.45	0.934
35	Plastic Architecture	Elective	9	22.5	10	2.2	0.919

design from the sample. It is also the only course of 40 students rated it. It is pertinent to however note considered irrelevant by students within the high that all the courses record some level of impact on impact group of courses (Table 2) in part because 13 out design.

Table 3: CVs and 95% CIs for courses most impacting design at MSc levels from students' perspective

Course	CV	95% CI for Means	
	%	Upper boundary	Lower boundary
Professional Practice I & II	14.6	5.08	4.62
Detailing and Specification Writing	15.7	4.96	4.31
Advanced Building Construction	18.7	4.86	4.3
Design Development	13.7	4.77	4.18
Sustainable Architecture	24.9	4.74	4
Sustainable Arch Design	20.6	4.8	3.77
Advanced Building Services	18.7	4.34	3.79
Life Project*	29.9	4.71	3.58

*CV well above the 25% benchmark for the study and relatively low boundary for CI

With respect to the second research question, students on average rated Cognate courses (M 3.84, SD 0.63) and Core courses (M 3.74, SD 0.89) higher for impact on design than Electives in areas of specialization (M 3.49, SD 0.799). Results from the paired samples T-test (Table 4) however reveal that although there was no significant difference between means for Core courses and Electives ($p=0.146$), the difference between means of Cognate courses and Electives was significant ($p=0.015$) and represented a small to medium size effect ($t^{\wedge}0.44$).

Table 4: Comparison between means for impact of Electives, Core and Cognate courses from Msc students' ratings

	T-statistic	<i>d</i> value	Cohen's effect size, <i>d</i>	Remark
Core courses vs. Electives	1.487	0.146	0.31	Small effect
Cognate courses vs. Electives	2.55	0.015*	0.44	Small to medium effect

★Significant at 0.05

Discussion

Practice related courses highly impact architecture education

Results from the data analyses reveal that Professional Practice, Detailing and Specification Writing, Building Construction, Design Development, Sustainable Architecture, Sustainable Architectural Design and Building Services most impact design at MSc levels (Table 3). These are all courses directly related to practice and are often taught by professionals in active practice. Architects in practice therefore play a significant role in the overall education and training of future architects. It is imperative that collaboration between academia and practice be urgently revived and strengthened to improve the quality of architecture education (Suleiman and Abubakar, 2015). Interview responses from students further revealed underlying reasons for this impact: courses where students are made to understand the practical pragmatic applications to design are perceived to be more relevant and beneficial to the curriculum and to architecture education. Students noted that:

Although scores from individual courses (Table 2) were not normally distributed, combined means of Core courses, Cognate courses and Electives in areas of Specialization were within limits of normal distributions.

“Strategies should be created so that courses relate to the present situation of the world to help architects grow with knowledge to solve current problems. Theoretical courses should focus more on implementation of the theories to real life projects by incorporating frequent site visits where majority of the theories can be discussed on site”.

“Theory courses should be related to practice as much as possible. There should be frequent site visits; students should be shown ideal construction methods and material installation since the architect is expected to carry out functions such as inspection and monitoring. A gallery should be provided where different building materials, finishes building components are displayed, so that students don't just know the names of materials but know them physically in terms of quality and appearance”.

“The department should work on pursuing hands-on and group oriented learning methods”.

“Priority should be placed on academic and practice synergy to equip the student with both types of knowledge to compete favorably for the advancement of the society”.

These observations also underscore the need to urgently address practical aspects of the design studio as results reveal a large number of students engage in private practice before qualifying as registered architects (Table 1). Not surprisingly, the increasing inability of many graduates to effectively undertake the expected range of work expected at graduate level has been a re-occurring complaint against academia from architects in practice. This finding presents a case for the possible re-evaluation of the registration criteria by ARCON after undergraduate training to address the issue of practice by unqualified and un-registered graduates of architecture. This measure may however have implications on the duration of the undergraduate degree in Architecture.

Arc. Ibrahim A. Haruna ^{FRNA, MNI, FRNA} has taught Professional Practice in ABU since 1999. He also teaches Specification Writing at the same institution

Curriculum not effectively achieving set target of specialization at MSc levels

Results from the survey suggest that presently, the curriculum is not effectively achieving the intended target of specialization at MSc level compared to the higher ranked set of Cognate courses. Several factors such as the curriculum just taking off, insufficient infrastructure (specifically studios and laboratories) and modalities in place for the courses as well as poor orientation for students were proffered as possible reasons for this finding during the interviews.

“Many of us are not aware of the relevance of some courses especially as it relates to design. Intense orientation at the beginning of the program would go a long way towards making students appreciate the holistic view of how individual courses affect what we do in design and practice”.

This lack of conscious awareness is also proffered as an explanation for the low impact of some core courses specifically Building Structures. A senior academic staff member notes,

"Students intuitively employ knowledge of structures acquired over time from the lower undergraduate classes to design without being conscious of it. For instance, how can a student design a space 12m wide at masters level devoid of visible columns and support without the knowledge of structural members capable of covering that distance?"

Poor attitude to architectural research; need for frequent curriculum evaluations.

The relatively low return rate of the questionnaires especially within an academic environment reflects an endemic and chronic problem in architecture, that of a poor research culture that has made the profession to rely on others for its knowledge base. This finding validates similar observations made by several authors in the past (Marcus, 2002; Hillier, 2007; Salama, 2007, Rittleman, 2010). During the interviews, a student noted that:

"Many of my colleagues believe filling the questionnaire a waste of time. How useful and beneficial will it be in the long run? Even after I explained the benefits of the research, which was clearly expressed in the questionnaire, many were indifferent. We are not used to research

Unfortunately, this poor attitude to research comes at a high price to the overall progress of the profession. It proffers a possible reason why allied professionals such as Quantity Surveyors, Builders, Engineers and Planners are gradually taking the lead in construction related matters and practice. It is imperative therefore that students and architects within academia and practice, are made aware of the great need for active involvement in current research and frequent curriculum evaluation. Interview responses from students support this argument.

"Architecture must be seen as a dynamic and pragmatic profession that requires constant and periodic evaluation to meet the needs of the society

"A regular evaluation of the curriculum involving

feedback from both students and lecturers is necessary

"Engage students in research as early as possible to gain a full understanding of how to carry out research

CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

In conclusion, this paper set out to investigate the relevance and impact of courses taken at the MSc level on design from the student perspective as part of strategies for evaluating the current curriculum at ABU. Results revealed that practice related courses have a high impact on the curriculum. Additionally, the curriculum is yet to fully achieve the set goal of specialization at MSc level when compared to established cognate courses. The study also revealed a poor attitude to research in architecture, which is detrimental to the sustainability of the profession at large.

The paper therefore recommends intensive orientation especially for electives in areas of specialization at the inception of the postgraduate program, provision of adequate studio facilities, frequent curriculum evaluations, pursuing a vigorous research-based curriculum which focuses on current needs of the architectural profession as well as teaching courses in practice related ways. This calls for renewed collaboration between practicing architects and Schools of Architecture. It also means regular training and capacity building for architecture educators as recently reiterated by Abubakar and Suleiman (2015).

This study focused on feedback on the curriculum as it relates and impacts design of MSc II students at Ahmadu Bello University employing student ratings. Further studies in other levels and Schools of Architecture will go a long way towards establishing how effective the architecture curriculum is in Nigeria. Future studies and feedback from other stakeholders notably academic staff as well as architects in practice is also essential in providing a holistic evaluative database on architecture education in the country.

REFERENCES

- Abdulkarim, M. (2009).** Architecture training in times of crises: Introducing reforms in the course-credit curriculum. In: *Proceedings of the Architects' Colloquium 2009: Architecture and the Nigerian Development Agenda II* held at Shehu Musa Yar'Adua Centre, Abuja, 24^h-26th March, 2009. pp. 140-152.
- Abdulkarim, M. (2011).** *Evaluation of the Architectural curricula and professional competence of the graduates of Ahmadu Bello University, Zaria-Nigeria.* Unpublished thesis (PhD), Department of Architecture, Ahmadu Bello University.
- Abubakar, A. and Suleiman, N. E. (2015).** Capacity building for Nigerian Architectural Educators. In: Laryea, S. and Leiringer, R. (Eds.) *Procs 6th West Africa Built Environment Research (WABER) Conference*, 10-12 August 2015, Accra, Ghana, pp. 209-218.
- Adewale, P. O. and Adhuzo, O. B. (2013).** Entry qualifications and academic performance of architecture students in Nigerian Polytechnics: Are the admission requirements still relevant? In: *Frontiers of Architectural Research* (2014), 3, pp. 69-75.
- Afolami, A. J., Olotuah, O. A., Fakere, A. A. and Omale, R. P. (2013).** Comparative analysis of students' performance in architecture department of a Nigerian University. In: *International Journal of Education and Research*, Vol. 1 No. 6 June 2013 pp. 1-8.
- Altrichter, H. (2005).** Curriculum implementation- Limiting and facilitating factors. In: Nentwig, P. and Waddington, D. (eds.). *Context based learning of Science.* Waxmann: Munster, pp. 35-62.
- Bashier, F. (2014).** Reflections on architectural design education: The return of rationalism in the studio. In: *Frontiers of Architectural Research*, Vol. 3 pp. 424-430.
- Bishop, G. (1985).** *Curriculum Development: A textbook for students.* London: Macmillan.
- Bryman, A. (2012).** *Social research methods* (4th ed.). New York: Oxford University Press.
- Dare-Abel, O. A., Alagbe, O. A., Aderonmu, P. A., Ekhaese, O. N. and Adewale, B. A. (2015).** Pathways to Architectural Education and practice success in Nigeria. In: *Journal of Education and Practice*, Vol. 6, No. 4, pp. 169-175.
- Field, A. (2013).** *Discovering Statistics using IBM SPSS Statistics* (4th Ed.) [Kindle version]. London: Sage.
- Hillier, B. (2007).** *Space is the Machine: A configurational theory of Architecture Space* Syntax: Press Syndicate.
- Kuhn, S. (2001).** Learning from the architecture studio: Implications for project based pedagogy. In: *Int J. Eng. Educ.* 17 (4-5), pp. 349-352.
- Mahmoodi, A. S. (2001).** *The Design Process in Architecture: A pedagogic approach using interactive thinking.* Unpublished thesis (PhD), University of Leeds, UK.
- Maina, J. J. (2008).** *Architecture education in Nigeria: Problems and way forward.* PhD seminar paper, Department of Architecture, Ahmadu Bello University, (May 2008), pp. 1-14.
- Mlarcus, L. (2002)** The need for theoretical knowledge in architectural practice. In: *Nordic Journal of Architectural Research*, Vol. 15 No. 4, pp. 1-20.
- Nazidizaji, S., Tome, A. and Regateiro, F. (2014).** Search for design intelligence: A field study on the role of emotional intelligence in architectural design studios. In: *Frontiers of Architectural Research*, Vol. 3 pp. 413-423.
- Revised Programmes (2012).** Proposed Faculty of Architecture and Sustainable Environment. Department of Architecture, Ahmadu Bello University, Zaria, Nigeria.
- Rittleman, P. R. (2010).** *The case for Architectural Research: A personal essay* [Online], Available from: http://www.burthill.com/FILES/practice/Case_for_Architectural_Research.pdf. [Accessed 23/03/2010].
- Salama, A. M. (2007).** Navigating housing affordability between trans-disciplinarity and life-style theories: The case of the Gulf States. In: *Archnet-IJAR, International Journal of Architectural Research*, Vol. 1 Issue 2, pp. 57-76.
- Sidawi, B. (2014).** The Tale of innovation in two departments of Architecture in the Kingdom of Saudi Arabia. In: *International Journal of Architecture, Engineering and Construction*, Vol. 3, No. 4 (December 2014), pp. 275-286.
- Suleiman, N. E. and Abubakar, A. (2015).** Collaboration between practice and school for the adequate training of the architect in Nigeria. Paper presented at the *Architects' Colloquium 2015*, Shehu Yar'Adua Centre Abuja, 8th-11th June, 2015, pp. 1-11.
- Syomwene, A. (2013).** Factors Affecting Teachers' implementation of Curriculum reforms and educational policies in schools: The Kenyan Experience. In: *Journal of Education and Practice*, Vol. 4, No. 22, pp. 80-86.
- Tzonis, A. (2014).** A framework for architectural education. In: *Frontiers of Architectural Research*, Vol. 3 pp. 477-479.
- Westgard, J. (2014).** *Z-stats/Basic Statistics* [Online article] Accessed 20/08/2014 from <https://www.westgard.com/lesson34.htm>.

COLLABORATION BETWEEN PRACTICE AND ACADEMIA FOR THE ADEQUATE TRAINING OF THE ARCHITECT IN NIGERIA

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ABSTRACT

The state of architectural education in Nigeria is reviewed, highlighting the challenges faced. The paper points to the necessity of collaboration between practice and the schools of architecture, in order to help in overcoming some of the challenges of architectural education and architectural practices are for the mutual benefit of both. Data were derived from questionnaires distributed at an Annual General Meeting of the Nigerian Institute of Architects, the results were analysed by simple descriptive statistics to help substantiate the points raised. The paper calls on architectural practices to support education in such ways material and financial donations, participation in direct training and indirect training through the industrial training programme. It also suggests the revival of the joint meeting of Architects Registration council of Nigeria (ARCON) Nigerian Institute of Architects (NIA) Association of Architectural Educators in Nigeria (AARCHES) Heads of Schools.

Keywords: Architectural education, practice, school of architecture, collaboration, stakeholders

INTRODUCTION

Olotuah (2002) and Kimeng (2007) identified major stakeholders in architectural education in Nigeria to include teachers, students, schools, government, professional bodies, corporate organizations and architectural firms. Architectural Firms are supposed to be the major employers of architecture graduates and thus the major stakeholders. However studies such as Abubakar's (2008) have found out that the major stakeholders are not satisfied with the proficiency of the architecture graduate at the point of employment. They point out that there is likely a problem with the training of the architect.

Others (for example, Abubakar & Suleman, 2013, Uji,

2006) have identified challenges of architectural education in Nigeria to include admission of unqualified students, deficiencies in curriculum, staffing quality and quantity, paucity of facilities and inadequate funding. The absence of good quality research, lack of linkages with other institutions, globalisation, poor teaching methods, lack of specialisation, are other problems.

However, most authors appear to lay the problems of architecture and architectural education on the inadequacy of curriculum. Mas'ud & Badiru (2004) & Annunobi (2006) believe in the expansion of the curriculum to include Business and Management courses. Others suggest the inclusion of Information and Communications Technology, ICT (Lawal & Abdulrahman, 2007), Sustainability (Olotuah, 2013; Eneh, 2007), Specialization (Oluigbo, 2005; Suleman, 2006), Research (Ayuba et al, 2007), Building and Environmental Evaluation (Amole 2000) and many others.

Kene (2007) concludes that only "mutual interaction on continuous basis between the practice and the schools of architecture will enrich the quality of the members of the profession..." This paper therefore focuses on the need for enduring collaboration between architectural practices and the schools of architecture to move architecture forward in Nigeria.

2.0. METHODOLOGY

This study relied more on secondary data obtained from published researches and other literature. Primary data were obtained from a questionnaire that was distributed at the 54th Annual General Meeting of the Nigerian Institute of Architects held at Ilorin between 19th - 22nd November, 2014. The respondents were architects from all over the country and of different experiences; some were in private practice, some in civil service and

some in education. This suggested that the respondents would give a broad view. The data were analysed using

descriptive statistics such as tables and percentages,

3.0 DATA PRESENTATION AND ANALYSIS

Table 1: Rating of Graduates

	Very Adequate	Adequate	Fairly Adequate	Not Adequate
Architectural Design	0%	80%	20%	0%
Graphic Expression	25%	65%	0%	10%
Construction Technology	0%	0%	35%	65%
Oral Expression	0%	65%	25%	10%
Computer skills	0%	50%	50%	0%
Leadership Skills	0%	20%	20%	60%

From the above table graduates are more adequate in Graphic Expression and Architectural Design while

they are least adequate in Leadership Skills and Construction Skills. They are average in Computer Skills.

Table 2: Areas of Collaboration Needed

	Highly Needed	Fairly Needed	Not Needed
Participation of practitioners in lecturing/Seminars	70%	30%	0%
Financial Assistance	100%	0%	0%
Material Assistance	100%	0%	0%
Accepting Students on Industrial training Programmes	100%	0%	0%
Research	80%	20%	0%
Accepting Lecturers on Part Times	80%	20%	0%

From the above table all areas listed need collaboration, with 70% being the least for Participating in Lectures and Seminars, 80% for collaboration on Research and Accepting lecturers on Part-time and 100% for

collaboration in Financial Assistance, Material Assistance and Accepting Students on industrial Training

4.0 DISCUSSIONS: SUGGESTED AREAS OF COLLABORATION

4.1 Curriculum

All of the respondents to the questionnaires express the need to update the curriculum to include additional subjects such as Marketing Skills, Architectural Historiography, Building Information Modelling.

Many authors (Ogunrayewa&Agbo, 2001; David, 2008; Fashuyi, 2008; Onolaja et al, 2008; Okpoechi, 2008; etc) seem to place the problem on the curriculum, suggesting a review of the curriculum to include various courses such as Management, ICT, Sustainability, Green Architecture and so on. Mas'ud (2007) sums it that 6 years are no longer enough and suggests a seven-year course. The National

Universities Commission (NUC) on the other hand keeps adding one General Studies Course after the other. Apart from the normal Use/Communication in English and Use of Library, there is Communication in French/Communication in Arabic, Nigerian Peoples and Culture, Peace and Conflict Studies, History and Philosophy of Science, Logic, Philosophy and Human Existence, Entrepreneurship Skills. These courses are compulsory for all undergraduate students! In addition, the student is expected to have a maximum of 24 credit units per Semester, leaving no room to add more relevant courses to the Nigerian Universities Commission's (NUC) Benchmark Minimum Academic Standards (BMAS). One cannot but agree with Mas'ud (2007) that the six years of the B.Sc/M.Sc are not enough, but neither are 7, 8 or 9 years! One wonders if we are not falling into the trap of training an architect who knows "very little about a great deal and keeps knowing less and less about more and more until he knows practically nothing about everything" (Adeyemi, 1996). Again, Adeyemi (2004) recommends that NIA should "define the kind of architecture it should want to bequeath to posterity"; NIA should take a serious look at the NUC BMAS for Architecture courses with a view to making it flexible for addition of professional courses along the philosophical objectives of the various schools.

This calls for collaboration with those in practice, who know what is the basic need for the industry, especially as they observe the deficiency graduates come with. Partnership with industry is a necessity for a thorough review of curriculum such that the student will not be saddled with many courses while leaving the main requirement of industry out and making the graduate of architecture knowing too much but not employable.

4.2 Collaboration in Training

All respondents expressed the need for collaboration in the area of practitioners actually being involved in the training of architects in such courses that would be best taught by experienced practitioner. Teaching of courses such as Professional Practice, Contract Administration, Computer Aided Design, and Working Drawings should involve the practitioner in one way or the other. Anigbogu (2012), sums it this way, "Architects are not being given sufficient training in such practical matters

as construction materials and systems, construction methods and practices, the cost of construction, specifications writing, codes and standards, and design and functioning of mechanical and electrical systems in buildings". So the schools ought to engage the professional to assist in giving instructions to the students. Some can volunteer to assist free of charge as is the case in some schools.

4.3 Staff Development and Student's Industrial Work Experience (SIWES)

No professional can be complete at graduation prompting Dabrowski, a Lecturer at Ahmadu Bello University, Zaria in the 80s, used to call his students %* architects. That is why there is a period of internship. The SIWES programme, NYSC, and early years of practice are periods that practical experience is gained. There is no denying the fact that the teacher needs constant updating of practical knowledge in view of the fast changing processes in the building industry caused by rapid change in technology and the insatiable human desires. Again collaboration with established practices is essential. Apart from the commendable continuous professional development seminars of the Architects' Registration Council of Nigeria (ARCON) and Nigerian Institute of Architects (NIA), which architects educators should be encouraged to attend, attachment with a firm for the long vacation period for a specific schedule is necessary for the teacher to gain practical experience. This is the case in developed countries. Frederick Steiner, Dean of the School of Architecture, University of Texas at Austin, explains how education and practice benefit from each other by pulling resources together for mutual benefit. He explains that "for several years, I spent my summers and one day a week during school year working at a regional planning Agency and we were able to secure grant funds..." (Steiner, 2013). Can this not work in Nigeria? Eneh's (2007) suggestion of train the framer programmes is a welcome idea aimed at improving the quality of the teacher. However most of the respondents express that they do not have such a scheme in their firms owing to lack of jobs.

The SIWES scheme is another area of collaboration that should be seen for what it is: architectural internship meant to put into practice what the student

has learnt in theory so that they can see how it works. It should be the beginning of practice experience. Here the practitioner is supposed to be the industrial teacher, finding an aspect of architecture to train the student in, but what is experience is that, most often than not, they are left on their own without attention during this period. Mafe (n.d) says this is because “some of the employers, who accept students for SIWES, are unwilling to allow students to handle equipment and machinery in the fear that students might damage them”. Agbo et al (2004) point to differences between architecture that is taught in schools and that which is in practice. Good internship will help the student understand the difference between what they are taught and what they are likely to face in practice, and so are better able to harmonise both. It will also help to cross check the progress of the schools in delivering the content of the curriculum by ensuring that they teach things that are required appropriately. The cooperation of architectural practices is needed in this area. Only 60% of the respondents indicated they have been collaborating with schools through accepting students on industrial assignment, with some calling on the NIA to make accepting of students on industrial training compulsory to all registered architectural firms.

4.4 Research

According to Kene (2007), “progress in any discipline and profession is ultimately related to the quality and quantity of its engagement with the production of knowledge”. In line with this assertion, Fadamiro (2002) explains that the aim of architectural education is to produce “a professional, ready for active, creative research and practical career.” Thus research should be done by every architect whether in practice or in school.

One of the problems of architecture in Nigeria is the lack of quality research from both school and practice. As a result no new knowledge is produced; previous knowledge is being recycled over and over. Where there is no research, there is no sustainability. Jaiyeoba (2004) identifies the problems of research in architecture in Nigeria to be “underfunding, shortage of manpower, lack of proper training of prospective researchers, inadequate infrastructure and facilities and especially a lack of information base.” To overcome these problems, there is need for collaboration between

practice and school. One of these areas should be providing information base. Can a Lecturer come to a firm to get information on designed projects and cost? A lot of publications by Lecturers in the schools of architecture are reviews, mostly because of lack of information! A practicing architect can collaborate with a Lecturer by suggesting areas of research on an area he is interested in. It is suggested that every practice should have a research plan, and invite researchers with whom to collaborate. This is akin to the research unit of manufacturing firms vis-a-vis the schools of engineering. Though all respondents accepted that research was a necessary area of collaboration, none of them has ever collaborated with a school in this area.

Asked what would be his role in professional architecture over the next few years, Arc S. Alabi responded, “... I would love to have my work(s) considered, analysed and documented as a significant contribution to the profession so that those coming behind can have something to read about what we have done...” (Alabi, 2013). There is implication for research collaboration in this statement.

Similarly, when he was asked what he would like to be remembered as far as the profession is concerned, Arc. OlufemiMajekodunmi, replied, “...also as an African who encouraged and promoted the education of architects, by ensuring that the practitioners of the profession are the best available.” (Construction Review, 2014). This is a call to all architectural practitioners to support architectural education as a means to making our graduates the best.

4.5 Funding and Facilities

This should ordinarily be a no go area but all the same because of the poor funding in the institutions it is necessary to make an appeal in this respect. The needs of the schools of architecture include books, journals, computers, excursions, internet connectivity, which government alone cannot meet adequately. The practitioner can help through contacts that will source funds for the school, donate cash or items needed. The NIA should make financial and material donations to schools of architecture similar to what ICAN does to Accountancy Departments in Higher Institutions.

5.0 CONCLUSION AND RECOMMENDATION

The problems of architectural education in Nigeria can only be solved by the continuous symbiotic relationship between practice and school, through collaboration in critical arrears of need, especially research, to produce new knowledge that will make architecture sustainable.

The following recommendations will help actualise and strengthen this collaboration:

- a. ARCON/NIA should take urgent steps to study the current NUC BMAS for Architecture courses with a view to making it a curriculum that can produce the type of architect it envisages.
- b. The ARCON/NIA/AARCHES/Heads of Schools meeting that used to be called to discuss issues that affect education and practice should be revived.
- c. Each school of architecture should be encouraged to employ as part of its teaching staff, practicing and experienced architects as a requirement of the professional accreditation.
- d. Each State Chapter of the NIA should be encouraged to give a report at every Annual General Meeting (AGM) and Biennial General Meeting (BGM) of steps taken to collaborate with schools of architecture in their domain.
- e. Architectural Firms and Building construction Companies should endeavour to take steps, however little, to encourage architectural education.
- f. It should be made mandatory for architectural firms to accept students on industrial training.
- g. NIA should plan to make financial and/or material donations to selected schools of architecture every year on rotational basis and this should be reported at AGMs and BGMs.

REFERENCES:-

- Abubakar, A. (2008).** An assessment of the state of schools of architecture in Nigerian universities. *AARCHES J*, 7(1), 85-93.
- Abubakar, A. & SuIeman, N. E. (2013).** The state of architectural education in Nigeria: Growth and development, challenges and the way forward. *NIA Journal*, June-September, 49, 50, 57-61.
- Adeyemi, E. A. (1996).** The appropriate direction of architectural education in the Africa Region. *AARCHES J*, 1(3), 38-41.
- Adeyemi, E. A. (2004).** The NIA strategic choice for the new millennium. *Proc. XLIV NIA General Assembly/Conference*, 34-43.
- Agbo, N. O., Ogbonna, A. C., and Okwoli, F. P. (2004).** A reflection on the conflict and reconciliations between taught (Academic) and Practical Architectural designs. *AARCHES J*, 3(2), 47-51.
- Alabi, S. B. (2013).** On architecture in Nigeria: 50 years of evolution. *NIA Journal*, June-September, 44-48.
- Amole, D. (2000).** Completing the training of the sphere of the architect's education through to building and environmental evaluation. *AARCHES J*, 1(5), 47-51.
- Anigbogu, N. A. (2012).** Leapfrogging, tunnelling through and overcoming: Meeting the needs of construction education in Nigeria. Paper presented at the AARCHES Conference, Unijos.
- Anunobi, A. I. (2006).** Training of architects to meet the challenges of the 21st Century: A case for a new curriculum approach. *AARCHES J*, 5(6), 1-6.
- Ayuba, P., Olagunju, R. E., Akande, O. K. (2007).** Architectural education and research: A responsive tool to contemporary challenges in architectural practice. *AARCHES J*, 6(3), 36-40.
- Construction Review (2014).** Architect Olufemi Majekodunmi. *Construction Review*, 4(11), Accessed from www.constructionreviewonline.com on 10/2/2014.

- David, N. M. (2008).** Review of curriculum of architecture in Nigerian universities. *AARCHES J*, 7(1), 2-7.
- Eneh, A. E. O. (2007).** Sustaining the built environment through architectural education. *ECHES J*, 6(3), 18-24.
- Fashuyi, S. O. (2008).** Architectural education and the curriculum. *MACHES J*, 7(1), 8-12.
- Jaiyoba, E. B. (2004).** The need for research convergence between architectural practice and architectural education in Nigeria. *IECHES J*, 3(1), 1-3.
- Kene, M (2007).** Architecture in the 21st Century Nigerian economy: The way forward. Accessed from www.nigeriansinamerica.com on 2/2/2014.
- Kimeng, H. T. (2007).** Bridging the gap between stakeholders in architectural education in Nigeria. *AARCHES J*, 6(3), 31-35.
- Lawal, L. A. T. and Abdulrahman, M. E. (2007).** Teaching business skills to architecture students: A case for curriculum change. *AARCHES J*, 6(3), 49-54.
- Mafe, O. A. T. (n.d).** Effectiveness of SIWES with respect to chemical engineering. <http://www.nsche.org.ng/cms/publications>. Accessed on 21/09/2015.
- Mas'ud, A. (2007).** Architectural curriculum: Are six (6) years enough any longer? *AARCHES J*, 6(3), 41-48.
- Mas'ud, A. and Badiru, Y. Y. (2004).** Architectural education and practice in the 21st Century: New trends and challenges. *AARCHES J*, 3(1), 44-50.
- Ogunrayewa, M. O. and Agbo, N. O. (2001).** Critical evaluation of Nigerian architects in the teaching profession. *AARCHES J*, 1(6), 33-37.
- Okpoechi, C. U. (2008).** Making architectural education relevant to societal trends: A case for a curriculum review. *AARCHES J*, 7(1), 20-26.
- Olotuah, A. O. (2002).** Architectural education in Nigeria: Realisation and actualisation. *AARCHES J*, 2(1), 1-5.
- Olotuah, A. O. (2013).** Sustainable Architecture and architectural education in Nigeria. *NIA Journal*, June-September, 40-41.
- Onolaja, O. A., Jolaoso, B. A. and Dipeolu, A. A. (2008).** Review of curriculum of architecture in Nigerian universities to meet new challenges and opportunities: A panacea for academic advancement. *AARCHES J*, 7(1), 13-19.
- Oluigbo, S. N. (2005).** Improving the quality of architecture graduates from Nigerian universities. *UECHES J*, 4(1), 72-76.
- Steiner, F. (2013).** Challenges for planning education. Accessed from www.planning.org/education/resources/challenges.htm on 10/2/2014.
- Suleman, N. E. (2006).** Towards an integrated architectural education in Nigeria: A case for Postgraduate Diploma in Architectural Technology. *AARCHES J*, 5 (1), 32-39.
- Uji, Z. A. (2006).** Bridging the gap between theory and practice of architecture in Nigeria. *JJECT/ESJ*, 5(6), 66-74.

CONCEPTUALIZING QUALITY OF LIFE FOR HOUSING TRANSFORMATIONS - A CASE OF SETTLEMENTS AROUND KADUNA OIL REFINERY.

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Abstract

Housing transformations should be used as a mechanism to improve the quality of life of households and neighbourhoods (see Sani-Katsina, 2013). This work is aimed at bringing together the concept of quality of life and housing transformations.

The work highlights the contributions of Authors in the field of Housing transformation studies globally and locally and also highlights on some literature review in the quality of life studies. The work further fills the gap in the current literature on housing transformations on the implications of the processes, practices and outcomes on the quality of life households and neighbourhoods. The work draws on data collected in 2010 in Kaduna, Nigeria

The findings show that the quality of life of the households can be improved if the building professional and the Government officials understand the needs of the households. The conclusion drawn gives direction for future policy and research.

Key words: Housing transformations, quality of life, standard of living

Introduction

Researchers from various fields of study have defined housing transformations using several terms (see Sani-Katsina, 2013). For this study housing transformation is defined as any change made to the interior or exterior of the building or the surrounding plot from the moment the occupant starts living in the property, be it owner, renter or otherwise. This change can be in terms of addition or subtraction (natural or artificial) to the internal layout or the physical structure using permanent or temporary building and non-building materials which are produced or manufactured locally or otherwise (Sani-Katsina, 2013).

Housing Transformation and the Apparent Gaps in Literature

Despite the significant work on housing transformations, there remain gaps or limitations in the literature. Many researchers have focused on the increase in floor space, but overlooked the quality of the product, mostly assuming that the quality of the structure increases with the transformation. Seek

(1983) suggests that additions and alterations to the dwellings are undertaken largely to meet demands for more and better housing. However, Tipple (1991) points out that the research on transformation in his case study areas only cover construction activity and not issues regarding housing quality. Considering areas where the residents extended, he added that issues such as repainting, changing the design of the doors and window frames, and hanging curtains to divide room were all disregarded.

Similarly, the literature is silent on the difficulties households face as they cope with living in the transformed dwellings. This is because the literature of housing transformations seemingly portrays the end result as successful. Nevertheless, some scholars have explored quality and satisfactions. For example, Mumi (2008) concludes in the study on consumer protection in Bali that there was low satisfaction of households in relation to physical quality of the government built houses.

Researchers on housing transformations have also concentrated more on interior spaces of the house and not considered neighbouring and outside spaces, which, according to Sueca (2003), may have cultural significance. However, Aduwo (2011) states that the transformers were pleased with the outdoor spaces which resulted from the housing transformations.

Sheuya (2009) also suggests that there could be in house crowding resulting from housing transformations but adds that these standards are unrealistic as they are set by the Tanzanian authorities and not the people. On a similar note, Tipple (2000) said that:

We have insufficient data from our study as there was no examination of how the occupants or neighbours feel about room sizes, ventilation and day lightning circulation spaces, materials and standards of construction, services provided and all other components of the physical environment provided by the informal transformation activity. However, such a study could provide important insights to assist in developing revised building codes based on local realities rather than imported norms (Tipple, 2000 p 140).

In a similar view Turner (1976) states that: The real use-value-of housing cannot be measured in terms of how well it conforms to the image of a consumer society standard. Rather, it must be measured in terms of how well the housing serves the household (Turner, 1976p 114).

Based on Turner's argument, this study tries to provide a measure for the implications for quality of life of the transformations on the household and neighbourhood.

Housing Transformations and Informality

According to Ogu and Ogbuozobe (2001), the majority of the Nigerian population is housed through an informal housing delivery system. However, those in both formal and informal housing undertake transformation work on their dwellings. The term informality is used by Nguluma (2003); Sueca (2003); Khan and Jia (2007); Mai, Mumtaz and Shamsuddin (2007) and Sheuya (2009) to refer to transformations done without planning approval. Tipple (1991), however, posits that housing transformation activity represents informal activity carried out upon structures dominated by formal sector management and technology. Peattie (1980); Strassmann (1986); Gilbert (1988); Kigochie (2001); Tipple (2005a, 2005b, 2006) all express a similar view while relating housing transformations to home based enterprises.

In a similar argument Tipple (2000) and Khan and Jia (2007), state that the planning authorities regard housing transformations done without planning approval as informal and illegal, even if land on which the building sits is legally owned by the householder. However, the definition of the term 'informality' is unclear. In the opinion of Kamete (2012) the distinction between formal and informal makes it possible for the authorities to use the perceived differences to diagnose

the latter as a deviation from the norm: a pathology. In a similar view Hernandez (2010) states that informality applies to the practices which are not part of the mainstream. However, while Hernandez (2010) notes that formal may imply legality while informal may mean illegality, Kamete (2011) suggests informality is not illegality. Tipple and Speak (2009 p 167) note that the "legitimacy of the terms 'illegal' and 'informal' are complex and hide a multitude of degrees of ownership and legality."

At this point, it is important to note that this research is not concerned with the debate about informality. What is important is not so much the status of the housing or the transformation work, but what it offers to the household, community and country. For example, Mai and Shamsuddin (2008) suggest, in their work on vernacular housing transformation in Abuja, Nigeria, that informality is today a paradigm of city-making in Africa, Asia and Latin America. Moreover, one area of agreement between researchers on housing transformation is in the way in which both can be seen as contributing to, and improving, the overall housing stock of a country.

Advantages of Housing Transformation

In general, researchers tend to agree that there are many advantages of housing transformations. Research by Tipple (2000) and Kamete (2006) suggest that transformers should be encouraged by government. In a similar argument, Turner (1976 p 130) states that "the management and maintenance of dwellings and their surroundings and therefore their longevity, depend primarily on the care of their residents and users". The advantages of housing transformations as presented by Tipple (2000) in his research on user initiated transformation of government built housing in the developing countries of Bangladesh, Egypt, Ghana and Zimbabwe are presented in table 1 below.

Table 1 The balance of the advantages of transformations

Transformations: a neighbourhood improvement	'There goes the neighbourhood!': transformations as 'creatng slums'
The transformation supplies housing through people who would not be expected to supply it (not particularly well off consumers of government built housing) on already built up and (usually) serviced land	Housing provided by transformers is usually uncontrolled, may be unplanned, and is unpredictable in its consequences for the physical and demographic conditions in the neighbourhood
Transformation renews low quality housing at no cost to the government. The new housing is generally of at least as high a standard as the existing house in the neighbourhood. Very high plot coverage is only evident where plots are small	There are some localised problems of very high floor-space index and plot coverage creating environmental problems

There are lower occupancy rates for main households. Occupancy rates for subsequent households are not much higher than main households. The new population is more varied and so gives a wider age and income spread for the demand for neighbourhood facilities (shops, etc.) and public services (schools, etc.)

Transformations increase fixed capital stock. Transformations allow households to adjust their housing at their own pace and in their cost limits. This allows residents to express themselves through their built environment. Standards of finish are generally higher than that of existing structures. They can create new supply at the bottom of the market for renting or rent-free occupation much more cheaply than new-build projects

Transformations allow economic activity in houses (home-based enterprises) including renting rooms (passive), retailing and production (active). No evidence of devaluation of surrounding and non-transformed properties was found.

Transformation encourages increase in population leading to higher demand for utilities and public services. Service lines are likely to be comprised by the narrower and less regular spaces between buildings and encroachment onto road reserves and access lanes

Transformations look chaotic rather than disciplined, do not follow current government-favoured designs, and change the look of the neighbourhood from that which was planned. Some of the new rooms are small and built to minimal standards of space and utility. They generate some rooms which do not conform to building regulations minima for dimensions, lighting, ventilation, etc.

Non-conforming uses may create negative externalities (nuisance, traffic, danger) which can reduce tire enjoyment of the residential area and lower market values.

Source: Tipple (2000 p 133)

Despite these advantages discussed above, transformations do pose some problems. For example, Tipple (1991); Sheuya (2009) and Aduwo (2011) raise concerns about overcrowding and the overload of services. Tipple (2000) also recognised that, although physical conditions improved in the areas of his study, the same may not be true elsewhere. Therefore, the full extent of the problems of transformations needs to be explored, particularly as they relate to the quality of life of those undertaking and living in them.

Housing Transformations and Quality of Life

Thus far, this chapter has explored literature specifically on housing adjustment theory and housing transformations. However, the literature on transformations does not fully address the implications of the transformations for the quality of life of the household and living standards. Despite this, Seek (1983); Shear (1983); Boehm and Ihlanfeldt (1986); Ziegert (1988); Potepan (1989); Gosling, Keogh and Stabler (1993); Kellett, Toro and Haramoto (1993); Littlewood and Munro (1997b); Tipple (2000); Nguluma (2003) and Sueca (2003) have all tried to relate the quality of the physical structure to the housing transformation. In the opinion of Kellett et al.

(1993), transformed dwellings are more likely to be of higher standard in terms of the physical structure. Kowaltowski, Gomes da Silva, Pina, Labaki, Ruschel and Moreira (2006) also relate quality of life to sustainability in their study of housing parameters in five states in Brazil, to set up site planning parameters for housing projects, and concluded that a population's views should be tested on sustainability and quality of life issues before decisions are taken. Tipple (2000); Tipple, Masters and Garrod (2000) and Payne and Majale (2004) point out that the valuable contribution of housing transformations to quantity and quality of the housing stock is recognised.

For these reasons, in order to identify the parameters for data collection and analysis, the author turned to work on 'quality of life'. In doing so, there was a need to identify how the two areas of knowledge can come together to form a framework for exploring and reconceptualising housing transformation in terms of their implications on the quality of life of the households and neighbourhoods.

Sengupta and Tipple (2007) acknowledge that there is no clear agreement about the quality of the measure.

However, the contribution of housing transformations to the quality of the dwelling and the quality of life of the households in the dwelling, during and after the transformations, is less well explored. Establishing the relationship between housing transformations and quality of life of the households and neighbourhood is a major offering of this study.

Quality of life or standard of living

According to Camfield (2012 p 400): "Quality of life is a dynamic and holistic concept that incorporates the material, relational and cognitive dimensions of people's lives". In the opinion of Shek (2012) there is no other research topic that has attracted so much research from different disciplines as that of 'quality of life'.

Beck, Joseph, Belisle, and Pilote (2001) express a similar view that the concept of quality of life has been the most strongly embraced of the many different welfare concepts, suggesting that it has the "broadest constructed and the best operationalized framework" (Beck et al., 2001 p 9).

Noll (2004) notes that there are two approaches to understanding 'quality of life'. The first is the Scandinavian level of living approach. The second is the American quality of life approach. These approaches differ, especially in the ways they suggest for measuring quality of life. The Scandinavian approach emphasizes the significance of objective living conditions, suggesting that "resources are defined in terms of money, social relations and security" (Noll, 2004 p 156). On the other hand, the American concept relies on subjective ideas of well-being of individuals. In this case, "the quality of life

must be in the eye of the beholder" (Campbell, Converse, and Rodgers 1976 p 442). Campbell et al. (1976) add that quality of life is also an experience for the individual in terms of satisfaction and dissatisfaction.

For the purposes of this study, the two approaches seem valuable as they link to the concept of 'standard of living'. However, 'standard of living is not, itself, adequate for the purposes of evaluating the implications of housing transformations, because it does not allow for subjective issues especially in aspects of culture and identity of different socio-cultural groups. As these are important elements of transformations at both household and neighbourhood levels.

Definitions of quality of life

There are many definitions for the concept of 'quality of life' but all are inclined towards a belief that "the openness of the concept enables the understanding of people's lives in their own terms" (Camfield, 2012: 400). This resonates with Sen (1999) who argues that the quality of life should be measured not by our wealth, but by our freedom such as freedom of action and decisions.

Camfield (2012) argues that whether measuring quality of life quantitatively or qualitatively all authors seem to share an interest in what it means for different people to live well or badly in their environment. However Mitchell (2000) identifies six components of quality of life as tools to use for a sustainable development pathway as shown in figure 1

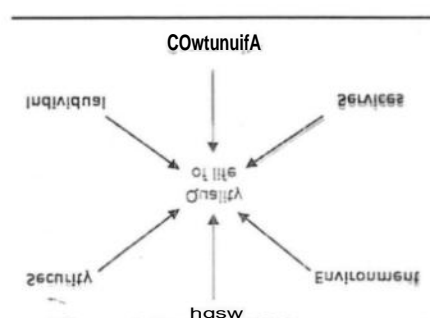


Figure 1 Quality of life components
Source: Mitchell (2000 p 79)

A broader definition is given by Mor (1987) in that quality of life includes the aspects of life which are personal and environmental which relate to living fully. This is a valuable starting point for this study which shows that the quality of life of the households and housing transformation processes are closely related.

According to Eickmeyer (2000) and Wee (2000) quality of life is clearly subjective and a reflection of one's values and beliefs. However, Camfield (2012) argues that studying subjective quality of life is not sufficient to gain a rounded picture of people's lives. Further, he argues that in developing countries the concept of quality of life has not been fully applied to research on poverty. For example, Camfield and McGregor (2005) suggest that studying of quality of life rather than the poverty of people in developing countries enables researchers to explore what poor people have and are able to do. Camfield (2012) further argues that researchers need to first ask people what a good quality of life or living well means to them, here and now. Camfield (2012) states that, for example, Nigeria was named the happiest country in the world in 2000 by the United Nation Development Plan, as 70% of Nigerian respondents described themselves as very happy. Meanwhile, Nigeria has a per capita income of \$328 and according to world values survey is one of the

25 least developed countries.

Anderson, Mikulic, Vermeylen, Lyly-Yrjanainen and Zigante (2007) has expressed a similar view that for some people material condition and standard of living are key aspects of quality of life, while for others it is enjoying good health and a favourable family life. Poor design and use of substandard building materials in the transformation process affects the health and safety standards of the house. For example, Tipple (2000) notes that poor quality housing allows only poor lifestyles and continual danger of disease and injury.

Stone, Vanderpool, Barbee and Patrick (2011) in their conclusion on the study and assessment of quality of life in Clarksdale public housing in Louisville after the HOPE VI redevelopment said the project was to eliminate the substandard eye sore physical environment along with associated crime, poverty and other social problems.

Research by Kahlmeier, Schindler, Grize, and Braun-Fahrlander (2001) also suggests that it is important to study the overall impact of the housing quality on the general wellbeing of the people. This position is further emphasized by Anderson et al. (2007) where they report that quality of life in housing is associated with the problems related to housing conditions.

Wee (2000) observes that the use of quality of place, to infer quality of life, assumes that the physical environment and surroundings play a deterministic role in the quality of life. However, quality of life in housing transformation is not just tied to the physical properties of the house or the neighbourhood. He further expresses that different income groups have different priorities in housing as relates to their quality of life.

Conceptualising Transformations and Quality of Life

The work brings together the study of housing transformation and quality of life studies. None of the approaches to or definitions of quality of life quite fit the study of housing transformations as they stand.

By bringing together these two (housing transformations and quality of life) a conceptual framework for understanding the relationship of one to the other was developed. This is based on the findings from the study area. This framework helps to fill in the gaps in the literature on housing transformations. The framework can be used by building professionals or government official to measure the success of a building in relation to quality of life.

Conceptualising transformations for quality of life	
Quality of Life	Transformation
1 Comfort	Improvements in quantity, quality and use of space Improvements in ventilation, lighting and privacy.
2 Health and safety	Protection of household members and buildings from environment and pollution Good building techniques, use of strong and sustainable materials. Appropriate home-based enterprises and avoidance of possible hazards
3 General satisfaction with the identity of the final product	Better services and infrastructure provision, use of motifs, cultural structures like the sit outs, coherent look even of houses still undergoing transformation, aesthetics.
4 Realisation of lifestyles	Appropriate design for privacy and cultural spaces, relationship between gender roles, goals and use of space. Goals and aspirations of households
5 Economics and investment	Utilization of income, labour and skills in terms of building time and building output.

Conclusion

The work has highlighted the relationship between housing adjustment theory and housing transformations. It is clear from the literature that there are several advantages in housing transformations. However the literature is silent on the effect of the housing transformations on the quality of life of the households and neighbourhood. In filling this gap the definitions of housing transformation and the concepts of quality of life, as they relate to the study, have been reconsidered.

Furthermore, to establish the relationship between the housing transformation and quality of life, a conceptual framework was developed. It is hoped that this conceptual framework is a valuable offering to other scholars. This conceptual framework is the tool that will be used to access the quality of life of the households.

Reference

- Aduwo, B.E. (2011) Housing Transformation and its Impact on Neighbourhoods in Selected Low-income Public Housing Estates in Lagos, Nigeria. Unpublished doctoral dissertation thesis. Covenant University Nigeria.
- Anderson, R., Mikulic, B., Vermeylen, G., Lyly-Yrjanainen, M. and Zigante, V. (2007) European Quality of Life Survey. Luxemburg: Office for the Official Publications of the European Communities.
- Beck, C.A., Joseph, L., Belisle, P. and Pilote, L. (2001) 'Predictors of Quality of Life 6 Months and 1 year after Acute Myocardial Infarction', *American Heart Journal* 142(2), pp. 271-279.
- Boehm, T.P. and Ihlanfeldt, K.R. (1986) 'The Improvement Expenditures of Urban Homeowners: An Empirical Analysis', *AREUEA Journal*, 14, pp. 48-60.
- Camfield, L. (2012) 'Quality of life in Developing Countries', in Land, K.C., Michalos, A.C. and Sirgy, M.J. (eds.) *Handbook of Social Indicators and Quality of Life Research*. London: Springer,

pp.377-380.

- Camfield, L. and McGregor, J.A. (2005)** 'Resilience and Well being in Developing Countries', in Ungar, M. (ed.) Handbook for Working with Children and Youth Pathways to Resilience Across Cultures and Contexts. Thousand Oaks: Sage.
- Campbell, A., Converse, P.E. and Rodgers, W.L. (1976)** *The Quality of American Life: Perceptions, Evaluations and Satisfaction*. New York: Russell Sage.
- Coulson, J.A. and Tipple, A.G. (2000)** 'Home-Based Enterprises and Quality of Life: A Preliminary Review of Evidence', *Quality of Life in Cities, 21st Century QOL*. Singapore. School of Building and Real Estate, National University of Singapore, pp. 575-581.
- Eickmeyer, M.W.L. (2000)** 'Quality of Life-the 'is', 'ought', and 'virtual'', Second international conference on Quality of life in cities; 21st century QOL. Singapore. Singapore: School of Building and Real Estate National University of Singapore., p. 676.
- Gilbert, A. (1988)** 'Home Enterprises in Poor Urban Settlements: Constraints, Potential and Policy Options', *Regional Development Dialogue*, 9(4), pp. 21-39.
- Gosling, J.A., Keogh, G. and Stabler, M.J. (1993)** 'Housing Extensions and Housing Market adjustment: A Case of Workington', *Urban Studies*, 30, pp. 1561-1576.
- Hernandez, J.G. (2010)** *El Parque de mi Barrio: Production and Consumption of Open spaces in Popular Settlements in Bogota*. Unpublished thesis. Newcastle University.
- Kahlmeier, S., Schindler, C., Grize, L. and Braun-Fahrlander (2001)** 'Perceived Environmental Housing Quality and Wellbeing of Movers', *Epidemiol Community Health*, 55, pp. 708-715.
- Kamete, A.Y. (2011)** 'A Fetish about Formality: Recasting the 'Authoritative' Handling of Informality in Urban Sub-Saharan Africa', *African Engagements: On Whose Terms?* Uppsala, 15 -18 June. Nordiska Afrika Institute.
- Kamete, A.Y. (2012)** 'Missing the point? Urban Planning and the Normalisation of 'Pathological' Spaces in Southern Africa', *Transactions of the Institute of British Geographers*, pp. 1-13.
- Kardash, H.S. (1990)** *The Transformation Process of Government Housing in Cairo: The Case of Helwan, El Tabbeen and Imbaba*. Working Paper in Preparation for Doctoral Dissertation. Centre for Architectural Research and Development Overseas, University of Newcastle Upon Tyne.
- Kellett, P., Toro, A. and Haramoto, E. (1993)** 'Dweller-Initiated Changes and Transformations of Social Housing: Theory and Practice in the Chilean Context', *Open House International*, 18(4), pp.3-10.
- Khan, T.H. and Jia, B. (2007)** 'Transforming to Variety: Lessons from Self-Built Neighbourhoods in Dhaka', *The HUK Scholars Hub*. University of Hong Kong.
- Kigochie, P.W. (2001)** 'Squatter Rehabilitation Projects That Support Home-Based Enterprises Create Jobs and Housing: The Case of Mathare 4A', *Cities*, 18(4), pp. 223-233.
- Kowaltowski, D.C.C.K., Gomes da Silva, V., Pina, S.A.M.G., Labaki, L.C., Ruschel, R.C. and Moreira, D.d.C. (2006)** 'Quality of life and Sustainability Issues As Seen By The Population of Low-Income Housing in the Region of Campinas, Brazil', *Habitat International*, 30, pp. 1100-1114.
- Littlewood, A. and Munro, M. (1997b)** 'Moving and Improving: Strategies for Attaining Housing Equilibrium', *Urban Studies*, 34(11), pp. 1771-1787.
- Mai, M., Mumtaz, M. and Shamsuddin, S. (2007)** *Housing Transformation's Delivery Potential in Developing Economies*. University of Malaysia.
- Mai, M.M. and Rahman, M. (2010)** 'Cultural Sustainability: Contrasting Housing Transformation Patterns of Peri-Urban Abuja and Core Dhaka Settlements', *Housing Researchers Colloquium*. Istanbul, 2-3 July.
- Mai, M.M. and Shamsuddin, S. (2007)** 'Urbanization and Globalization of Gbagyi Housing Transformation', *International Journal on Sustainable Tropical Design Research & Practice*, 2(1), pp. 49-58.
- Mai, M.M. and Shamsuddin, S. (2008)** 'Ethnic Spatial Identity in The Context of Urbanization: The Transformation of Gbagyi Compounds in North Central Nigeria', *Journal of Urbanisation*, 3(1), pp. 265-280.
- Mitchell, G. (ed.) (2000)** *Indicators as Tools to Guide Progress on the Sustainable Development Pathway*. North Shields: Urban International Press.
- Mor, V. (1987)** 'Cancer Patients Quality of Life Over the Disease Course: Lessons from the Real World', *Journal of Chronic*

- Diseases, 40(6), pp. 535-544.
- Murni, R. (2008)** Towards A Consumer Protection for Low-Cost Housing in Indonesia. Unpublished thesis. Newcastle University.
- Nguluma, H.M. (2003)** Housing Themselves: Transformations, Modernisation and Spatial Qualities in Informal Settlements in Dar es Salam, Tanzania. Stockholm.
- Noll, H.-H. (2004)** 'Social Indicators and Indicator Systems: Tools for Social Monitoring and Reporting', OECD, World Forum Statistics, Knowledge and Policy. Palermo, 10-13 November.
- Ogu, V.I. and Ogbuozobe, J.E. (2001)** 'Housing Policy in Nigeria: Towards Enablement of Private Housing Development', Habitat International, 25, pp. 473-492.
- Payne, G. and Majale, M. (2004)** The Urban Housing Manual: Making Regulatory Frameworks Work for the Poor. London: Earthscan.
- Peattie, L.R. (1980)** 'Anthropological Perspective on the Concepts of Dualism, the Informal Sector, and Marginality in Developing Urban Economies', International Regional Science Review, 5(1), pp. 1-31.
- Potepan, M.J. (1989)** 'Interest Rates, Income and Home Improvement Decisions', Journal of Urban Economics, 52(2), pp. 282-294.
- Rowe, B.R., Haynes, G.W. and Stafford, K. (1999)** 'The Contribution of Home-Based Business Income to Rural and Urban Economic Development', Economic Development Quarterly, 13(1), pp. 66-77.
- Sani-Katsina, H. (2013)** Housing Transformations: Understanding Processes, Practices and Outcomes on The Quality of Life of Households and Neighbourhoods in Settlements around Kaduna Oil Refinery. Unpublished thesis. Newcastle University.
- Seek, N.H. (1983)** 'Adjusting Housing Consumption: Improve or Move', Urban Studies, 20, pp. 455-469.
- Sen, A. (1999)** Development as Freedom. New York: First Anchor Books.
- Sengupta, U. and Tipple, A.G. (2007)** 'The Performance of Public-Sector Housing in KolKata, India, in the Post-Reform Milieu', Urban Studies, 44(10), pp. 2009-2027.
- Shear, W.B. (1983)** 'Urban Housing Rehabilitation and Move Decisions', Southern Economic Journal, 49(10), pp. 1030-1052.
- Sheuya, S. (2009)** 'Urban Poverty and Housing Transformations

DRIVERS AND DETERMINANTS OF HOUSING TRANSFORMATIONS IN THE GLOBAL AND LOCAL CONTEXT – A REVIEW OF THE LITERATURE

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Abstract

Housing transformation has always existed. But the question is what are the drivers and determinants of these transformations?

This work seeks to address this concern by exploring housing transformations in the local and global context. In particular, it will focus on the drivers and determinants of the housing transformations and the role of the households, professionals in the building industry and the government organisations.

However, the work begins with an exploration of the definitions of housing transformation which is so central to the understanding of reasons for housing transformation. This study is based on data collected from secondary sources. The review shows that most of the reasons for housing transformations are for economic reasons. The study suggests that Architects should be involved in housing transformations so that transformations can be used as a mechanism to improve quality of life of households who transform. The conclusion drawn gives direction for future policy and research.

Key words: Housing Transformations, housing gap, shocks and triggers, housing consolidation, housing adjustment theory, housing ladder

Introduction

Scholars from various fields of study have used several terms to define and understand the concept of housing, with varying scope in the area of interest of each researcher. Steggell, Binder, Davidson, Vega, Hutton, and Rodecap (2001) argue that housing may be seen as

an object, a product, a process, a resource, an environment, a symbol or even a state of mind. Turner (1976); Kellett, Toro and Haramoto (1993); Kellett and Napier (1995); Rapoport (1995); Tipple (2000) and Steggell et al. (2001) along with other researchers regard housing as a process and try to relate the transformation activity to the characteristics of the dwelling and to those of the dweller in their study on housing transformation. Kellett et al. (1993) suggest that housing should perhaps be viewed as an organic process of continual change of both the dwelling and the dweller.

Housing Transformations: Definitions and Typologies

Following this, housing transformation can be regarded as a continuous cycle and an unending process in every society, either consciously or unconsciously, regardless of the means by which the house was acquired, i.e. through self-help, private development or government built housing. In a similar argument, Kellett et al. (1993) state that a dweller is able to change a dwelling while the dwelling also has an influence on the dweller. It is the view of Turner (1976); Dovey (1985); Kellett et al. (1993) and Adekun (2007) that the relationship of the dweller and dwelling is important in understanding the housing processes.

Although several definitions have emerged from the various studies of housing transformations, there is substantial agreement among scholars that transformation refers to change. Researchers have, however, referred to housing transformation using various other terms, but all in relation to physical changes made to the dwelling. Tipple Tipple, Owusu

and Pritchard (2004) state that changes and extensions made in houses are generally known as transformations.

Kendig (1981) defines housing transformation as home improvement, addition, alteration or renovation to the dwelling. Baum and Hassan (1999), in their research of residential mobility carried out in Australia in an attempt to study the extent to which owners renovate their homes, referred to transformation as renovation, extensions and interior subdivisions. However, Seek (1983) refers to transformation as incremental, while Gosling, Keogh and Stabler (1993) refer to transformations as the extension, addition, alteration and improvement of a house.

All these definitions have been understood by this study to mean that Housing Transformation is the process of the evolution of the house or the dwelling with interest in the gradual process and the development of the final product. There are more definitions of housing transformations, but for the purpose of this study we find the definitions given from case studies conducted in the developing countries to be more relevant at this point.

In the study of the transformations of the vernacular housing of the Gbagyi tribal people, Mai and Shamsuddin (2007) identified three types of transformations: the physical, through extensions or alterations etc.; the social, which entail a redefinition of values and norms; and the psychological, in which the customs and values associated with the original setting also change.

Tipple (2000); Sueca (2003) and Sheuya (2009) have defined transformation in relation to increase in floor area of the transformed space. However, Tipple (1991) noting the building materials and construction technology used in transformation activity in case study areas in Ghana, Egypt, Zimbabwe and Bangladesh, defines the transformation of a dwelling

“as an alteration or extension involving construction activity and using materials and technology in use in the locality” (Tipple, 1991:4).

Kellett et al. (1993), for the purpose of their research in social housing in Chile, consider other changes apart from an increase in floor area and housing needs. According to Kellett et al. (1993: 4):

Different types of change can be identified; these may involve change of space usage and layout, physical alterations or modifications to the existing structure, as well as extensions (i.e. increasing size).

Khan and Jia (2007) in their research in Dhaka refer to housing transformation as “the alterations of either any or both the external and partition walls which occur during house improvement” (Khan and Jia, 2007: 271).

Following several of the definitions and studies of housing transformation, we identify areas not considered in the housing transformation that this study finds relevant especially in accessing the quality of life of the households and dwellings.

For this reason, in the study of housing transformations in Kaduna, Nigeria, Sani-Katsina (2013) defines housing transformations as any change made to the interior or exterior of the building or the surrounding plot from the moment the occupant starts living in the property, be it owner, renter or otherwise. This change can be in terms of addition or subtraction (natural or artificial) to the internal layout or the physical structure using permanent or temporary building and non-building materials which are produced or manufactured locally or otherwise. The definition will focus on the areas of transformation which other researchers have not considered, such as demolition. Natural or artificial demolition will be considered because this has an impact on the neighbour's house and is therefore considered relevant to the housing transformation of both the new and the old, and the neighbour's house. In

a similar argument, Gosling et al. (1993) state that:

The condition of neighbouring properties, changing environmental quality and variations in accessibility can all be expected to affect the payoff to improvement activity (Gosling et al., 1993: 1564).

Transformation or Consolidation

Indeed, Kellett and Napier (1995) and Napier (2002) use the word consolidation to mean the final stages of transforming a core unit of housing. However, this work focuses specifically on the transformation of dwellings and explores more than incremental additions. It is, therefore better seen in terms of transformations for the purposes of this work.

Nevertheless, work on consolidation is relevant to this study and there are similarities, in the explanation of what people actually do to their houses. For example, Gough and Kellett (2001), in research on the consolidation of self-help settlements in Pereira and Santa Marta in Columbia, found that there is a close interrelationship between income levels, dwelling consolidation rates and household profiles, all of which are in a state of continuous change.

2.1 Housing Adjustment Theory

According to Steggell et al. (2001) in a review of theories used in housing research the theory of housing adjustment was developed specifically to explain how households think and behave in performing their housing behaviour. Moreover, housing needs are determined, primarily, by the composition of the household and, as the household grows, or shrinks, so does the space requirement. In research conducted in Seattle on members of the parent teacher association, Morris and Winter (1975) expressed a similar view that the adjustment process is the behaviour of families attempting to meet the changing needs of housing as they grow or decline. They further noted that family housing adjustment theory simplifies the process that occurs in actual life.

In Riemer's (1943) opinion, the theory of housing in relation to the family was thought of in terms of adjustment and maladjustment to the family home.

Steggell et al. (2001) further argue that the major components of the housing adjustment theory define housing norms and constraints that affect the household's ability to act and the resulting housing decisions and behaviours.

Quercia and Rohe (1993) divide the evolution of the housing adjustment theory into four stages, relating it to its adequacy in explaining the housing adjustment behaviours of households. The first stage explains the models of rural-to-urban migration. The second stage explains the models of intra urban mobility. Stage three explains the model of non-moving adjustment decision. The fourth and final stage explains the more comprehensive models of housing adjustment that include both moving and non-moving adjustment mechanisms within the same framework. This final stage corresponds to Seek (1983) and Sherman and Combs (1997) views that in housing adjustment, the household may either alter the current dwelling or move to another dwelling. This is similar to Rossi (1955) study on residential mobility which relates the concept of family life cycle to space requirement.

Morris and Winter (1975) further note how the theory of housing adjustment stipulates that when the household recognizes a housing deficit, possible corrective measures include household adaptation or housing adjustment.

Seek (1983), Winter and Morris (1998) and Sherman and Combs (1997) express a similar view that household adaptation involves making changes to the household itself through actions to do with entrance and departure from the household.

Models of both moving and non-moving adjustment

mechanisms have been put forward by researchers. According to Quercia and Rohe (1993) and Littlewood and Munro (1997b), the decision to move is made in conjunction with the decision to improve.

Goodman (1976); Edin and Englund (1991) and Higgitt (1996) claim that people move in search of better housing. However, in the opinion of Seek (1983), his research in Adelaide found that it was mainly because of the high financial and psychological costs of moving that many homeowners tended to stay in the same house for a long time and modified it as their housing demands changed over their life cycle. However, Seek (1983) acknowledges in his research that apart from the cost of constructing the improvement, there are intangible costs associated with improving such as the trouble and inconvenience suffered during the period of construction.

Clark and Onaka (1983); Seek (1983) and Kahlmeier, Schindler, Grize, and Braun-Fahrlander (2001) posit that moving is better than staying and improving. Potepan (1989) argues that these models present home improvements as inferior alternatives to moving. Littlewood and Munro (1997b) express a similar view and suggest that moving is not better than staying and improving.

This research is particularly interested in the improving option of the housing adjustment theory but acknowledge the contribution of the other possible adjustment options. For example, Peng (2012) observes that housing extensions can be likened to moving while staying put. This means changing housing quantity and quality without relocation. Gosling et al. (1993) suggests that this reinforces the idea that the decision to extend is likely to be explained in the same terms as residential mobility.

Many scholars have tested and extended the theory of housing adjustment in understanding and analysing the housing adjustment decisions made by families in their

various fields of research (For example see Morris and Winter, 1975; Seek, 1983; Steinberg, 1984; Carmon and Gavrieli, 1987; Crull, Bode and Morris 1991; Kellett and Higdon, 1991; Tipple, 1991; Carmon, 1992; Gosling et al., 1993; Kellett et al., 1993; Earhart, Weber and McCray 1994; Ukoha and Beamish, 1996; Sherman and Combs, 1997; Yust, Hadyjanni, and Ponce 1997; Littlewood and Munro, 1997b; Bouzarovski, Salukvadze and Gentile 2011).

Morris and Winter (1978) examined the complex processes by which American families make decisions about their housing and the way in which the structure of American society determines how families are housed, as well as the consequences of housing the families. Another researcher who has tested and extended the theory is Wiesenfeld (1997), who extended the theory by using qualitative methodology to study members of Barrio, and found that the dwelling unit was not separate from its environment.

Tipple (2000), however, concludes that the 'housing adjustment theory' is set in the context of the well-developed housing market of the industrialised countries where the option to move may be more available. Nevertheless, the theory is useful in the consideration of less developed housing markets.

Tipple (2000) therefore extends the theory of housing adjustment further by relating it to housing transformation theories in developing countries. He links it to the implications of the housing transformations on the households, government and policy makers.

Drivers of housing adjustment

The opinion of Rossi (1955); Seek (1983); Gosling et al. (1993); Quercia and Rohe (1993) and Tipple (2000) is that housing mismatch leads to housing adjustment. The mismatch can occur as a result of the different needs of the life cycle. According to Morris and Winter

(1978); Seek (1983); Gosling et al. (1993); Lee, Brandth and McFadden (1994), needs and wants change over time depending on physical, social, economic and environmental and public circumstances leading to a resultant action taken on the building. In this view, the life cycle argument grows from the belief that households in similar socio-economic circumstances have similar housing needs and demands, and that the demand for improvements is derived from the demand for more suitable housing. Seek (1983) points out that this is especially relevant if this life cycle occurs with an advancement of wealth. According to Quercia and Rohe (1993), if the levels of housing stress of a household rise over the threshold levels then a household will adjust their dwelling to correct the situation. Quercia and Rohe (1993) add that every household has a tolerance level and if the characteristics of the house or neighbourhood no longer satisfy them, then the household experience becomes stressed and they take the necessary action to adjust.

Marrow-Jones and Wenning (2005), however, relate the decision to move up or down for house owners based on a model of three concepts; the first concept is the housing ladder, which is comprised of the characteristics of the householder, such as occupation, income, age and marital status. People go up the ladder as they acquire the resources to do so and are expected not to come down. According to Marrow-Jones and Wenning (2005: 1741):

The housing ladder concept also presumes that there is an agreed upon hierarchy of better housing and all households have equal opportunities to capture the reward of climbing the housing ladder.

The second concept in Marrow-Jones and Wenning (2005) model is housing life cycle events, which influence a household's decision to move. Seek's (1983) idea of the lifecycle corresponds to Marrow-Jones and Wenning (2005) concept of the housing

ladder, where age and income are directly related.

However, Marrow-Jones and Wenning (2005), Gosling et al. (1993) and Sueca (2003) point out that the model of lifecycle events has been criticized by researchers for use of the head of the household as the dependant in decision making. Gosling et al. (1993) used a questionnaire for house extenders who applied for permission in 1987, providing information on house types, household characteristics, reason for extending and the degree of satisfaction with extension expenditure. They concluded that extensions were less likely to be triggered by specific life cycle events in Workington. Clark and Onaka (1983) argue that the likelihood of encountering life cycle changes depend on the stage of the household life cycle. Nevertheless, Sueca (2003) points out that the use of lifecycle events to generalise theory on housing adjustment is unsuitable as lifecycle events vary from country to country. This researcher, however, acknowledges that lifecycle events may be different, but all households have lifecycle events.

Other drivers of housing adjustment are gaps. According to Seek (1983) in his research in Australia a gap leads to housing adjustment. He notes that at some point in time a gap between the actual and the preferred level of housing consumption occurs as a result of some missing housing attributes not provided by the current dwelling. Also, the dissatisfaction or stress mounts over time and on reaching the critical level a decision to bridge the gap arises. Seek (1983) further explains that the gap results from factors such as households changes in socio-economic circumstances, tastes and preferences, change in attributes and changes in housing prices and other external influences relating to land use or transportation, advancement in career and increasing wealth, possibly with more growing children. Shocks such as changes in income, wealth or status, arrival of children or parents can shift the tolerance level either upward or downwards, increasing

the stress levels and dissatisfaction. Gosling et al. (1993) express a similar view that stress levels, which they call triggers, can cause housing adjustments.

Research by Morris and Winter (1975) also suggest that a family that perceives a salient gap between its housing and that required by the family norms of the given society will experience a housing deficit and will feel the pressure from within the family or outside to correct the deficit.

In a similar view, Kellett et al. (1993) argue that there is never an end to any housing and housing is not static, and that if the residents of a dwelling consider it incomplete or deficient or inadequate, they are bound to make changes to it. Moreover, inevitably the occupants of the dwelling do not remain static, as families change as part of the natural life cycle of birth, growth etc. Similarly, Kellett and Higdon (1991) note that there is evidence that in general aspiration levels tend to rise. This is in line with Crull et al. (1991), who suggest that when a household experiences a deficit between its current housing and societal housing norms, housing satisfaction will be low and therefore the household will consider some form of housing adjustment. Tipple (2000) found that as a household increases in size through the addition of children or other dependants, or reduces when the children leave to marry and form their own households, needs and demands for space and other housing goods change. The many drivers of housing adjustment lead households to take decisions.

According to Seek (1983), housing adjustment decisions are based on two concepts which he calls a two part decision-making process. To quote from Seek (1983:456):

The first is the decision to adjust one's housing consumption and the second is the choice between the alternatives of moving or improving, or a combination of both. The first part results from a mismatch between

the desired and the actual level of housing and the second part depends on the costs and the benefits associated with each adjustment alternative.

It is in this second part of the housing adjustment decision making process that we see the connection to housing transformations, in that transformation is the alternative to moving. Thus, housing transformation is one form of housing adjustment. Mai and Shamsuddin (2012) conclude from their research in Abuja, Nigeria that housing transformation, whether by moving, improving, or a combination of both, is the search for a satisfactory habitat.

Drivers of Housing Transformation

This section presents a more focused exploration of the drivers of housing transformation. There are many reasons for housing transformations, and these vary greatly according to geographical location, socio-cultural circumstances and household characteristics. According to Lawrence (1989) the design, meaning, and use of these dwellings are intimately related to a range of cultural, socio-demographic and psychological dimensions. In a similar argument, Mai et al. (2007) suggest that in any society the motive behind the transformation involves shaping the built form physically moderated by social and psychological reasons. Kellett et al. (1993) refer to the reasons for making changes in the dwellings as motivations and explanations.

Another reason why people transform, especially in mass housing, is because the design was created without the dwellers' characteristics being taken into consideration during the design of the plan, and therefore the dweller might want to shape the house to his liking. Napier (2002) argues, following a study of core housing consolidation in South Africa, that it is evident that the original mass housing design was not appropriate for the setting in which it was built. In a similar line of argument, Napier (1997) suggests that people should decide what to build initially and how the

house should grow gradually over the years.

Kellett and Higdon (1991) has expressed a similar view that there is a frequent desire to personalise and differentiate the individual dwelling from the rest, particularly where standard, identical solutions are supplied. Similarly, Salim (1998) in a study of owner occupier housing in Malaysia, noted that households move into dwellings and improve the poorly designed dwellings into better houses to suit their lifestyle.

According to Tipple (2000), another reason for carrying out an extension is the need for more space for additional households. In a similar view, Shiferaw (1998), in a study of self-initiated transformations of public-provided housing in Addis Ababa, Ethiopia, suggests that housing transformations occur as a result of short fall of housing supply. Cho and Kang (2011) state that generally the purpose of the planning and design of the living environment is to create the environment for a healthy life. However, the upgrading of property was to achieve higher space standards.

Lack of resources is also a reason why households transform their houses over a period of time. According to Seek (1983: 460), "They could also be making incremental improvements to their home as a way to spread the high costs of housing over time."

It is the view of Shiferaw (1998); Arimah (1999); Tipple and Ameen (1999); Tipple (2000); Mahmud (2003); Sheuya (2009) and Mai and Shamsuddin (2012) that housing transformation arises from the need for income generating activities in the house. Kellett et al. (1993) also found out that households use the dwellings as an asset to generate income. Kellett and Tipple (2000); Nguluma (2003); Mai and Rahman (2010); and Marsoyo (2012) also express a similar view that income from rent is a common reason for making transformations.

Tipple (2000) observed that the prospect of petty landlord activity can be a valuable addition to meagre incomes where the landlords are willing to make considerable sacrifices in terms of their own comfort to allow a source of rental income. This position is also supported by Mai et al. (2007) in that the attraction for rental income became a prime motivation for housing transformation, especially in the consolidated era (1992-2006), when most federal activities took place in Abuja, Nigeria. Sheuya (2009) also found in his study in Dar-es-salaam, Tanzania, that households tend to avoid poverty through income from rentals.

The opinion of Jolly and Bridge (2005) is that forced or labour migration cause changes which influence housing transformations as a result of influences on culture or urbanisation. Incoming or returning migrants may bring new skills, new ideas or career opportunities.

Tipple (1999) discovered that in the sample studied in Mindola the main reason for building a cabin next to the house was to allow relatives to stay rent free.

Carmon and Oxman (1981) and Tipple (2000) argue that the lack of, or inadequate, infrastructure can be a motivation for making transformations in order to provide them. Kardash (1990) also found in Helwan and El Tebben in Egypt that extra kitchens, toilets and bathrooms had been fitted in the transformed dwelling in order that the married sons could have a self-contained flat. Other reasons for housing transformations are the design of a dwelling that can allow or encourage transformation, especially in core housing design. For example, Steinberg (1984) concluded from his research on the architecture of five storey flats in Ain el Sira in Egypt that the occupants had found a weak plan in a static building system and expressed their needs, aspirations and whimsy.

1. Transformation as Stock Production

Research by Tipple (2000) suggests that through

transformations, consumers of housing are becoming producers of housing. Similarly, Tipple (1996) reports his research in Kumasi during the 1980s where he found that the major increase in the housing stock had come from the extensions people made to their existing houses rather than from the construction of new houses. According to Tipple (2000), through the action of thousands of individuals who are already housed, many more rooms and services are added to the housing stock. Mai et al. (2007) express a similar view that researchers have identified the role of transformation as a housing supply strategy in their research areas, as housing extensions are a housing supply mechanism. Kellett et al. (1993) also observe that one of the advantages of housing transformation is the increase in stock by creating more rooms. Tipple et al. (2004) point out the user-initiated transformations in government built housing in Ghana and Zimbabwe. They suggest that transformations should be seen as a means of renewing the housing stock at the same time as adding accommodation and services.

Napier (1997), in a study on the post-occupancy investigation of core housing in Khayelitsha and Inanda, South Africa, found that core housing will eventually become adequate housing through incremental growth of that housing. This is important because, as Kamete (2006) notes, it is not adequate to simply focus on quantity. It is also necessary to address qualitative deficit within the housing stock. He argues that this can be done in a number of ways, including the incorporation of such aspects as upgrading and promoting and encouraging transformations and conversions. Tipple (2000) and Kamete (2006) conclude that housing transformation is therefore a balance between shelter upgrading and new shelter construction.

2. Transformation as Economic Logic

Transformation can be seen as the manifestation of economic logic in three main ways. First, it can be the

cheaper and more cost effective model of housing adjustment. Seek (1983); Dynarski (1986); Baum and Hassan (1999) and Sueca (2003) suggest that moving has financial implications on households.

Seek (1983) believes that the main impediment to moving is its financial and psychological cost and further suggests that when both options are available people would prefer to improve as the latter alternative is cheaper and less disruptive. Even when moving is the preferred model of adjustment, moving into a cheaper dwelling which is deficient in some attributes and subsequently making good these deficiencies, additions, alterations or renovations according to Seek (1983) is a way of spreading housing costs over time by making improvements as and when the households can afford when the need arises.

Sinai (2001) expressed a similar view that households that use their home for shelter or income generation through informal sector activities are less likely to move as a business decision.

Second, transformation can improve a household's income and capital. Friedmann and Sullivan (1974); Strassmann (1986, 1987); Raj and Mitra (1990); Marsoyo (1992, 2012); Tipple (1993); Gough (1996); Moser (1998, 2007, 2009); and Rowe et al. (1999) suggest that through housing transformations households increase their income. In the opinion of Kellett et al. (1993); Sinai (1998, 2001); Mahmud (2003); Tipple and Kellett (2003); Tipple et al. (2004); Mai et al. (2007); Mai (2007); Sheuya (2009) and Mai and Rahman (2010) transformations are often done to provide room for a home-based enterprise or for income from renting. According to Moore (2000, 2006); Shaw et al. (2000); Gough et al. (2003); and Gough (2010) housing transformation provides employment at home through home-based enterprises. Indeed, such enterprises may make the difference between ownership and renting. According to Kamete

(2001) informal income generating activities can help towards owning a house in Harare, Zimbabwe. Kellett and Tipple (2000) express a similar view that many households will not exist without a home-based enterprise.

It is the view of Coulson and Tipple (2000); and Ghafur (2000) that home-based enterprises are important for poor members of the society to help them generate income. According to Tipple (1994) transformation activity provides income through the construction industry and the construction itself is simpler and cheaper per unit cost. Tipple (1994) adds that there are also significant economic gains available from using local materials and technologies in construction. According to the report by the International Labour Office UNCHS/ ILO (1995) construction of housing provides strong forward and backward linkages in the economy.

Research by Ziegert (1988) based on a sample of households from the University of Michigan's panel study of income dynamics suggest that both minor and major renovations potentially add to the value of the structure.

The third is the reuse and recycling of building materials. Mai and Rahman (2010) observed that the reuse of building materials is an economic approach in housing transformation.

3. Housing Transformation, Culture and Identity

According to Rapoport (1969: 47):

(...) the house form (and settlement) is not simply the result of physical forces or any single casual factor, but is the consequence of a whole range of socio-cultural factors seen in their broadest terms.

The opinion of Solanke (2008) is that culture gave birth to architecture. Similarly, according to Jabareen

(2005: 134):

The concept of culture and its manifestations appear not only in people's perceptions, beliefs, values, norms, customs, and behaviours, but also in the designs of objects and in the physical environment, including houses and neighbourhoods.

Subsequently, culture and identity can be lost through housing transformations, thereby resulting in new culture and identity. Mai and Shamsuddin (2008) express a similar view that the effect of globalisation and urbanisation can lead to transformation of dwellings, as they found that the peri-urban areas of Abuja, Nigeria lost their traditional housing characteristics as a result of transformation caused by urbanisation. However, households transform to promote culture. Tipple (1991) express a similar view that there are culturally motivated reasons why people transform their dwellings, especially on issues relating to privacy as he states that actions to increase privacy take two main forms: increasing privacy from outsiders such as places to entertain guests while shielding the private areas as required by some cultures and guests; and increasing privacy within the dwelling. According to Geertz (1973) most of the cultural issues surrounding house form and design are centred on privacy. For Rapoport (1977) this privacy is expressed differently within each cultural group. Moughtin (1985) explains how each zoning and privacy regulations are emphasized within the compounds in northern Nigeria.

Mai et al. (2007) in research on the transformation of Gbagyi architecture in Abuja, Nigeria, found that the main reason for the cultural change in housing transformations was urbanisation.

Transformations can change the nature and appearance of homogenous mass produced housing. Research by Tipple (2000) suggests that housing transformations create variety out of uniformity. In a similar view, Khan

and Jia (2007) state that in the housing transformations in Dhaka, a variety of spaces and sizes are equally created through transformations. The relationship between housing transformation, culture and identity is two way. For example, in a comparison of Dhaka core housing in Bangladesh and Gbagyi compound housing in Nigeria, Mai and Rahman (2010) state that economic drivers took precedence over cultural sustainability, thereby jeopardising local identity.

In the opinion of Chutapruttikom (2011):

Since culture has an impact on the built- environment, the values of the culture must be taken into serious consideration, in order to thoroughly comprehend the dwelling forms characteristic of any particular society, as well as how such built environments are used (Chutapruttikom, 2011: 29).

4. Housing Transformation and Gender

We assume that women are the poorest in most societies and several researchers have noted the value of housing transformation as a way of improving women's income through home-based enterprises. Fanning (1981); Bose (2000); Coulson and Tipple (2000); Ghafur (2002); and Domenico (2008) state that home-based enterprises are especially important for women. Mahmud (2003) noted the way women transform domestic spaces for income generation in Dhaka bustees. Similarly, Bourennane (2007) in a study of women's access to home-based enterprises in Botswana, found that despite the planning restrictions female-headed households managed to add small spaces for rent and home-based enterprises. In a similar view, Muller (1990) observed how women who could not leave the house because of child care and domestic duties, or because it was considered 'improper' for them to move in public, used the house itself as a place of business.

5 Transformation as Sustainable Development

Agenda 21 UNCED (1992) on sustainability focuses on

being efficient and doing more with less. Tipple (2000); Sueca (2003); Mai and Rahman (2010) and Kellett and Tipple (2000) have studied housing extensions as sustainable development. For example, Tipple (1996, 2000) argues that housing transformations are sustainable developments in line with global policies on sustainability. According to Tipple (1996: 371):

As set out in agenda 21, sustainable development implies a concept of economic growth that provides fairness and opportunity for all the worlds people not just the privileged few, without further destroying the worlds natural resources and without further compromising the carrying capacity of the globe. Such development would be economically, socially and environmentally sustainable, it would make efficient use of existing finite resources, particularly (in our case) serviced land, infrastructure and construction materials (Tipple, 1996:371).

The opinion of Tipple (1996, 2000) is that housing transformation conserves resources such as land, infrastructure and serviced land and upgrade existing estates, improves physical housing condition, reduces the spread of urban footprint, and improves the social, economic and environmental quality of the living and working environment. Gosling et al. (1993) argue that housing extensions reduce the long term pressure of demand for new land for building where the land is in restricted supply either as a result of town planning controls, physical constraints or competition from other users. Mai and Shamsuddin (2012) suggest that housing transformation is a sustainable housing delivery system that increases supply within the reach of urban poor.

Sueca (2003) found that transformations improve the environment and develop culture in Bali. However, Mai and Rahman (2010) found in Abuja that transformation led to loss of cultural sustainability of the people and in turn led to the new identity of the

physical structures.

Peng (2012) in a study of housing renovations in Brisbane, Australia observes that the durability and sustainability of dwellings give homeowners incentives to preserve the quality by repair, upgrade and maintenance. In a similar view, Durmisevic and Brouwer (2000) state that buildings and their components should have the chance to have multiple lives.

Tipple (1996; 2000) concludes that transformations improve not only the social and economic quality of life in the neighbourhood but also improve environmental quality and generally promote sustainable development. However, Aduwo (2011) adds that strict measures of control should be put in place to stop the neighbourhood fabric deteriorating.

Conclusion

The work has shown the drivers and determinants of housing transformation. It further highlighted the relationship between the advantages of housing transformations and the reasons why households transform. The work also noted how life cycle events drive housing adjustment and housing transformations. It is clear from the literature that there are several advantages in housing transformations and that housing transformations can be used as a mechanism to improve quality of life. Following this Architects should be involved in housing transformation processes and practices to help improve quality of life of households.

Reference

Abrams, C. (1964) *Mans Struggle for Shelter in an Urbanizing World* Cambridge: MIT Press.

Adeokun, C.O. (2007) *Consonance between Lifestyle and Spatial Patterns in Yoruba Domestic Architecture*. Unpublished thesis. University College London.

Aduwo, B.E. (2011) *Housing Transformation*

and its Impact on Neighbourhoods in Selected Low-income Public Housing Estates in Lagos, Nigeria. Unpublished doctoral dissertation thesis. Covenant University Nigeria.

Arimah, B.C. (1999) 'User Modifications in Public Housing Estates: Some Findings from the Nigerian Scene', in Awotona, A. (ed.) *Housing Provision and Bottom-up Approaches : Family Cases from Africa, Asia and South America*. Ashgate: Aidershot, pp. 39-54.

Baum, S. and Hassan, R. (1999) 'Home Owners, Home Renovation and Residential Mobility', *Journal of Sociology*, 35(1), pp. 23-41.

Bose, M. (2000) 'Women's Home-Based Work In the Slums of Calcutta, India: Meaning and Status Implications', *Housing, Work and Development*. Newcastle 26-28 April. Newcastle University.

Bourenane, M. (2007) *A Legal Framework for Enabling Low-income Housing: A study of Womens Access to Home Based Enterprises in Botswana*. Royal Institute of Technology, Stockholm.

Bouzarovski, S., Salukvadze, J. and Gentile, M. (2011) 'A Socially Resilient Urban Transition? The Contested Landscapes of Apartment Building Extensions in Two Post -communist Cities', *Urban Studies*, 48(13), pp. 2689-2714.

Carmon, N. and Oxman, R. (1981) 'Self-help Housing Rehabilitation in Distressed Neighbourhoods in Israel', Haifa. Samuel Neaman Institute for Advanced Studies in Science and Technology, Technion. Israel Institute of Technology.

Chutapruttikom, R. (2011) *Life on Tracks: Reconstructing Home in Informal Railway Settlements Bangkok*. Unpublished thesis. Newcastle University.

Clapham, D. (2005) *The Meaning of Houses*. Bristol: The Policy Press.

Clark, W.A.V. and Onaka, J.L. (1983) 'Life Cycle and Housing Adjustment as Explanations of Residential Mobility', *Urban Studies*, 20, pp. 47-57.

Coulson, J.A. and Tipple, A.G. (2000) 'Home-Based Enterprises and Quality of Life: A Preliminary

- Review of Evidence', *Quality of Life in Cities, 21st Century QOL*. Singapore. School of Building and Real Estate, National University of Singapore, pp. 575-581.
- Crull, S.R., Bode, M.E. and Morris, E.W. (1991) 'Two tests of the Housing Adjustment Model of Residential Mobility', *Housing and Society*, 18(3), pp. 53-64.
- Davidson, F. and Payne, G. (eds.) (2000) *Urban Projects Manual. A Guide to Preparing Upgrading and New Development Projects Accessible to Low Income Groups*, second edition edn. Liverpool: Liverpool University Press.
- Domenico, D.M. (2008) 'I'm Not Just a Housewife: Gendered Roles And Identities in the Home-Based Hospitality Enterprise', *Gender, Work & Organisation*, 15(4), pp. 313-332.
- Dovey, K. (1985) 'Home and Homelessness', in Altman, I. and Werner, C. (eds.) *Home Environments*. New York: Plenum Press.
- Durmisevic, E. and Brouwer, J. (2000) 'Building for the Future', *Quality of Life in Cities*. Singapore. School of Building and real estate, pp. 447-460.
- Dynarski, M. (1986) 'Residential Attachment and Housing Demand', *Urban Studies*, 23, pp. 11-20.
- Earhart, C.C., Weber, M.J. and McCray, J.W. (1994) 'Life cycle differences in housing perspectives of rural households', *Home Economics Research Journal*, 22(3), pp. 309-323.
- Eickmeyer, M.W.L. (2000) 'Quality of Life-the 'is', 'ought', and 'virtual"', Second international conference on Quality of life in cities; 21st century QOL. Singapore. Singapore: School of Building and Real Estate National University of Singapore., p. 676.
- Fanning, M.J. (1981) 'Why Women Work Closer to Home', *Urban Studies*, 18(2).
- Friedmann, J. and Sullivan, F. (1974) 'The Absorption of Labor In the Urban Economy: The Case of Developing Countries', *Economic Development and Cultural Change*, 22, pp. 385-413.
- Geertz, C. (1973) *The Interpretation of Cultures*. New York: Basic Books.
- Ghafur, S. (2000) 'Urban Poor Home-Based work and Development In Bangladesh: An Entitlement Perspective', *Housing, Work and Development: The Role of Home based Enterprises*. Newcastle 26-28 April. Newcastle University.
- Ghafur, S. (2002) 'Gender Implication of Space Use in Home-Based Work: Evidences From Slums in Bangladesh', *Habitat International*, 26, pp. 33-50.
- Gilbert, A. (1988) 'Home Enterprises in Poor Urban Settlements: Constraints, Potential and Policy Options', *Regional Development Dialogue*, 9(4), pp. 21-39.
- Goodman, J.L. (1976) 'Housing Consumption Disequilibrium and Local Residential Mobility', *Environment and Planning*, 8, pp. 885-874.
- Gosling, J.A., Keogh, G. and Stabler, M.J. (1993) 'Housing Extensions and Housing Market adjustment: A Case of Workington', *Urban Studies*, 30, pp. 1561-1576.
- Gough, K.V. (1996) 'Home-Based Enterprises in Low-Income Settlements; Evidence from Prereira, Colombia', *Danish Journal of Geography*, 96, pp. 95-102.
- Gough, K.V. (2010) 'Continuity and Adaptability of Home-Based Enterprises: A Longitudinal Study From Accra, Ghana', *International Development Planning Review*, 32(1), pp. 45-70.
- Gough, K.V. and Kellett, P. (2001) 'Housing Consolidation and Home-Based Income Generation: Evidence from Self-Help Settlements in Two Colombian Cities', *Cities*, 18(4), pp. 235-247.
- Gough, K.V., Tiple, G.A. and Napier, M. (2003) 'Making a Living in African Cities: The role of Home-based Enterprises in Accra and Pretoria', *International Planning Studies*, 8(4), pp. 253-276.
- Higdon, D.A. (1995) *Codes of Transformation Practice: A Holder's Guide to Making Extensions to the Home*. Newcastle Upon Tyne: Centre for Architectural Research and Development Overseas, University of

Newcastle Upon Tyne: 'draft volumes for Bangladesh, Egypt, Ghana and Zimbabwe'.

Jabareen, Y. (2005) 'Culture and Housing Preferences in a Developing City', *Environment and Behaviour*, 37(1), pp. 134-146.

Jolly, S. and Bridge, H.R. (2005) *Gender and Migration*. Sussex.

Kahlmeier, S., Schindler, C., Grize, L. and Braun-Fahrlander (2001) 'Perceived Environmental Housing Quality and Wellbeing of Movers', *Epidemiol Community Health*, 55, pp. 708-715.

Kamete, A.Y. (1998) 'Continuity with Change: A Review of Zimbabwe's Public Sector Urban Low-Income Housing Production System', *Development Southern Africa*, 15(1), pp. 13-28.

Kamete, A.Y. (2001) 'The Quest for Affordable Urban Housing: A Study of Approaches and Results in Harare, Zimbabwe', *Development Southern Africa*, 18(1), pp.31-44.

Kamete, A.Y. (2006) 'Revisiting the Urban Housing Crises in Zimbabwe: Some Forgotten Dimensions?', *Habitat International*, 30, pp.981-995.

Kardash, H.S. (1990) *The Transformation Process of Government Housing in Cairo: The Case of Helwan, El Tabbeen and Imbaba*. Working Paper in Preparation for Doctoral Dissertation. Centre for Architectural Research and Development Overseas, University of Newcastle Upon Tyne.

Kellett, P. and Higdon, D.A. (1991) 'Homes from Housing: A study of Residential

Kellett, P. and Napier, M. (1995) 'Squatter Architecture? A Critical Examination of Vernacular Theory and Spontaneous Settlement with Reference to South America and South Africa', *Traditional Dwellings and Settlements Review*, 6(2), pp. 7-24.

Kellett, P. and Tipple, A.G. (2000) 'The Home as Workplace: A study of Income-Generating Activities Within the Domestic Setting', *Environment & Urbanization*,

Kellett, R, Toro, A. and Haramoto, E. (1993) 'Dweller-Initiated Changes and Transformations of

Social Housing: Theory and Practice in the Chilean Context', *Open House International*, 18(4), pp. 3-10.

Kendig, H.L. (1981) *Buying and Renting: Household Moves in Adelaide*. Canberra: Australian Institute of Urban Studies.

Khan, T.H. and Jia, B. (2007) 'Transforming to Variety: Lessons from Self-Built Neighbourhoods in Dhaka', The HUK Scholars Hub. University of Hong Kong.

Lawrence, R.J. (1987) *Housing, Dwellings and Homes: Design Theory, Research and Practice*. New York: Wiley.

Lawrence, R.J. (1989) 'Translating Anthropological Concepts into Architectural practice', in Low, S.M. and Chambers, E. (eds.) *Housing Culture and Design: A Comparative Perspective*. Philadelphia: University of Pennsylvania Press, pp.89-114.

Lee, S.Y, Brandth, J.A. and McFadden, J. (1994) 'Effects of Conditions and Satisfaction', *Housing and Society*, 21(3), pp.34-51.

Mahmud, S. (2003) 'Women and the Transformation of Domestic Spaces for Income Generation in Dhaka bustees', *Cities*, 20(5), pp. 321-329.

Mai, M., Mumtaz, M. and Shamsuddin, S. (2007) *Housing Transformation's Delivery Potential in Developing Economies*. University of Malaysia.

Mai, M.M. (2007) *Transformation of Vernacular Housing Pattern in Peri-Urban Abuja-Nigeria due to Informal Urbanism, 1976-2006*. University of Tecknologi, Malaysia.

Mai, M.M. and Rahman, M. (2010) 'Cultural Sustainability: Contrasting Housing Transformation Patterns of Peri-Urban Abuja and Core Dhaka Settlements', *Housing Researchers Colloquium*. Istanbul, 2-3 July.

Mai, M.M. and Shamsuddin, S. (2007) 'Urbanization and Globalization of Gbagyi Housing Transformation', *International Journal on Sustainable Tropical Design Research & Practice*, 2(1), pp. 49-58.

- Mai, M.M. and Shamsuddin, S. (2008) 'Ethnic Spatial Identity in The Context of Urbanization: The Transformation of Gbagyi Compounds in North Central Nigeria', *Journal of Urbanisation*, 3(1), pp.265-280.
- Mai, M.M. and Shamsuddin, S. (2012) 'Urbanization and Globalization of Gbagyi Housing Transformation', *ALAM.CIPTA*, 2(1).
- Marrow-Jones, H., A and Wenning, M.V. (2005) 'The Housing Ladder, the Housing life-Cycle and the Housing Life-Course: Upward and Downward Movement among Repeat Home-Buyers in a US Metropolitan Housing Market', *Urban Studies*, 42(10), pp. 1739-1754.
- Marsoyo, A. (1992) *Place-Space and Socio-Economic Analysis of Home-Based Enterprises in Yogyakarta Indonesia*. Unpublished thesis. Asian Institute of Technology.
- Marsoyo, A. (2012) *Constructing Spatial Capital : Household Adaptation Strategies in Home-Based Enterprises in Yogyakarta*. Unpublished thesis. Newcastle University.
- Moore, J. (2000) 'Placing Home in Context', *Environmental Psychology*, 20, pp. 207-217.
- Moore, J. (2006) 'Homeworking and Work-Life Balance: Does It Add To Quality of Life', *Revue Europeenne de Psychologic Appliquee/European Review of Applied Psychology* 56(1), pp. 5-13.
- Morris, E.W. and Winter, M. (1975) 'A Theory of Family Adjustment', *Journal of Marriage and the Family*, 37(1), pp. 79-88.
- Morris, E.W. and Winter, M. (1978) *Housing, Family and Society*. New York: John Wiley & sons.
- Moser, C.O.N. (1998) 'The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies', *World Development*, 26(1), pp. 1-19.
- Moser, C.O.N. (ed.) (2007) *Asset Accumulation Policy and Poverty Reduction*. Washington: Brookings Institution Press.
- Moser, C.O.N. (2009) *Ordinary Families, Extraordinary Lives: Assets And Poverty Reduction in Guayaquil, 1978-2004*. Washington: Brookings Institution.
- Moughtin, J.C. (1985) *Hausa Architecture*. London: Ethnographica.
- Muller, M. (1990) 'Room for One's Life: Women, Houses and Social Change', *Habitat International*, 14(4), pp.43-50.
- Napier, M. (1997) *The Incremental Growth of Housing: A Post -Occupancy Investigation of Core Housing in Khayelitsha and Inanda*. (BOU/i53). Pretoria.
- Napier, M. (2002) *Core housing, Enablement and Urban Poverty: The Consolidation Paths of Households Living in Two South African Settlements*. Unpublished thesis. Newcastle University.
- Nguluma, H.M. (2003) *Housing Themselves: Transformations, Modernisation and Spatial Qualities in Informal Settlements in Dar es Salam, Tanzania*. Stockholm.
- Peng, T.-C. (2012) 'A Microstructural Analysis of Housing Renovation Decisions in Brisbane', *New Zealand Economic Papers*, 1, pp. 1-30.
- Quercia, R.G. and Rohe, WM. (1993) 'Models of Housing Adjustment and Their Implications for Planning and Policy', *Journal of Planning Literature*, 8(1), pp.20-31.
- Raj, M. and Mitra, B. (1990) 'Household, Housing and Home-Based Economic Activities in Low-Income Settlements', in Mulkh, R. and Nientied, P. (eds.) *Housing and Income In Third World Urban Development*. London: Aspect.
- Rapoport, A. (1969) *House Form and Culture*. Englewood Cliffs, N. J: Prentice-Hall.
- Rapoport, A. (1977) *Human Aspects of Urban Form: Towards A Man-Environment Approach To Urban Form and Design*. New York: Pergamon Press.
- Rapoport, A. (1995) 'A Critical Look at the Concept 'Home'', in Benjamin, D.N., Stea, D. and Saile, D. (eds.) *The Home: Words, Interpretations, Meanings and Environments*. Hants: Avebury Publishing.
- Riemer, S. (1943) 'Sociological Theory of Home Adjustment', *American Sociological Review*,

8(3), pp. 272-273.

Rossi, P.H. (1955) *Why Families Move: A Study in the Social Psychology of Urban Residential Mobility*. Glencoe: Free Press.

Rowe, B.R., Haynes, G.W. and Stafford, K. (1999) 'The Contribution of Home-Based Business Income to Rural and Urban Economic Development', *Economic Development Quarterly*, 13(1), pp. 66-77.

Salim, A. (1998) *Owner-Occupiers Transformation of Public Low Cost Housing in Peninsular Malaysia* Unpublished thesis. Newcastle University

Sani-Katsina, H. (2013) *Transformation of Dwellings in settlements around Kaduna Oil Refinery: Understanding processes, practices and outcomes on the quality of life of Households in Neighbourhoods* Unpublished thesis. Newcastle University

Seek, N.H. (1983) 'Adjusting Housing Consumption: Improve or Move', *Urban Studies*, 20, pp. 455-469.

Shaw, H.G., Shaw, A.S. and Trache, H. (2000) 'The Homeworking Revolution: Considering the Property Dimension', *Regional Studies*, 34(3), pp. 303-307.

Sheuya, S. (2009) 'Urban Poverty and Housing Transformations In Informal Settlements: The Case of Dar-es-Salaam, Tanzania', *International Development Planning Review*, 31(1), pp. 81-108.

Shiferaw, D. (1998) 'Self-Initiated Transformations of Public-Provided Dwellings in Addis Ababa, Ethiopia', *Cities*, 15(6), pp. 437-448.

Sinai, I. (1998) 'Using the Home for Income Generation: The Case of Kumasi, Ghana', *Cities*, 15(6), pp. 417-427.

Sinai, I. (2001) 'Intraurban Housing Mobility in a Traditional West African city: Shelter or Business Decision', *Urban Studies*, 38(3), pp. 535-540.

Solanke, O. (2008) 'Architecture and Cultural Identity', *Architects Colloquim*. Abuja, pp. 236-247.

Steggell, C.D., Binder, S.K., Davidson, F.,

Vega, P.R., Hutton, E.D. and Rodecap, A.R. (2001) 'The Role of Theory In the Study of Housing', *Housing and Society*, 28(1&2), pp. 87-100.

Steinberg, F. (1984) 'Ain el Sira in Cairo: The Architecture of Poverty', *Open House International*, 9(2), pp. 35-42.

Strassmann, W.P. (1986) 'Types of Neighbourhood and Home-Based Enterprises: Evidence from Lima, Peru', *Urban Studies*, 23, pp. 485-500.

Strassmann, W.P. (1987) 'Home-Based Enterprises in Cities of Developing Countries', *Economic Development and Cultural Change*, 36, pp. 121-144.

Sueca, N.P. (2003) *Housing Transformation: Improving Environment and Developing Culture in Bali* Unpublished thesis. Newcastle University.

Tipple, A.G. (1994) 'Employment from Housing: A Resource for Rapidly Growing Urban Population', *Cities*, 11(6), pp. 372-376.

Tipple, A.G. and Kellett, P. (2003) 'Housing and Work in the Same Space: Spatial implications of Home-Based Enterprises in India and Indonesia', *Conference of the Asian Planning Schools*. Hanoi, September. Hanoi Architectural University.

Tipple, A.G., Owusu, S.E. and Pritchard, C. (2004) 'User-Initiated Extensions in Government-Built Estates in Ghana and Zimbabwe: Unconventional but Effective Housing Supply', *Africa Today*, 51(2), pp. 79-105.

Tipple, G. (1991) *Self Help Transformations of Low Cost Housing: An Introductory Study*. Newcastle Upon Tyne: Centre for Architectural Research & Development overseas (CARDO), London.

Tipple, G. (1993) 'Shelter As A Work Place: A Review of Home-Based Enterprise in Developing Countries', *International Labour Review*, 132(4), pp. 521-539.

Tipple, G. (1996) 'Housing Extensions as Sustainable Development', *Habitat International*, 20(3), pp. 367-376.

Tipple, G. (1999) 'Transforming Government -

Built Housing: Lessons From the Developing Countries', *Urban Technology*, 6(3), pp. 17-35.

Tipple, G. (2000) *Extending Themselves. User Initiated Transformations of Government-Built Housing in Developing Countries*. Liverpool: Liverpool University Press.

Tipple, G. (2005a) 'The Place of Home-Based Enterprises in the Informal Sector: Evidence from Cochabamba, NewDelhi, Surabaya and Pretoria', *Urban Studies*, 42(4), pp. 611-632.

Tipple, G. (2005b) 'Pollution and Waste Production in Home-Based Enterprises in Developing Countries: Perception and Realities', *Environmental Planning and Management*, 48(2), pp. 275-299.

Tipple, G. (2006) 'Employment and Work Conditions In Home-Based Enterprises In Four Developing Countries: Do They Constitute 'Decent work?', *Work, Employment and Society*, 20(1), pp. 167-179.

Tipple, G. and Ameen, M.S. (1999) 'User Initiated Extension Activity in Bangladesh: 'Building Slums or Area Improvement?', *Environment and Urbanisation*, 11(1), pp. 165-183.

Tipple, G., Masters, G. and Garrod, G. (2000) 'An Assessment of the Decision to Extend Government-Built Houses in Developing Countries.',

Urban Studies, 37(9), pp. 1605-1617.

Tipple, G. and Speak, S. (2009) *The Hidden Millions: Homelessness in Developing Countries*. London: Routledge.

Turner, J.F.C. (1976) *Housing by People*. London: Marion Boyers Publishers Ltd.

UNCED (1992) *United Nations Conference on Environment and Development*, Rio de Janeiro.

UNCHS/ ILO (1995) *Shelter Provision and Employment Generation*. Nairobi: United Nations Centre for Human Settlements (Habitat)/ Geneva: International Labour Office.

Wiesenfeld, E. (1997) 'Construction of the Meaning of a Barrio House: The Care of A Corocas Barrio', *Environment and Behavior*, 29, pp. 34-63.

Winter, M. and Morris, E.W. (1998) 'Family Resource Management and Family Business: Coming Together in Theory and Research', *The Entrepreneurial Family*, pp. 30-47.

Yust, B.L., Hadjuyanni, T. and Ponce, L.R. (1997) 'Exploring Housing Quality Measures In Rural Area of the Philippines', *Housing and Society*, 24(1), pp. 59-74.

Ziegert, A.L. (1988) 'The Demand for Housing Additions : An Empirical Analysis', *AREUEA Journal*, 16(4), pp. 479-492.

OPTIMIZATION OF CHOICE OF EXTERNAL FINISHES AND ROOFING OF BUILDINGS IN NIGERIAN UNIVERSITIES

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Abstract

This study analysed the evolution of choice of optimal external finishes and roofing in Nigerian universities. The study traced the evolution of Nigerian architecture through the historical style and traditional architecture, to the colonial, modern and late modern styles; and to the postmodern trend. The paper further documented the characteristics of the architecture found in Nigerian universities, and the evolution of choice of external finishes and roofing in these universities. It highlighted the challenges faced by architects over time, and the responses, innovations and failures in the quest to optimise choice of external finishes and roofing. The methodology adopted for the study comprised mainly field studies and literature review. The field studies covered representative buildings such as senate buildings, lecture theatres, auditoria and faculty buildings; and these were analysed in several representative universities. A comparative analysis of these universities revealed certain trends that gave a national perspective to the problem of sub-optimization of choice of external finishes and roofing in the universities, irrespective of age, ownership structure or specialization. These trends include correlation between level of funding and quality of finishes, poor maintenance leading to roof leakage and staining of walls, construction of pitched roofs on existing flat roofs to solve leakage problems, successful use of indigenous finishes, and slow but gradual adoption of modern construction materials. The study concluded that the quality of exterior finishes and roofing tended to be determined by the level of available funding and the state of the national economy. There was propensity for regular award of petty maintenance and painting contracts while the scarcity of highly skilled and experienced craftsmen for installation or construction of high-quality finishes discouraged the use of these finishes. The study recommended better adaptation to climate, the use of materials that age without decaying, use of organic and sustainable materials, lifecycle approach to estimating cost of finishes, and increased use of high-energy materials for cladding.

Keywords: architecture, external finishes, Nigeria, school buildings, university buildings.

INTRODUCTION

The first generation Nigerian universities were established around independence in 1960, which coincided with the flowering of the international style,

and these were designed largely by British and foreign architects. Nigerian architects returning from training abroad and indigenous architects contributed more significantly to the architecture of later-generation, technology, agriculture, specialist, state-owned and private universities. The architectural style also evolved from pure modern into the low-trop, high-trop, nouveau-riche, late modern and postmodern trends.

Overlaying all these were the civil war, the oil boom, the indigenisation policy, the Structural Adjustment Programme (SAP), political misadventures, the re-emergence of democratic rule, and the emergence of nationalist indigenous architects. This technological and socio-economic roller coaster was reflected in the architecture of university buildings. A particularly interesting aspect was the attempt by architects to design buildings more compatible with the Nigerian climate, using mostly low building technology, local building materials, and distributed ventilation, air-conditioning and plumbing systems. While some designs were successful, many of these buildings were architectural disasters, and the university landscape became dominated by poorly designed, badly constructed and infrequently maintained structures (Ogunsote & Prucnal-Ogunsote, 2006).

AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to enhance the optimization of choice of external finishes and roofing in Nigerian universities. The objectives of the study are to:

1. Trace the evolution of Nigerian architecture and document the characteristics of the architecture found in Nigerian universities.
2. Review the architectural climatic design zones in Nigeria and the recommendations for architectural design with climate in Nigerian universities with emphasis on the building envelope.
3. Review the factors determining choice of external finishes and roofing in Nigerian universities
4. Analyse the evolution of choice of external finishes and roofing in Nigerian universities and highlight the challenges faced by architects over time, and the responses, innovations and failures in the optimisation of choice of external finishes and roofing.
5. Propose solutions to the problem of sub-optimisation of choice of external finishes and

roofing in Nigerian universities.

RESEARCH METHODOLOGY

The methodology adopted for the study comprised mainly field studies and literature review. The field studies covered case study documentation of the external finishes and roofing of representative buildings, such as senate buildings, lecture theatres, auditoria and faculty buildings in several representative universities. These field studies were conducted over several years to document evolution and changes over time. The literature review covered previous studies on the evolution and characteristics of Nigerian architecture, the classification and characteristics of the architecture of Nigerian

universities, design with climate in Nigerian universities and the factors that determine choice of external finishes and roofing. The data from the field studies and literature review were analysed for trends and distribution to establish a national perspective.

EVOLUTION OF NIGERIAN ARCHITECTURE

The evolution of Nigerian Architecture from pre-colonial to contemporary times was presented in the classification of Nigerian architecture by Prucnal-Ogunsote (1994). It portrayed the historical style (represented by the European, Brazilian and North African trends), traditional architecture, the modern style (comprising the international and the New West African styles) and the postmodern trend (Figure 1).

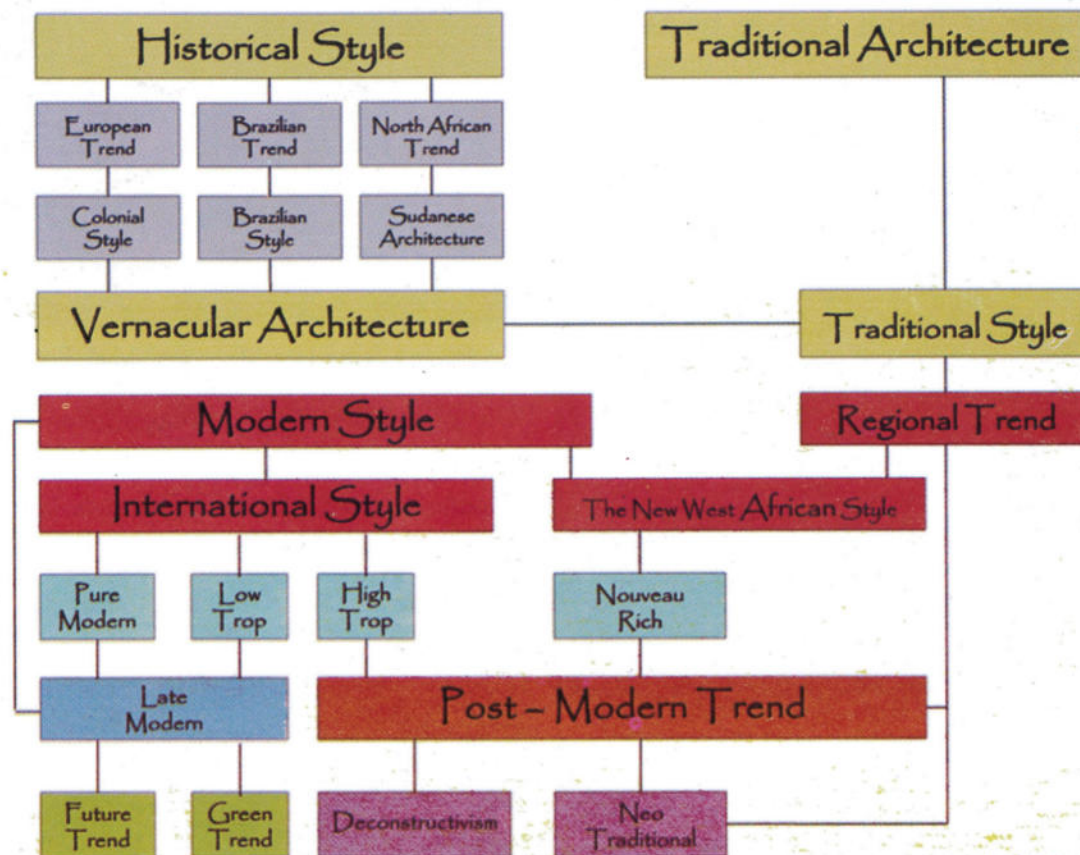


Figure 1. The evolution of Nigerian Architecture. Source: Adapted from Prucnal-Ogunsote(2001).

The historical style and traditional architecture

The strongest influences on indigenous architecture were the introduction of Islam into northern Nigeria, the return of the ex-slaves from the Americas (especially Brazil), and colonization. The historical style consists of the European trend followed by the colonial style. The Brazilian trend evolved into the Brazilian style while the North African trend evolved into Sudanese architecture. The blend of traditional architecture and the historical style formed vernacular architecture.

The historical style reveals how architects can draw

inspiration from historical heritage as evidenced by the regional trend in contemporary Nigerian architecture. There was a very weak link between the historical style (including traditional architecture), and contemporary modern architecture of Nigeria.

The colonial style

The European influence on Nigerian architecture increased with the establishment of colonial rule. Corrugated iron sheeting and cement have had perhaps the greatest impact. The colonial style was most distinctly represented by public and administrative buildings from that era. These were reminiscent of the

classic revival in England with the classic orders carved out of walls to give impressive scale. Colonial houses were usually either imported 18th century houses of the English countryside or prefabricated construction with deep verandas and overhanging eaves. These were sometimes raised on stilts. They usually had a continuous horizontal band of windows. Later designs were heavier since they were made of cement blocks and the windows were smaller.

The modern style

The modern style became popular by the late 1930s and in the 1960s modern design concepts were used as a symbol of progress though these were not always compatible with the culture or climate of Nigeria. Much sensitivity to the climate was however demonstrated in some university buildings including the Department of Nursing, University of Ibadan, Ibadan, by Design Group Nigeria (Plate 1). The natural ventilation and sun shading achieved remains exemplary.



Plate 1. Department of Nursing, University of Ibadan (1967) by Design Group Nigeria. Source: Photograph by the authors (October 2005).

The pure modern style

The pure modern style has an idealistic approach with elements trying to attain perfection and deeper meaning. It is functionalism with all its characteristics but with a pure character (Plate 2).



Plate 2. University Bookshop, University of Ibadan (1960s) by Design Group Nigeria. Source: Photograph by the authors (October 2005).

The late modern style

This style is reminiscent of the extreme of the international style but with better response to the culture, climate and economy. This pragmatic and technocratic architecture was well represented in Nigerian university architecture by the Faculties of Law and of Social Sciences buildings at the Obafemi Awolowo University, Ile-Ife (Plate 3) which provided extra shadow on the elevations by drastically projecting the roof canopy.



Plate 3. Faculty of Law (left) and Faculty of Social Sciences (right), Obafemi Awolowo University, Ile-Ife. Source: Photograph by the authors (circa 2004).

The postmodern trend

A popular example of the postmodern trend is the Oduduwa Hall at the Obafemi Awolowo University, Ile-Ife (Plate 4).



Plate 4. Oduduwa Hall by AMY, Obafemi Awolowo University, Ile-Ife. Source: Photograph by the authors (February 2007).

The low-trop style

Low-trop architecture represents architecture for the poor. Although it satisfied the basic functional needs it had low aesthetic value. It is architecture by draughtsmen with the buildings usually one or two storeys high. Local materials and labour were used to minimize the construction cost.

CLASSIFICATION OF NIGERIAN UNIVERSITIES

Nigerian universities can be classified by age, ownership and specialization.

Classification by age

Nigerian universities are generally grouped into four generations. The classification is based on the time frame and economic situation as presented in Table 1. Most respected are first generation universities including the famous Ahmadu Bello University, Zaria; Obafemi Awolowo University, Ile-Ife and University of Lagos, Lagos (Plates 5 to 7).



Plate 5. Senate Building by Egbor and Associates, Ahmadu Bello University, Zaria. Source: Photograph by the authors (September 2005).



Plate 6. Department of Architecture (1976) by Design Group Nigeria, Obafemi Awolowo University, Ile-Ife. Source: Photograph by the authors (February 2007).



Plate 7. Senate Building by James Cubitt and Partners, University of Lagos, Lagos. Source: Photograph by the authors (circa 2008).

Table 1. Classification of Nigerian universities by age.

Generation	Time frame	Number of Universities	Comments
First	1948-1970	5	Established following the recommendations of the Ashby Commission and set up by the British Colonial Government to meet the manpower demands of the country.
Second	1971-1980	12	Established in response to the growing needs for scientific and technological development.
Third	1981-1990	13	They addressed special areas of technology and agriculture.
Fourth	1991 to date	11.6	Federal, state-owned, open and private universities. These included ten (10) federal and seven (7) state-owned specialist universities. Others are non-specialised.
Total		146	

Source: Adapted from Ajayi and Ekundayo(2008); from National Universities Commission (2015); Nwagwu and Agarin(2008) and United States Diplomatic Mission to Nigeria (2014).

Classification by ownership

Nigerian universities are owned by federal and state governments, and by private organizations, religious organizations and individuals (Table 2).

Federal universities

The universities are solely funded by the Federal Government. They continue to play a role in setting national standards and in provision of manpower needed for development. The universities witnessed unprecedented growth with a variety of architectural concepts especially during the economically buoyant periods. The materials and the external finishes used for the construction of these buildings were largely determined by funding.

State-owned universities

These were established by state governments to further spread educational opportunities and also to fulfil the political agendas of politicians. The buoyancy of the economy of each state directly affected the provision of infrastructure in these universities.

Private and mission universities

The Federal Government established a law in 1993 allowing the private sector to establish universities (United States Diplomatic Mission to Nigeria, 2014). These universities were often profit-making ventures, but they were closely monitored by the National Universities Commission (NUC) for adherence to standards. The best ones often exhibited flamboyant architecture to attract students (Plate 8). At the other end of the spectrum, the worst ones accommodated students in little better than sheds.



Plate 8. College of Science and Technology, Covenant University, Ota, Ogun State. Source: Photograph by the authors (August 2008).

Table 2. Classification of Nigerian universities by ownership.

Ownership	Number of Universities
Federal government	46
State government	41
Private individuals and organizations	61
Total	148

Source: Adapted from National Universities Commission (2015) and United States Diplomatic Mission to Nigeria (2014).

Classification by specialization

Most Nigerian universities are non-specialized, and they run courses in the arts, social sciences, sciences, engineering, medicine, et cetera. A few were established to advance technological education and agricultural development, as well as to support the petroleum sector. Others cater to the special needs of the armed forces, and these include colleges for the Nigerian Army, the Air Force, the Navy and the Police.

Table 3. Classification of Nigerian universities by specialization.

Category of university	Number	Comments
Non-specialized	US	Includes all first generation universities
Specialized (technological, agricultural, education, professional)	24	Universities of Science and Technology (15) Universities of Education (4) Universities of Medical/Health Sciences (2) Universities of Agriculture (2) Maritime University (1)
Military	9	Military colleges (7) Police college (1) Aviation college (1)
Total	148	

Source: Adapted from National Universities Commission (2015).

THE ARCHITECTURE OF NIGERIAN UNIVERSITIES

The architecture of Nigerian universities and especially of the first generation universities tended to be iconic and was seen as symbol of excellence and modernity by society. Many of the more unique buildings were designed by the most renowned Nigerian architecture firms, although many of these had foreign partners and staff.

Characteristics of the colonial style in Nigerian universities

This style has survived mainly in staff housing. The buildings tended to be surrounded by large gardens and many of their features enhanced passive cooling. Their most distinctive characteristics were:

1. Steep roofs for proper drainage and to provide a cushion of air within the roof structure. This acted as an insulator between the corrugated asbestos roofing sheets and the asbestos ceiling

tiles.

2. High ceilings.
3. Large overhanging eaves casting extra shadow on the building envelope.
4. Relatively small windows that provided adequate illumination inside.
5. Thick walls that act as heat sinks.
6. White coloured facades for sun reflection.
7. Deep verandas allowing comfortable outdoor activities.

External finishes and roofing used in the colonial style in Nigerian universities

The most common roofing materials were corrugated asbestos and galvanised steel roofing sheets. Roofing tiles were less common. A lot of timber was used, especially for structural roof members, doors, and windows. Hollow sandcrete (Portland cement and sand) blocks in six and nine-inch widths were popularized. This was plastered with a mixture of sand and cement, and usually finished with emulsion paint. Stone was used extensively for external walls, and the plaster used to bind the stones often painted with black or white emulsion paint in a characteristic pattern.

Characteristics of the pure modern style in Nigerian universities

A good example of the pure modern style is the University Bookshop at the University of Ibadan which was designed by Design Group Nigeria (Plate 2). It had an elegant form, good detailing, and was a manifestation of the principles of functionalism with clean forms and simplicity. The parapet wall and the almost flat roof seemed to hover over a fragile glazed elevation which in turn 'grew' directly from the ground surface.

External finishes and roofing used in the pure modern style in Nigerian universities

Large areas of fixed (picture) windows were quite common, and central air conditioning and ventilation plants were always provided. There was little or no provision for natural ventilation, and many spaces had only artificial lighting. Beton brut was common, as were textured external wall finishes and brick facing. The use of emulsion paints necessitated annual repainting of many buildings.

This style was dominated by the use of flat concrete roofs with minimal slope and with felting used for waterproofing. For smaller structures, these concrete slabs were replaced by timber beams with plywood sheeting covered with felting, as in the staff club, Ahmadu Bello University, Zaria. These roofs were usually hidden behind large parapet walls. When

pitched roofs were used, they had small slopes, and were covered with corrugated long-span aluminium sheets or corrugated cement and asbestos-based roofing sheets.

Characteristics of the late modern style in Nigerian universities

The Senate Building at the University of Lagos is a good example of the late modern style. James Cubitt and Partners used waffle floors, wall tiles, and structural columns projected onto the front elevation in a sophisticated way (Plate 7). They diversified the form by using different heights and by projecting a semi-cylindrical form for the approach elevation. Similarly the Faculty of Science Complex at the University of Lagos (1978) by Godwin Hopwood was a design with a very challenging site which was used to enhance the ventilation within the complex. The sloping site was used in a way that allowed the penetration of the wind into every building and good cross ventilation was provided.

External finishes and roofing used in the late modern style in Nigerian universities

A significant attempt was made to use local building materials and to use more durable finishes for external walls. These materials included granite for walls, brick facing, textured weather-resistant acrylic paints, and tyrolean (a cement-based textured exterior wall coating). The use of beton brut reduced significantly, and the colours used were brighter and more contrasting, with patterns used as accents. Large glass areas were replaced by smaller ones, and louvered windows which provided better ventilation gradually replaced casement windows and fixed picture windows. DejiOyenuga and Partners was especially adept at detailing highly expressive and durable wall finishes, as in the use of smooth pebbles on external walls of the Department of Biological Sciences, Obafemi Awolowo University, Ile-Ife (1973).

The use of flat concrete roofs diminished, with corrugated long span aluminium roofing sheets and corrugated cement and asbestos based roofing sheets becoming more common. The use of parapet walls also reduced significantly, and roofs were often brightly coloured and exposed. Even when concrete roofs are used, they were more expressive and better drained, as in the Civil Engineering Department, Obafemi Awolowo University, Ile-Ife (Plate 9).



Plate 9. Department of Civil Engineering by Niger Consultants, Obafemi Awolowo University, Ile-Ife. Source: Photograph by the authors (October 2005).

Characteristics of the low-trop style in Nigerian universities

The presence of the low-trop style in the landscape of Nigerian universities became most evident in the late 1980s when the economy started running down. The resources available were very limited and the university authorities did not hesitate to use direct labour to provide essential buildings and infrastructure for the ballooning student population. This was however at the expense of aesthetics, and often even of functionality and durability. The architecture of this style was very pedestrian and uninspiring. It was simply mediocre architecture.

External finishes and roofing used in the low-trop style in Nigerian universities

This style was dominated by the use of low-cost and less durable external finishes. The use of emulsion paint was common, and this was easily washed away by the heavy rains. Fungal attack, especially in the more humid regions, left extensive blemishes. There was far

less maintenance, and architectural blight became common.

Low-pitch timber roofs were used, and these were covered with corrugated galvanized roofing sheets, or less commonly by low-gauge, painted (not anodized) long-span aluminium roofing sheets. These galvanized roofing sheets often started rusting after a few years, and because of the thin gauge, leakage was common. The low-quality aluminium sheets became discoloured after a few rainy seasons.

Retrogressive aspects of the low-trop style

The introduction of the low-trop style into the architecture of Nigerian universities was promoted by several factors. There was a large increase in student admission, and pressure to provide more buildings. Meanwhile, the funding decreased in real terms, and there was a period of several years when there was no budgetary allocation (or no funds release), for capital projects. Many universities had to use internally generated revenue or donations for construction work, and the preference was for 'temporary', poorly finished and poorly equipped buildings. These buildings were usually designed as single-storey buildings, to avoid the structural expertise required to design and construct suspended floor slabs. They rarely had good landscaping. These low-trop buildings were not iconic as expected of university buildings, and the low-cost building techniques used reflected on the durability of their finishes (Plate 10). The local contractors engaged, primarily through a political patronage system, also did not possess the expertise to construct durable buildings, and often considered contracts as rewards, for which they were not willing to give much in return. The fact that these emergency contractors did not have a name to protect did not help matters



Plate 10. Multipurpose Hall donated to the Olabisi Onabanjo University, Ago-Iwoye. Note the shed-like architecture and poor finishing. Source: Photograph by the authors (November 2005).

THE ARCHITECTURAL CLIMATIC DESIGN ZONES OF NIGERIA AND THE BUILDING ENVELOPE

Architectural climatic design zones are defined by the approximate boundaries where a change in the climate and a change in thermal comfort requirements should be reflected in changed building form or changed building elements. These zones for Nigeria were defined by Ogunsote and Prucnal-Ogunsote (2002) as the coastal, forest, transitional, savannah, highland and semi-desert zones. These zones were developed along lines similar to those followed by Ogunsote (1990) and the method used the definition of adaptation to establish the relation from the set of climates to the set

of possible alternative architectural responses such that given any element in the first set, one and only one element in the second set results. The possible alternative architectural responses that might influence choice of external finishes and roofing are size of openings, protection of openings, heat capacity of walls and floors, heat capacity of roofs and rain protection. The possible alternative architectural responses for each design zone are shown in table 4. Similar studies were carried out by Lawal (2013) who used psychrometric charts to assess thermal comfort in South Western Nigeria and he proposed design strategies for six cities using the control potential zone (CPZ) technique.

Table 4. Sketch design guidelines for adaptation of external finishes and roofing to climate in the architectural climatic design zones of Nigeria.

Design criteria	Possible alternative architectural responses	Architectural climatic design zone					
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Size of opening	Large. 40-80% of wall area	?					
	Medium. 25-40% of wall area		?	?			
	Composite. 20-35% of wall area				?	?	
	Small. 15-25% of wall area						?
Protection of openings	No soecial protection necessary						
	Protect from rain and direct sunlight	?	?	?	?	?	?
Walls and Floors	Light low heat capacity	?	?				
	Heavy, over 8 hours long time lag			?	?	?	?
Roofs	Light, reflective surface and cavity	?	?				
	Light and well insulated			?			
	Heav. over 8 hours' time lag				?	?	?
Rain protection	No protection from rain needed						
	Provide adeauate rainwater drainage						?
	Protection from heavv rain needed	?	?	?	?	?	

Source: Adapted from Ogunsote (1990).

ARCHITECTURAL DESIGN WITH CLIMATE IN NIGERIAN UNIVERSITIES

The application of climatic design principles in Nigerian universities has a varied history. There were several factors that combined to determine the level of application.

Expertise of the architects and engineers

There were several foreigners and Nigerians who trained abroad that started practice in Nigeria in the 60s and 70s. These architects tended to have a good understanding of the importance of climate in

architecture, and even developed a climate-sensitive variant of the modern style called the New West African style. Other foreign architects who did not live in Nigeria or that were trained in Nigeria in the 70s and 80s tended to have poor understanding of these concepts. The situation however gradually improved with greater emphasis on building climatology and environmental sciences in the architecture curriculum.

Availability of localised design guides for architectural design with climate

Design guides for architectural design with climate

were largely adaptations from studies carried out by the British Research Establishment. While generally useful, it was not until significant research in Nigeria was conducted before architects had localised guides and more precise understanding of the interactions between the Nigerian climate and buildings.

Sustainability of technology and funding

Many of the first buildings in Nigerian universities were in the pure modern style, complete with flat roofs, central air-conditioning, fixed windows, and sometimes artificial lighting. As maintenance problems developed, power supply became erratic and equipment broke down, adoption of a more sustainable building model with well drained roofs, distributed air conditioning, natural ventilation, daylighting and extensive use of local building materials and components became a necessity. This awakening was promoted by poorer funding of the universities.

Impact of CAD and IT

The widespread usage of Computer Aided Design software and the Internet in the last decade gave architects access to information and computing power that made the design of buildings compatible with the Nigerian climate realistic within short delivery deadlines.

FACTORS (CHALLENGES) DETERMINING CHOICE OF EXTERNAL FINISHES AND ROOFING IN NIGERIAN UNIVERSITIES

The factors that determined the choice of external finishes and roofing in Nigerian universities varied over time and between university types, but an attempt has been made to generalize them.

Climate

Most universities experience heavy rainfall during some months of the year. Even in the savannah zone where there are many months without rainfall, the monthly rainfall in the rainy season still exceeds 200 mm, making the provision of proper roof drainage a necessity. Humidity is also a major climatic factor, especially in the humid southern part of the country, where deterioration of building finishes by biological mechanisms, a process enhanced by high humidity, is a serious concern. Other climatic factors such as high solar radiation, wind, high temperatures and high diurnal temperature ranges could also create conditions conducive to physical, chemical, and biological degradation of finishes.

Aesthetics

Apart from providing a more conducive learning environment, beautiful and well landscaped

universities attracted students and sponsors for purely aesthetic reasons. There was competition between universities to have the most aesthetically pleasant buildings, and the external finishes contributed significantly to this.

Durability

Durability of building finishes and roofing refers to their resistance to deterioration by physical, chemical and biological mechanisms (Aluko & Ogunsoye 2013, p. 579). More durable materials tended to be more expensive, and sometimes required greater expertise in construction or installation.

Cost

Funding was a major constraint in the specification of building finishes and roofing.

Availability

Most high-tech building finishes and roofing materials were imported, with the establishment of local factories for finishing stone and timber to international standards being a recent development. The general tendency was to use what was readily available in the open market.

Constructability and skill level of craftsmen

The best building finishes often required skilled workmen and professional expertise for installation and construction. Contractors tended to prefer using less skilled workmen who were more readily available and cheaper. They also preferred simple structures that did not require the services of registered and experienced engineers. Projects requiring professional project management and supervision by expert professionals and consultants were avoided since they were more difficult to manipulate in terms of specifications (Ogunsoye, Prucnal-Ogunsoye and Ude, 2011).

Professional awareness

Current knowledge of the type and properties, history of local application and even the true cost of building finishes by professionals in the building industry is essential in taking the right decisions when specifying materials and during construction.

Peer pressure

Introduction of modern materials for external finishes and roofing often gave buildings a modern mien, and competitors often tended to copy such buildings.

Cultural factors

Urbanization is a recent development, and the majority of Nigerians still live in rural areas, where the quality of building finishes and roofing tends to be low. When these people migrated to cities, they tended to

underestimate the importance of building finishes, and many considered painting buildings a waste of money. For example, majority of bungalows rented out to off-campus students as hostels are unpainted. Some of these people were stakeholders in the universities, either as end users or staff directly involved in building projects delivery, and they sometimes influenced the choice of finishes. The authors and many architects involved in design and supervision of university buildings often needed to strongly resist lowering of external finishes specifications during building construction, arguing that there were other ways to resolve cost overruns.

INNOVATIONS IN THE CHOICE AND OPTIMIZATION OF EXTERNAL FINISHES AND ROOFING

There were several innovations introduced in universities that were acclaimed as appropriate solutions to the problems of optimizing external finishes and roofing.

Conversion of flat concrete roofs to pitched roofs

Flat concrete roofs tended to leak after a few years due to poor maintenance culture, and non-replacement of felting. Gutters tended to get blocked, and dust and seeds blown onto the roofs were trapped and facilitated the growth of weeds, which destroyed the waterproofing (felting). A novel solution was to build pitched roofs atop these flat concrete roofs (Plates 11 to 14).

Roofing of open-air structures

The outdoor auditorium of the Oduduwa hall was covered and used for academic programmes (Plate 4).

Use of brick facing for walls

The use of brick facing, instead of brick walls provided aesthetically pleasant buildings that required less maintenance and less skill in construction (Plate 15).

Use of weather-resistant paints

The use of tyrolean and weather-resistant textured paints was a cheap alternative to tiling and stone cladding.

Use of butterfly roofs

Butterfly roofs made rainwater harvesting easier, and the gutter area required was less. It was also possible to eliminate parapet walls, or to simplify their design because they were not linked to roof gutters (Plate 16).

Use of fins and canopies to protect walls and openings from driving rain and sun

Skilful design of exterior walls was used to protect walls and openings from driving rain and sun, thus

reducing the area of the wall requiring highly durable finishes (Plate 17).



Plate 11. Umaru Shehu Lecture Theatre, aka Spider Lecture Theatre (Twin Lecture Theatre) by Niger Consultants, Ahmadu Bello University, Zaria. The sloping roof slabs were covered with felt and drained into concrete gutters. Source: Photograph by the authors (September 2005).

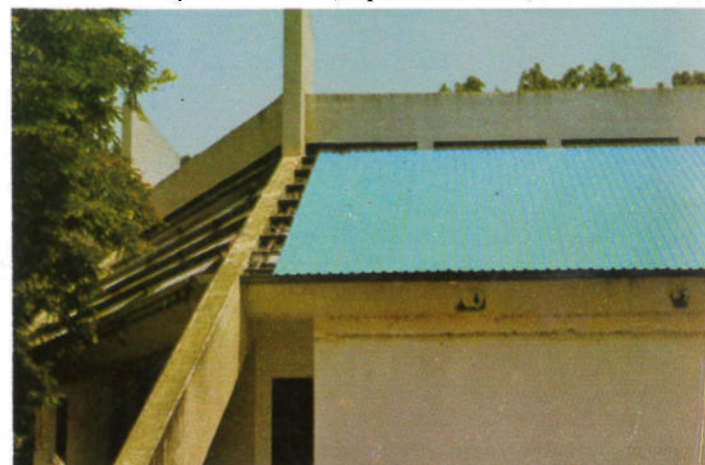


Plate 12. Umaru Shehu Lecture Theatre (Twin Lecture Theatre) by Niger Consultants, Ahmadu Bello University, Zaria. The same sloping roof slabs later covered with long span aluminium roofing sheets. Note the layout of the spacer rods and purlins. Source: Photograph by the authors (July 2011).



Plate 13. Lecture Theatre, Faculty of Pharmacy, Ahmadu Bello University, Zaria. Note the flat roof being replaced with pitched roof. Note also the spouts of the original roof gutter. Source: Photograph by the authors (July 2011).

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Plate 14. Roof-top Studio, Department of Architecture, Ahmadu Bello University, Zaria. The pitched roof was constructed on top of the space truss originally covered by plywood boards. Source: Photograph by the authors (November 2005).



Plate 15. School of Earth and Mineral Sciences by Soft Designs Environmental Consultants Ltd (2004), Federal University of Technology, Akure. Note the use of brick facing and recessed openings and walls. Source: Photograph by the authors (December 2006).



Plate 16. Faculty of Basic and Applied Sciences by Soft Designs Environmental Consultants Ltd (2008), Elizade University, Hara Mokin, Ondo State. Source: Photograph by the authors (January 2012).

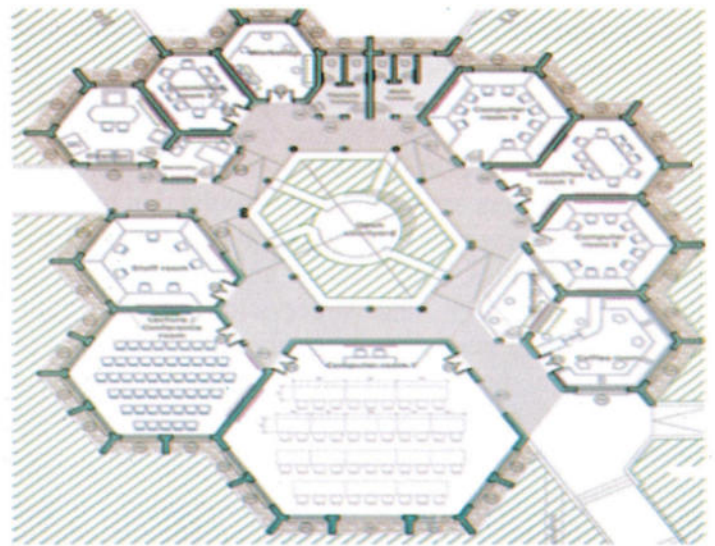


Plate 17. Floor plan of the Computer Resource Centre by Soft Designs Environmental Consultants Ltd (2003), Federal University of Technology, Akure. Note the use of fins to protect walls from rain and sun. Source: Soft Designs Environmental Consultants Ltd (2003).

COMPARATIVE ANALYSIS OF CHOICE OF EXTERNAL FINISHES AND ROOFING

A comparative analysis of the choice of external finishes and roofing in the case studies revealed some common trends. These trends cut across all universities irrespective of age, ownership structure or specialization.

Correlation between level of funding and quality of finishes

Private universities that charged very high fees tended to have higher quality of finishes than poorly funded public universities. Public universities did not charge tuition fees for undergraduate studies, and they relied mainly on Government subventions and partially on internally generated revenue from non-degree programmes. Their admissions were commonly oversubscribed, sometimes at ratios of ten or more qualified applicants per available space. Private universities on the other hand charged exorbitant fees, and their admissions were usually undersubscribed. The private universities justified these high fees by claiming that their facilities were of international standard, and they enhanced this image by showing off well-finished buildings in advertisements. Funding has been found to be important in both private and public universities in Nigeria in studies carried out by Akinyalu, (2012), Omoregie (2011) and Saanu (2015).

During the oil boom period of the seventies and early eighties, big and frequent contracts were awarded for university buildings, and these were often executed by firms with foreign partners using high quality exterior finishes and roofing materials, most of which were imported. By 1996 the situation drastically worsened with the introduction of the unpopular Structural

Adjustment Programme (SAP). The poor economy of the country adversely affected the execution of building contracts with a drop in the quality of exterior finishes and roofing which was very visible especially in the first generation universities.

Poor maintenance leading to roof leakage and staining of walls

All first generation universities faced serious problems of leakage of the concrete flat roofs designed in the international style. Second and third generation universities suffered similar problems, but this was more because of poor quality of workmanship and poor maintenance culture.

Construction of pitched roofs on existing flat roofs to solve leakage problems

This was one of the innovative methods developed to deal with both faulty conceptualization of the original design and poor maintenance culture.

Successful use of indigenous finishes

There was increased use of locally available external finishes including stone, stone facing, brick facing, wall tiles, mosaics and sandstone. There was gradual adoption of the use of natural and durable external finishes (Plate 18).

Slow but gradual adoption of modern construction materials

There was slow but gradual adoption of steel roof structure, steel cladding and insulated aluminium roofing sheets which prevented overheating of the interior (Plate 19).

Plate 18. New University Chapel, University of Lagos, Lagos. Note the use of vitrified ceramic tiles for external finishing. The old University Chapel with steel cladding and contrasting architecture can be seen in the background.

Source: Photograph by the authors (July 2008).



Plate 19. University Chapel, University of Lagos, Lagos.

Note the used of coated steel cladding. Source: Photograph by the authors (July 2008).

CONCLUSIONS

This study has attempted to analyse how the choice of external finishes and roofing of university buildings in Nigeria has evolved over the last half century in response to socio-economic, aesthetic and technological stimuli. The following conclusions were reached.

Correlation between level of funding and quality of finishes

The quality of exterior finishes and roofing tended to be determined by the level of available funding and the state of the national economy. When funding was low and the standard of living dropping, there was tendency to cut corners and to use low quality finishes, often with a profit motive. There was a drastic difference between the oil boom and the post Structural Adjustment Programme periods. There was also difference between private universities that charged high fees and had low admissions compared to public universities that did not charge tuition and had high admissions.

Propensity for regular award of petty maintenance and painting contracts

There was a patronage system built around most university administrations, and constant pressure to award contracts for petty maintenance jobs like painting and repairs of leaking roofs. When high quality finishes were used, there was significant reduction in the award of such contracts, which many administrators might arguably not have preferred. Short-term economic interests dictated the use of non-durable and cheaper materials, which in the long run also helped generate income from petty maintenance and painting contracts.

Low skill level of craftsmen

The non-availability of large numbers of highly skilled and experienced craftsmen for installation or construction of



high-quality finishes discouraged the use of these finishes.

RECOMMENDATIONS

Better adaptation to climate

Studies have shown that the intensity of rainfall in Nigeria does not justify the use of flat roofs in any part of the country. The humidity, solar radiation, wind speeds, annual mean temperatures and temperature ranges also do not rationalize the use of exterior finishes that are highly susceptible to deterioration by biological and chemical mechanisms. This is more so in the southern parts of the country where pollution from gas flaring, urbanization and industrial activities is more prominent. The impact of the climate on finishes and roofing should be a major consideration during material specification, and the use of durable and weather resistant finishes made from sustainable materials is recommended.

Materials that age without decaying

The use of natural and sustainable building finishes, such as stone and bricks can significantly reduce the maintenance costs. These materials age gracefully, but there is urgent need to develop treatments that can inhibit their deterioration by biological agents.

Life-cycle approach to estimating cost of finishes

Comparisons of various options for exterior finishes are often based on the initial cost of acquisition and installation. The cost of maintenance over the lifespan of the building is often ignored. The aesthetic and health-related advantages of the various materials are also often not taken into consideration. Thus materials that are cheaper, but more expensive in the long run are often chosen. A lifecycle approach to cost estimation can reduce such errors of judgement.

Organic and sustainable materials

Organic and natural materials are more sustainable and pose less health risks and their use is encouraged.

High-energy materials for cladding

The use of high-energy materials for cladding, such as anodized or coated steel and aluminium is gradually gaining acceptance in high-profile and commercial buildings. Introduction of these materials into university architecture promises to enhance the durability and aesthetics of exterior finishes of buildings.

REFERENCES

Ajayi, I. A. & Ekundayo, H. T. (2008). The deregulation of university education in Nigeria: Implications for quality assurance, *Nebula*, 5(4). Retrieved from <http://nobleworld.biz/images/Ajayi_Ekundayo.pdf>.

Akinyalu, P. (2012). Appreciating funding problems of public universities. *The Punch Newspaper Online Edition*, July 30, 2012. Retrieved from <http://www.punchng.com/opinion/appreciating-funding-problems-of-public-universities/>.

Aluko, O. O. & Ogunsote, O. O. (2013). Assessment of external building finishes: a case study of selected buildings in Akure, Ondo State, Nigeria, *International Journal of Engineering and Technology*, 3(5): 578-587. Retrieved from <http://iet-journals.org/archive/2013/may_vol_3_no_5/7196711363963

48.pdf>.

Lawal, A. F. (2013). Climate Responsive Approach to Building Design for Comfort in Warm-Humid Climate. *International Journal of Engineering and Technology*, 3(1): 50-58. Retrieved from <http://www.ajol.info/index.php/lwati/article/view/79824>.

National Universities Commission (2015). Nigerian universities. Retrieved from <<http://www.nuc.edu.ng/pages/universities.asp>>.

Nwagwu, W. E., & Agarin, O. (2008). Nigerian university websites: A webometric analysis. *Webology*, 5(4), Article 62. Retrieved from <http://www.webology.org/2008/v5n4/a65.html>.

Ogunsote, O. O. & Prucnal-Ogunsote, B. (2002). Defining climatic zones for architectural design in Nigeria: A systematic delineation, *Journal of Environmental Technology*, 1(2): 1-14.

Ogunsote, O. O. & Prucnal-Ogunsote, B. (2006). *Campus planning and architecture: Memoirs from seven American universities*. Department of Architecture, School of Environmental Technology, Federal University of Technology, Akure.

Ogunsote, O. O. (1990). *Architectural design with Nigerian climatic conditions in view: A systems approach*. Ph.D thesis, Ahmadu Bello University, Zaria.

Ogunsote, O. O., Prucnal-Ogunsote, B. & Ude, O. A. (2011). Sustainable Design of University Buildings in Tropical Climates: A Case Study of Three Universities in Ondo State, Nigeria, *Proceedings of the International Union of Architects (UIA) XXIV World Congress of Architecture*, UIA, Tokyo, Japan.

Omorogic, N. (2011). Issues and Challenges in Private University Education in Africa: Funding of Private Universities in Nigeria. *LWATI: A Journal of Contemporary Research*, 8(4), 272-282.

Prucnal-Ogunsote, B. (1994). A study of modern trends in some aspects of architecture in Nigeria. Ph.D thesis, Ahmadu Bello University, Zaria.

Prucnal-Ogunsote, B. (2001). Classification of Nigerian architecture, *Journal of the Association of Architectural Educators in Nigeria (AARCHES-J)*, 1(6): 48-56. AARCHES, Akure.

Saanu, S. (2015). Why Nigerian varsities are poorly ranked. *Daily Independent Newspaper*, March 2, 2015. Retrieved from <http://dailyindependentnig.com/2015/03/nigerian-varsities-poorly-ranked/>.

United States Diplomatic Mission to Nigeria (2014). Resources: Nigeria – Educational profile. Retrieved from: http://nigeria.usembassy.gov/nigeria_education_profile.html.

THE EFFECTS OF SPATIAL PERCEPTION ON HUMAN BEHAVIOUR IN SELECTED STUDENT HOSTELS IN THE UNIVERSITY OF JOS, NIGERIA

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ABSTRACT

Individual perceptions of space affect the behavioural values of their environments. This paper examines the effects of spatial perception on human behaviour by individuals and how they relate in the space that they inhabit. Spatial perception is affected by sociological needs, psychological state and individual differences. The environment also influences human behaviour even as both mental and physical stimuli affect behavioural responses. The way people perceive their environment also influences their social interaction within the built environment. Hence, individuals respond to their environment based on perception, cognition and spatial behaviour. The paper also examines the interrelationship that exists among perception, cognition and spatial behaviour, utilising a case study (qualitative) approach to evaluate the effects of spatial perception on the behaviour of the students. Qualitative survey instrument using purposive and random sampling techniques generated data from one hundred and fifty (150) questionnaires were administered to students in selected student hostels in University of Jos. Questionnaires were collated and analysed using Kendall Tau rank correlation measure and Mann-Whitney U Test in comparing the two hostels. Results reveal that students' behaviour is influenced by the spatial design of their rooms in terms of room size, colour, ventilation and physical condition as well as the number of students allocated to the rooms. The study outcome will be useful for spatial planning and interior design of residential units and hostel design in tertiary institutions.

Key words: Effects, Human Behaviour, Interior Environment, Spatial Perception

INTRODUCTION

Space is that which brings people together and simultaneously that which separates us from each other (Lawson, 2001). Hence it can be said that space is a language with social and cultural variations which can be observed all over the world wherever and whenever people come together. It is therefore important for buildings to 'speak' the language of space, as individual perceptions of space, often reveal behaviours within the particular enclosure. This is due to the fact that

space creates settings which organise human lives, activities and relationships often subliminally. Spatial behavior involves verbal and non-verbal communication. Recent studies make the case for evidence based architecture, where architectural design is generated by architects' observation of society in general and building occupants in specific, as design should not be done for people, but with people (Markus, 1993).

Human behaviour is largely affected by spatial configurations and dimensions. Variations in behaviour can be attributed to cultural interpretations of spatial distances in different ways which can lead to misunderstanding, and even insults. This study explores the way individual perception of an architectural space influences human behaviour as well as the way it mediates human relationships. The study also seeks to establish architectural space and design as a container to accommodate, influence, structure, organise as well as facilitate human spatial behaviour in the interior environment. The study therefore examines the effects of spatial perception on human behaviour in selected hostels in the University of Jos by putting forward two hypotheses:

Hypothesis One

H₀: There is a significant relationship between the level of spatial perception and human behaviour.

H_p: There is no significant relationship between the level of spatial perception and human behaviour.

Hypothesis Two

H₀: There is a significant difference between the

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level of spatial perception among students and their behaviour in University of Jos hostels.

H₁: There is no significance difference between the level of spatial perception among students and their behaviour in University of Jos hostels.

LITERATURE REVIEW

Spatial Perception is the ability to evaluate how things are arranged in space, while investigating their environmental relationships. Human beings continually obtain information and stimuli from their environments, enabling them to make conscious and subconscious judgments about the surroundings, to determine appropriate actions and attitudes (Robson, 1999). Good spatial perception allows individuals grasp the arrangement of our surroundings and our relationship to them, keeping them from constantly colliding with the objects around them. The process also enables humans and other organisms become aware of the relative positions of their own bodies and objects around them. How a person interprets space is therefore a phenomenological experience that goes beyond the limitations of psychological confinement. Spatial explorations while utilising one's senses are indeed manipulated by human behaviour which is controlled by social, physiological and physical inadequacy. Robson (1999), states there are three modes of perception in human beings, namely, the operational mode, the responsive mode, and the inferential mode. Robson further states that an environment, which provides information on all three levels, is a successful environment especially when it also relates to things that are familiar and understood from previous experiences.

Individuals respond uniquely when confronted with a specific situation or experience. These responses fall into three categories: sociological, psychological and physiological, all of which are influenced by factors within the interior environment. Sociological determinants relate to the social needs and problems of

the occupants of a space. Factors that pertain to these sociological responses include group dynamics and communication. Studies of **communication** reveal that, in conversation, people prefer to sit across from one another rather than side by side. In the planning of the interior environment psychological determinants relate to the psychological needs and concerns of the occupants. Visual privacy, acoustic privacy, and aesthetic factors are key determinants to be considered. Physiological determinants relate to physical needs of the occupants. Factors to be considered during the planning phase that deal with physiological responses include functionality, ergonomics, life safety, and health concerns. Sobocinski (2010) asserts that human beings possess a particular set of senses with varied specialization and sensitivity to stimuli. In modern times, cities produce numerous signs identifying society, institutions, and individuals. This is achieved primarily by visual and verbal means, with some non-verbal elements inherited from the beginnings of human communicative behaviour. In the digital age, addition, there is the whole sphere of online communication which again is primarily visual and linguistic (Sobocinski, 2010).

Several factors influence or determine human behaviour in the interior environment including genetics, social norms, core faith and culture and attitude. Behaviours are affected by traits (which can be inherited), which can be characterised as the result of a specific combination of multiple genes, and these traits can also be affected by different factors. Environment, for example, is amongst the primary factors affecting trait development. Genes can be manipulated and modified and the environment can increase certain outcomes of genes (McInerney, 2008). An individual's behaviour also varies depending on the group(s) they are a part of, a characteristic of society that allows norms heavily impact society. Without social norms, human society would not function as it currently does; humans would have to be more abstract in their

behaviour, as there would not be a pre-tested 'normal' standardised lifestyle, and individuals would have to make many more choices for themselves. Tangney, & Mewig and Mashek, (2007) assert that core faith and ideologies also affects individual behaviour. Unlike, some behaviour that can be inherited as identified by McInerney (2008) culture is situated between the human nature on the one hand and the individual personality on the other. Culture is not inheritable or genetic, but culture is learned.

Proxemics refers to the study of man's appreciation and use of space. Hall (1963) coined the term "proxemics" when he investigated man's use of personal space in contrast with "fixed" and "semi-fixed" feature space. Fixed feature space is characterised by unmovable boundaries (divisions within buildings) while semi-fixed feature space is defined by boundaries such as furniture. Informal space is characterized by a personal

zone or "bubble" that varies for individuals and circumstances. While the use of each of these spatial relationships can impede or promote the act of communication, most often is their informal space, the personal space constitutes an area that humans protect from the intrusion of outsiders (Figure 1). Behavioural studies indicate that individuals perceive a distance that is appropriate for different types of messages; they also establish a comfortable distance for personal interaction and nonverbally define this as their personal space. Research supports the notion that the violation of this personal space can have serious adverse effects on communication. Thus, if an individual is to be satisfied in communications encounter his/her personal space must be respected. Invasion of this personal space while also trespassing within territorial boundaries places the individual in double jeopardy which must be compensated for the other's increased anxiety.

Table 1: Spatial Territory For The Purpose Of Communication

Space Distance	Purpose	Range
Intimate	embracing or whispering	450 mm-1200 mm
Personal	conversations among good friends	1524 mm -4572 mm
Social	conversations among acquaintances	1200 mm – 3600 mm
Public	public speaking	3600 mm or more

Source: Hall (1963)

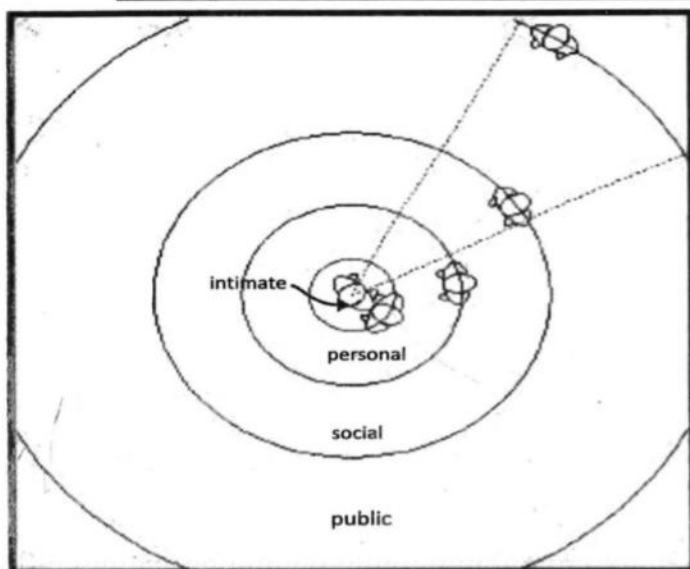


Figure 1: Levels of space: intimate, personal, social, and public. Source: Adapted from Lawson (2001)

In a similar study on spatial perception of outdoor environments, student groupings were found to be affected by the space boundaries that it occupies in educational settings even as enclosure of space affects in-group interactions and seclusion. Jordan University of Science - Irbid, Jordan showed decreased willingness to interact whereas increasing personal enclosure had a positive effect on the interactive space located to create

social interactions and friendship settings in educational institutions (Al-Homoud, and Abu-Obeid, 2003).

A related study on indoor environments and job satisfaction identifies room condition factors such as thermal conditions, acoustics, views, lighting, and ergonomics as having a significant effect on the behaviours of employees in the work place. An important aspect of the workplace that the research identified was the control that employees have on their work environment. Personal storage was a significant factor among issues raised (Salama and Courtney, 2009). This present study would therefore rely on dependent measures as the determinants of spatial perception and behaviour. This study would include six determinants namely condition of room; ventilation, level of privacy, room size, room height appropriateness and adequate storage. The study will use utilise five factors for behaviour determination, namely: individual attitude; social norms/hostel's rules and regulations; religious beliefs; personality and situational reaction of individual.

METHODOLOGY

The primary purpose of this research was to identify the effects of spatial perception on the behaviour of the residents in Abuja and Village Hostels, University of Jos, Nigeria. The study also identified what factors within the hostel rooms influenced positive or negative behaviour. The data that was collected was divided into four sections: socio-economic data, awareness of spatial perception, room size, allocation physical condition and human behaviour. The research method included a structured questionnaire, which was

administered in the context of one-on- one structured and formal interviews. The interviews were conducted in the selected hostel areas to provide the respondents with context. The study setting was:

- a. Abuja Hostel
- b. Village Hostel

The selected study population consisted of one hundred and fifty students (150) selected randomly, though evenly distributed between the two hostels. Participation of the subjects in the study was voluntary. The contextual settings of the hostels varies with the face-to-face structured interviews were conducted at the above described two selected zones. The instrument, which was developed by applying factor analysis to the initial scale, was used to collect information about perception of individual interaction and privacy within the group. Informed consent was sought and obtained verbally. The collected data related to dependent and independent variables, earlier identified in the literature review became the dependent measures or the determinants of spatial perception and behaviour. Procedurally, the study included six determinants - condition of room; ventilation, level of privacy, room size, room height appropriateness and adequate storage. The study also included five determinants of behaviour - individual attitude; social norms/hostel's rules and regulations; religious beliefs; personality and situational reaction of individual. The data collectors randomly selected 75 students from Abuja Hostel (plates i and ii) and 75 students from Village Hostel (plates iii and iv). The data was collected over a six week time period. After being selected, the subjects gave verbal assent to participation in the study and then the subjects were interviewed contextually in the selected study settings.

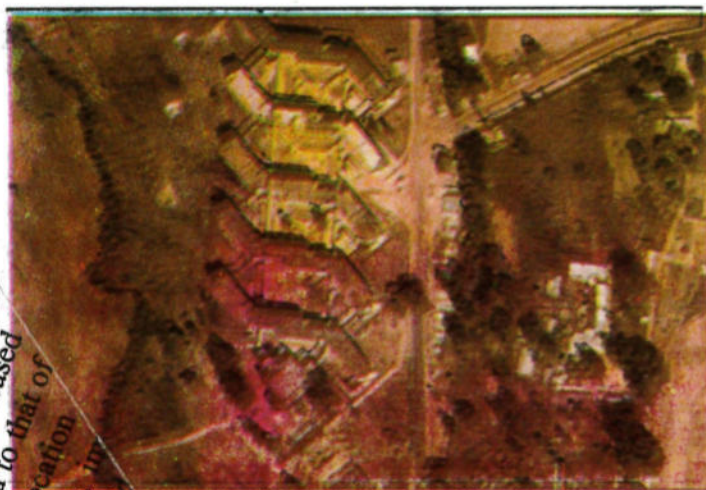


Plate i: Abuja Hostel Aerial View

Source: Google Earth (2014)

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Front View Abuja Hostel Block D



Plate iii: Village Hostel Aerial View
Source: Google Earth (2014)



Plate iv: Front View Village Hostel Compound 8

RESULTS AND DISCUSSION

Table 2 depicts the sum of the weighted values, mean, standard deviation and standard error scores for data on spatial perception and human behaviour generated from the respondents. The outcome of the result shows the need for a well-ventilated accommodation tops the list of the determinants for spatial perception among students in the Abuja Hostel, next to ventilation, is level of privacy, followed by room size, condition of the room, adequate storage space with room appropriateness attracting the least score. Religious belief attracted the highest value in the determinants of students' behaviour in the hostel. Personality type, social norms, individual attitude also attracted high values, with the least determinant being situational reaction by the individual. When the values are compared with those from the Village Hostel, it is obvious that the students in Village Hostel have a strong concern for a considerable level of privacy they should enjoy. This is followed by the need for a well-ventilated apartment, condition of the room, adequate storage space, room side and room's height appropriateness. The behaviour of the majority of students in this hostel is largely accounted for by religious beliefs, followed

by personality type, individual attitude, social norms with situational reaction being the least determinant of the students' behaviour. The study also tested the two hypotheses put forward, namely:

Hypothesis One

H₀: There is a significant relationship between the level of spatial perception and human behaviour.

H₁: There is no significant relationship between the level of spatial perception and human behaviour.

Hypothesis Two

H₀: There is a significant difference between the level of spatial perception among students and their behaviour in University of Jos hostels.

H₁: There is no significance difference between the level of spatial perception among students and their behaviour in University of Jos hostels.

Tables 4 and 5 show the relationship between spatial perception and students' behaviour in the selected hostels of University of Jos. Using the Kendall Tau rank correlation measure, the results obtained are shown on the above tables. The correlation coefficients reveal stronger correlation between spatial perception and students' behaviour in the two hostels. The Kendall Tau test was performed and the correlation coefficients were found to be statistically significant at $p < 0.05$ and 0.01 . This implies that there is significant relationship between the level of spatial perception and human behaviour. However, from table 5, it can be observed that adequate storage space is the least influencing factor on students' behaviour within their room space in the Village Hostel contrary to the findings of Salama and Courtney (2009) on the significance of storage space. Despite the relatively weak correlation coefficients they are found to be statistically significant.

The second hypothesis seeks to test if there is difference between the level of spatial perception among students and their behaviour in University of Jos hostels. Mann-Whitney U test was performed test the hypothesis and

the result presented in the table 6. Table 6 and 7 above show the summaries of Mann-Whitney U test conducted to evaluate hypothesis two that there is no significance difference between the level of spatial perception among students and their behaviour in University of Jos hostels. The mean rank scores in table 4 reveal that students in the Abuja Hostel, on the average have a higher spatial perception than students in the Village Hostel. The mean rank for students in

Abuja hostel is 6.67 compared to 6.33 score for Village hostel. The results of the test for students' behaviour were in the expected direction (6.20 and 4.80 respectively). Given the asymptotic and exact sig (p-value = .872 > .05 and .465 > .05), the Mann-Whitney test is not significant. This finding indicates that there is no significance difference between the level of spatial perception among students and their behaviour in Abuja and Village Hostels of University of Jos.

Table 2: Factors that influence student's spatial perception of their room spaces

Factors	Rank	Very strongly	Strongly	Neutral	Weakly	Very weakly
Condition of room	1	30.8	63.5	21.2	13.5	3.8
Ventilation	2	31.1	35.1	14.9	13.5	5.4
Attitude	3	27.8	41.7	21.9	9.7	1.4
Level of privacy	4	18.9	45.9	16.2	17.6	1.4
Room size	5	17.4	42	18.8	18.8	2.9
Social norms	6	12.2	40.5	33.8	12.2	1.4
Religious beliefs	7	35.9	17.6	16.2	15.6	9.4

Table 3: Descriptive Analysis of Students' Spatial Perception and Behaviour in two Hostels in University of Jos

FACTORS	ABUJA HOSTEL N=75				VILLAGE HOSTEL N=75			
	Sum	Mean	SD	SE	Sum	Mean	SD	SE
<i>Determinants of Spatial Perception</i>								
Condition of room	304	4.05	.899	.104	315	4.20	.854	.099
Ventilation	328	4.37	.731	.084	318	4.24	.928	.107
Level of Privacy	318	4.24	.852	.098	320	4.27	.890	.103
Room size	315	4.20	.838	.097	290	3.87	.991	.114
Room height appropriateness	276	3.68	1.199	.138	288	3.84	.806	.093
Adequate storage space	297	3.96	.845	.098	302	4.03	.328	.038
<i>Determinants of Behaviour</i>								
Individual Attitude	301	4.01	.878	.101	300	4.00	.930	.107
Social Norms/hostel's rules & regulation	317	4.23	.981	.113	295	3.93	.859	.099
Religious belief	325	4.33	.905	.105	324	4.32	.903	.104
Personality	319	4.25	.773	.089	309	4.12	.614	.071
Situational reaction of individual	294	3.92	.983	.114	297	3.96	.829	.096

Table 4: Relationship between Spatial Perception and Students' Behaviour in Abuja Hostel

	<i>Kendall T Correlation</i>				
	Individual Attitude	Social Norms	Religious belief	Personality	Situational reaction
Condition of room	.937	.802	.740	.792	.901
Ventilation	.722	.944	.803	.887	.709
Level of Privacy	.781	.866	.741	.836	.767
Room size	.822	.882	.762	.845	.803
Room height appropriateness	.900	.779	.789	.813	.926
Adequate storage space	.830	.715	.641	.666	.831

Field survey (2015): N = 75. Correlation is significant at 0.01 level; $p < 0.01$.

Table 5: Relationship Between Spatial Perception and Students' Behaviour in Village Hostel

	<i>Kendall T Correlation</i>				
	Individual Attitude	Social Norms	Religious belief	Personality	Situational reaction
Condition of room	.844	.744	.846	.766	.790
Ventilation	.796	.743	.924	.710	.755
Level of Privacy	.792	.740	.925	.707	.757
Room size	.896	.950	.740	.856	.974
Room height nonroominess	.817	.893	.699	.776	.894
Adequate storage space	.453	.488	.403	.537	.469

Field survey (2015): N = 75. Correlation is significant at 0.01 level; p<0.01.

Table 6: Ranks

	Group	N	Mean Rank	Sum of Ranks
Spatial Perception	Abuja Hostel	6	6.67	40.00
	Village Hostel	6	6.33	38.00
	Total	12		
Students' Behaviour	Abuja Hostel	5	6.20	31.00
	Village Hostel	5	4.80	24.00
	Total	10		

Table 7: Test Statistics¹

	Spatial Perception	Students' Behaviour
Mann-Whitney U	17.000	9.000
Wilcoxon W	38.000	24.000
Z	-.161	-.731
Asymp. Sig. (2-tailed)	.872	.465
Exact Sig. (1-tailed Sig.)	.937 ^a	.548 ^a

a. Not corrected for ties.

b. Grouping Variable: Group

a. Not corrected for ties

b. B. Grouping Variable: Group

CONCLUSION

Though it was hypothesised that students of the Abuja and Village hostels of the University of Jos differ in levels of perceptions of their interior spatial environments (hostel rooms), the finding indicates that there is no significance difference between the level of spatial perception among students and their behaviour in Abuja and Village Hostels of University of Jos. There is however a significant relationship between the level of spatial perception and human behaviour. Measures should be put in place to address the direct concerns and spatial perceptions of the students as these go a long way in eliciting positive behavioural traits in the students living in the hostels as well as increase satisfaction with living conditions. This in turn should encourage positive spatial perception as identified in *Al-Homoud, and Abu-Obeid (2003)*. Effective spatial

design done with due consideration of the users of the space (evidence based design) as well ventilated rooms anticipating the possibility of overcrowding (a major user consideration).

RECOMMENDATIONS

In order for the interior environment to elicit positive human behaviour as facilitated by spatial perception, which will ensure maximal satisfaction as well as healthy social interaction among the students living in the hostels, great consideration has to be given by both the Architects and the school management to the spatial design of the hostel rooms.

Long lasting solutions can be produced by taking the following measures into cognisance:

1. Architects should design with people and not just for people (evidence-based design). This means that spaces should be designed with careful consideration to occupants of the spaces and their needs.
2. Management of tertiary institutions should provide more hostels to address the teeming student populations, ensuring higher levels of satisfaction to the occupants.

3. Care should be taken by the designers to provide enough room for storage and adequate ventilation in the spatial design.

REFERENCES

- Al-Homoud, M. and Abu-Obeid, N. (2003). *University outdoor spatial layout effect on perception of students' interaction and group seclusion*. *Journal of Architectural and Planning Research*.20(3): 221-233.
- Hall, E. T (1963). *The Hidden Dimension*. Garden City, NJ: Doubleday & Co.
- Kecmanovic, D. (1969). *The paranoid attitude as the common form of social behavior*. *Sociologija*, pp. 573-585. Retrieved from <http://search.proquest.com/docview/608776397accountid=12347>
- Lawson, B. (2001). *The Language of Space*. Jordan Hill, Oxford: Reed Educational and Professional Publishing Ltd.
- Markus, T. (1993). *Buildings and Power: Freedom and Control in the Origin of Modern Building*. London: Routledge.
- McInerney, J. (2008). *Behavioral genetics*. Retrieved from http://www.ornl.gov/sci/techresources/Human_Genome/elsi/behavior.shtml
- Robson, S. A. (1999). *Turning the tables: The psychology of design for high-volume restaurants*. *Cornell Hotel and Restaurant Administration Quarterly*, pp. 56-63.
- Salama, A. M. and Courtney, L. (2009). *The Impact of the Spatial Qualities of the Workplace on Architects' Job Satisfaction*. *GBER*.8(2): 88-102
- Sobocinski, M. (2010). *On Proxemics and Territoriality in Communicative Behavior of Man-A Communique*. *B[^]dawnictwo Wyższej Szkoły Filologicznej we Wrocławiu*.
- Tangney, J. S., Stuewig, J. and Mashek, S. (2007). *Moral Emotions and Moral Behaviour*. *Annual Review of Psychology*, 58, 345.

A FRAMEWORK FOR THE APPLICATION OF CASE STUDY RESEARCH IN ARCHITECTURAL DESIGN THESES IN NIGERIA

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ABSTRACT

The application of case studies in architectural practice and education (teaching), as guide for architectural design is widely understood. However, there appears to be misconceptions and limited understanding of the application of case study approach to theoretical research in architecture. This is of great importance due to the increasing awareness of the role of research in architectural development and the need for more specialization. In order to put this in proper perspective, a review of the concept of case studies was conducted in context with architectural education and practice in Nigeria. The outcome of this is a proposed framework/guide for the application of same in architectural research, especially for postgraduate architectural theses as obtains in most Nigerian universities. The need to approach case studies scientifically in accordance with global practices in here emphasized. The paper therefore recommends that more emphasis be laid on case studies research methodology in order to enhance theoretical research output and contribution to knowledge.

Keywords: Architectural research, architectural theses, case study, education, framework, practice.

INTRODUCTION

The term 'case studies' has attained common usage in the field of architecture that one could innocently assume it to be an architectural term. From the classrooms to the studios; from the undergraduate projects to postgraduate theses, and finally in professional practice. Case studies have become part of the process of arriving at solutions to design problems. In Nigeria's schools of architecture, many of the theses involves one form of case study or another. However, a look at some of these architectural theses reveals a lot of limited and stereotypical approach to case studies. In these treatise, case studies focused on similar building typologies and archetypes, as guides for the development of proposed schemes. This may be attributed to the fact that the post graduate degree programs of most schools of architecture in Nigeria were still largely design oriented, with emphasis on creativity and the application, rather than creation of knowledge.

With the advent of globalization, the fact that the society is now knowledge-driven, and the challenges of specialization and diversification seems to challenge the architecture profession hence there is an urgent need to revisit methodological issues associated with the postgraduate architectural theses in Nigeria, especially at

the Masters level. This will engender better research outcomes and much-needed knowledge for the profession.

Uji (2002) noted that works of architecture cannot be equated with that of the artists or that of disciplines such as engineering. This is because artwork are the outcome of nebulous imaginative processes, while engineering works follow precise, predetermined, systematic and mathematical procedures. Similarly, Abdulkarim (2005) noted that the nature of architecture places it in a zone of convergence of theoretical inquiry and practical reality. The pursuit of theoretical enquiry necessitates a systematic collection, analysis and interpretation of data, while the practicality is hinged on technical knowledge and creativity. This calls for the architectural theses to be approached through a hybrid research methodology, in order to harnesses the advantages of knowledge application and creativity; as well as knowledge creation.

While case studies still remains one of the most viable approaches for architectural theses, it is necessary to deepen the understanding of its applications in architectural research, and a more scientific or systematic approach to its application. This will also enhance the quality of architectural theses, especially with regard to contribution to knowledge. Case study is beyond the documentation of the built environment. It is an empirical inquiry (Yin, 2009), and can lead to the creation of theoretical knowledge. It is therefore important to look at case study research methodology and its role in conducting an architectural theses which meets both professional and theoretical/academic requirements. This will ensure that product of Nigerian schools of architecture can compete with their peers in other parts of the world, and contribute to knowledge which will benefit the entirety of the architecture profession in Nigeria and beyond. This paper therefore aims at capturing the essence of case studies, placing architectural case studies in context with universal research methodology, and clarifying key issues in the application of case studies in architectural research. It also provides a framework for the conduct of case study based researches for architectural theses in Nigeria and beyond.

The Architecture Theses in Nigerian Universities

The architecture program in Nigerian universities has gone through many phases and assumed variety of nomenclature. This includes the Bachelor of Architecture (BArch)/ Master of Architecture (MArch), Bachelor of Science (BSc)/ Master of Science (MSc), Bachelor of

Environmental Science (BES)/ Master of Environmental Science (MES) and Bachelor of Technology (BTech)/ Master of Technology (MTech). Presently, an MSc in architecture is required to directly qualify one for the Nigerian Institute of Architects Professional Practice Examinations (NIAPPE), which is a prerequisite for professional registration with the Architects Registration Council of Nigeria (ARCON). However, in the research/academic world, and in accordance with the guidelines for postgraduate studies in many Nigerian universities, the award of an MSc suggests that one has undergone some form of scientific research and probably made contributions to knowledge. This appears not to be the case with many of the MSc theses conducted in schools of architecture in Nigeria.

Traditionally, the theoretical background and case studies in the architecture thesis of many Nigerian universities appear to have focused on the review and application of knowledge gathered from literature and case studies to a design solution. In contrast to this, a thesis which aims at contributing to knowledge should focus on the investigation of certain phenomenon or theories. In this light, case studies for such theses should be scientific in collecting, analysing and interpreting data. A look at these theses shows that they were largely more like architectural design projects, accompanied by design reports. In many cases, there was little evidence of systematic collection or analysis of data, which are the key characteristics of research. The only semblance of data collection in many of these theses were usually mentioned under the term 'case studies'. However, case studies is beyond a mere visit or documentation and discussion of buildings in order to learn from them and apply what is learned in one's design solution.

CASE STUDY IN CONTEXT

Yin (2009) defined case study as an empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence. Other definitions include: A "method for learning about a complex instance, based on a comprehensive understanding of that instance obtained by extensive description and analysis of that instance taken as a whole and in its context (General Accounting Office Program Evaluation and Methodology Division (GAOPEMD), 1990: 15)." These definitions suggests that case study is targeted at a holistic understanding of the case or phenomenon under investigation. This can only be achieved through multiple methods of data collection and triangulation of obtained results.

Case study methodology developed within the social sciences such as psychology, sociology, anthropology and economics, and is now widely applied in practice oriented fields such as environmental studies, social work, education and management science (Johansson, 2010). Veal (2006) noted that a case study may refer to a research method or a unit of analysis, and involves "the study of an

example - a case - of the phenomenon being researched" (p.108). However, the concept of 'a case' is not well defined and remains a subject of discussion. Various authors have given definitions of what a case is. The case may be a relatively bounded object or a process; it may be theoretical, empirical, or both (Ragin & Becker, 1992; Osuala, 2005). At a minimum, a case is a phenomenon *specific to time and space* (Johansson, 2010). This includes an event, an entity or an individual (Myers, 1997; Yin, 2009). In architectural theses, case study is widely approached as a unit of analysis, while the cases are usually buildings or the built environment. However, application of case study as a research methodology appears to be limited.

Case study approach is characterized by a purposeful selection of the case to study and triangulation, which is normally conducted by means of multiple-methods of data collection (Johansson, 2010). It is expected to capture the complexity of individual cases, and may involve contrasting cases studied in a similar manner (Veal, 2006). These studies may be qualitative or quantitative, or a combination both (Stake, 1995; Osuala, 2005; Yin, 2009).

Teaching and Design versus Theoretical Studies

Case studies are widely applied in architectural education (teaching) and practice. Architecture education involves the use of cases (selected buildings) as guides for learning about building typologies, their design requirements and challenges. Likewise, cases are used as guides in practice. This is because architectural solutions in practice are based on knowledge of a repertoire of cases either from personal experiences or established model cases (Schon, 1991). This acquaints most architects with the study of cases as guides, especially when faced with unfamiliar building typologies and challenging design problems. Harling and Laurier (2010) suggested that the main difference between teaching and research cases was in the nature and mode of data presented. Case study for theoretical research in architecture may require the use of a wider range of data collection and analysis techniques and instruments which were not applicable to teaching cases. Stake (1995) noted that theory could be absent from studies which focus on a describing the case and its issues. This is especially applicable in the field of architecture where most teaching and practice cases were largely based on visual survey. For theoretical and academic case studies, existing theoretical issues can be used as guides in order to conduct exploratory studies (Yin, 2009). This is also relevant if studies are to contribute to knowledge or develop new theories (Creswell, 1994; Harling & Laurier, 2010).

A METHODOLOGY FOR ARCHITECTURAL CASE STUDIES

Case Study Selection (Sampling)

Veal (2006) noted that case study selection was

comparable to sampling in a quantitative research and that cases were usually purposively selected (purposive sampling). This meant that cases were identified for study due to their inherent qualities which were in consonance with the phenomenon under investigation. This may be because they were information-rich, critical, revelatory, unique, representative or extremely atypical (Stake, 1995, Patton, 1990; Osuala, 2005). This is as opposed to representational sample used in statistical investigations (Stake, 1995, Patton, 1990). Case study research may be based on one or more cases. A single case design may be used where the case is critical, unique or typical, or that the study is longitudinal, comparing the case at different points in time (Yin, 2009).

Case studies may be illustrative, exploratory, explanatory, evaluative, critical instance, and cumulative, among others (GAOPMD, 1990; Veal, 2006). For the purpose of this paper, the applications of case studies will be discussed under five categories which this study adjudged as the most relevant to architectural theses. These are: illustrative, exploratory, explanatory, evaluative and critical instance.

Illustrative Case Studies

Veal (2006) described illustrative case studies as those chosen deliberately to increase the likelihood of showing or demonstrating a particular proposition. In such instances, a single case may be selected as typical examples or multiple cases each representing important variations (GAOPEMD, 1990). In architectural theses, an information-rich typical case can be used to illustrate and investigate an architectural problem, while multiple cases representing different facets of the phenomenon being illustrated is also applicable. Such studies are descriptive in character and primarily describes and maps out the phenomenon under investigation. This approach was used by Nasiri (2007) to examine the sustainable features of the vernacular architecture in the hot-arid regions of the Middle Eastern and North African regions. The case study illustrated the use of passive heating and cooling in Kasbahs, courtyard houses and traditional Iranian houses in the city of Yazd. Similarly, Mingozi and Bottiglioni (2007) conducted a case study of a sustainable residential settlement in Pieve di Cento. The residential settlement in Pieve di Cento was designed according to sustainable principles and revealed a good example of smart use of simple strategies to reach energy efficiency targets both in the hot and cold season.

Exploratory Case Studies

Exploratory case studies were usually undertaken before launching into large-scale investigations. Its function is to develop the evaluation questions, hypotheses, measures, designs, and analytic strategy for a bigger study. Selection of cases for exploratory studies required at least one site that represented each important variation to make a convenience sample acceptable (Veal, 2006; GAOPEMD, 2009).

Explanatory Case Studies

Explanatory case studies may be used to test the applicability of an existing theory (Veal, 2006), or to interconnect previously unknown or unappreciated factors in relevant ways. This may be used where theoretical postulations has never been empirically tested or where it has never been tested in a particular environment. Lara (2001) in a study titled '*popular modernism: An analysis of the acceptance of modern architecture in 1950s Brazil*' had this as one of the research questions; 'why was modern architecture better received in Brazil than in Europe or the United States?' This question was answered by conducting a case study of Belo Horizonte city, Brazil.

Evaluative Case Studies

Evaluative case studies are used in testing effectiveness of policies or programs in order to suggest modifications and alternatives (Veal, 2006). Selections of cases were not out of convenience and purposive sample may be typical or representative of diversity and best and worst cases. Also, the number of cases depends on program diversity since generalization was usually wanted (GAOPEMD, 2009). One of the popular architectural issues which recently appear to attract large numbers of evaluative studies is the issue of sustainable design. Oluigbo (2010) employed evaluative case studies in a bid to establish the factors which were critical to the sustainable design of tourism facilities in context with the characteristics of North-Western Nigeria.

Critical Instance Case Studies

Critical instance case study is applied in the examination of one, or very few, cases for one of two purposes. The first is the examination of a unique situation of interest, where there was little or no interest in generalizability. The second and rare application is where a highly generalized or universal assertion was being called into question, and needs to be tested through examining one instance. The emphasis is on ruling out alternative causes; report describes instances, presents conclusions about cause, give evidence (GAOPEMD, 2009). An example of this is a research aimed at investigating the causes of failure of a particular project or collapsed buildings.

Data Collection

Some of the defining characteristics of case study methodology are: The use of multiple sources of data in order to capture the complexity of cases, (see Table 1), and the triangulation of this data (Veal, 2006; Yin, 2009; Johansson, 2010). In contrast to these, many architectural researchers equate case studies with visual survey and documentation. Architectural case studies could apply either qualitative or quantitative methods or a combination of both. The combination of both methods will contribute to gaining better understanding of the phenomena under investigation and combine depth with breadth in the outcome thereby increasing the reliability

and validity of a study (Hartmann, 1988; Kaplan & Duchon, 1988). Groat and Wang (2002) noted that multi-method approaches in architectural research could combine multiple methods of data collection such as ethnographic, survey, participant design and experimental methods. All these methods of data collection can be integrated in case studies. Case study for architecture theses should therefore begin with possibly a reconnaissance survey, followed by a visual survey/documentation of the physical characteristics of the case. These will satisfy the traditional requirements of architectural theses. In addition to these however, case studies for theoretical research may require the use of general methods of data collection. These include: Observations and participant observations, visual survey and checklists, interviews, questionnaire survey, models and simulation, and scientific measuring instruments among others. This is because, in order to understand the performance of a buildings spatial organisation, for instance, data on the spatial organisation itself should be collected through visual survey and documentation (sketches, photographs, charts, etc). This may be adequate for some studies, especially when the study is totally descriptive. But for other studies, it may be necessary to hear from the architect of the building, through interviews, and also the users, through questionnaire surveys. Some studies may even require simulation or use of other instruments such as luminance metres.

Architectural researchers in Nigeria appear to shy away from questionnaires and interviews in the conduct of case studies. These instruments are useful for the survey of users or consumers of architecture. Possible areas of questionnaire survey in architectural case studies include: attitudes and perceptions, preferences and cognition. Lara (2001) used in-depth interview to sought explanations on why modern architecture was better received in Brazil than in Europe or the United States. For interviews in architecture, respondents may include: Architects and other members of the building industry; the client or owner, the users, and even passive consumers of architecture (passers by who make visual contact with the building).

Data Analysis

According to Veal (2006), all forms of analysis are possible within the context of a case. This analysis may be conducted for individual cases, across cases, or within groups of related cases (Christie *et al*, 2000). Analysis of architectural case study research may be statistical and non-statistical, and include descriptive analysis, visual analysis, comparative analysis, content analysis, and parametric and non-parametric statistical tests. Discussion of case study analysis may be based on pattern matching, logical argumentation/ explanation building and time series analysis among others (Veal, 2006).

Pattern matching relates the features of a case to what

might be expected from an existing theory (Veal, 2006). Logical argumentation simply describes making sense of some aspect of the cosmos in a systematically rational manner. Literature, in many fields of study, include works which give logical order to a set of previously desperate factors. Architectural works seem to frame logical conceptual systems, which interconnect previously unknown or unappreciated factors in relevant ways. These are examples of logical argumentation. The outcome of logical argumentation is an explanatory system, which if widely accepted will become a way of understanding some aspects of interaction between humans and the built environment, or a normative basis for action in design (Groat & Wang, 2002). Application of this method involves logical or causal explanation of the case study findings by to-and-fro referencing between theories from literature review and obtained data (Veal, 2006). Time series analysis involves the development of explanations based on observation of changes over a period of time (Veal, 2006). Organization of information within each site by time of occurrence, coupled with a systematic analysis of contextual influences on events, permits a non-quantitative time series analysis for case study data. The flow of events over time for each significant actor and for significant points in the series of events forms the organizing framework for data analysis within each site. Such comparisons of when key actions occurred, how well (or poorly) they were carried out, and what influenced both timing and quality of performance can be particularly helpful in case studies of program implementation (GAOPMD, 1990).

FRAMEWORK FOR ARCHITECTURAL THESES CASE-STUDY RESEARCH

Veal (2006) stated that a survey of 500 visitors to a site or facility could be regarded as a case study. However, to be seen as a case study in its full sense the study should include information on the history and environment of study. A large number of cases in architectural research are usually physical units such as buildings and sections of the built environment. As a result of this, detailed documentation of such cases are required before the application of general data collection techniques. Also, while a number of architectural case studies were aimed at teaching or guiding design, others were practically for theoretical reasons. However, most architecture masters theses (MSc, MTech, March, etc) in Nigeria involves architectural design and at least a pinch of theoretical enquiry. This necessitates the fusion of requirements for design oriented case studies with that for theoretical case studies (case study methodology). For the design aspect, a cue could be taken from the three basic attributes of architecture in the discussion of the case.

These attributes are: Spatial organisation (commodity, function, arrangement); Form and expression (aesthetics, delight), and; Structure and materials (firmness, technology, shelter) (based on Vitruvius, Moore, 1979). Figure 1 illustrates the convergence between requirements for architectural design case studies with that for theoretical research.

This paper proposes a framework that combines design documentation/description with theoretical data collection and analysis. A descriptive account of the cases may be based on the following headings: History and background; site planning and landscaping; spatial organisation of buildings; form and expression; structure and materials; and, building services. This should then be followed by the application of general data collection techniques. Figure 2 below shows a proposed framework for architectural case studies.

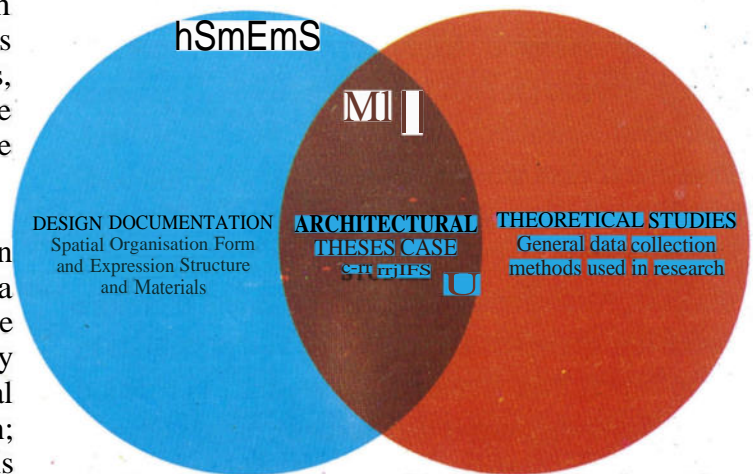


Figure 1: Convergence of Architectural Design and Knowledge Creating Case Studies

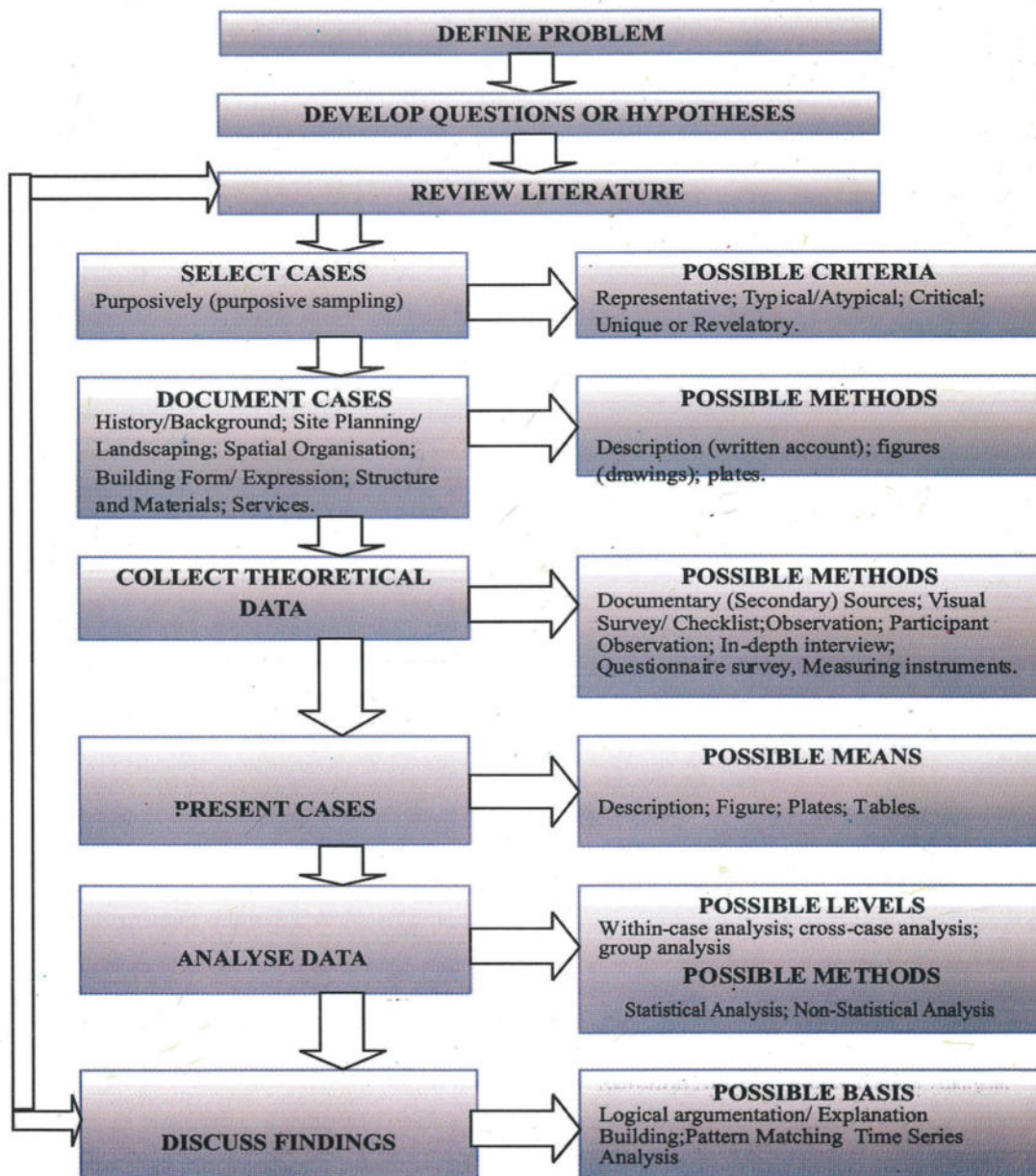


Figure 2: Proposed Framework for Architectural Theses Case Studies

CONCLUSION AND RECOMMENDATION

Case study research methodology in architecture should go beyond the documentation and description of the physical characteristics of the built environment. Architectural case studies can apply general methods and techniques used in research. This is in addition to the documentation of the architectural characteristics of the case. Architectural researchers should therefore embrace this approach and unlock its vast potentials in order to enrich their studies and contribute to existing body of knowledge, rather than focus on the application of knowledge, creativity, and spontaneity. This will however require an increase in research-oriented interactions, and refocusing of post graduate studies in many schools of architecture in Nigeria and beyond.

REFERENCES

- Abdulkarim, M. (2005). Between theory, education and practice of architecture. *Journal of the Association of Architectural Educators in Nigeria*, 4(1), pp. 65-71.
- Christie, M., Rowe, P., Perry, C. and Chamard, J. (2000). *Implementation of Realism in Case Study Research Methodology*. Brisbane: International Council for Small Business, Annual Conference.
- Creswell, J. (1994). *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks, California: Sage Publications.
- General Accounting Office Program Evaluation and Methodology Division (GAOPEMD) (1990). *Case Study Evaluations*. GAO/PEMD-91-10.1.9.
- Groat, L. and Wang, D. (2002). *Architectural research methods USA*: John Wiley & Sons.
- Harling, K. and Laurier, W. (2010). *An overview of case study*. Retrieved September 10, 2010 from www.academic-conferences.org/pdfs/case_study_research.pdf.
- Hartmann, R. (1988). Combining field methods in tourism research. *Annals of Tourism Research*, 15(1), 88-105.
- Johansson, R. (2010). *Case Study Methodology Reflected in Architectural Research*. Retrieved May 10, 2010 from <http://www.infra.kth.se/~rolfj/Foufaces2003.pdf>
- Kaplan, B., & Duchon, D. (1988). Combining qualitative and quantitative methods in information systems research: A case study. *MIS Quarterly*, 12(4), 571-587.
- Lara, F. (2001). *Popular modernism: An analysis of the acceptance of modern architecture in 1950s Brazil*. Unpublished Ph.D Dissertation, University of Michigan.
- Mingozzi, A., and Bottiglioni, S. (2007). *Bioclimatic Architecture: The Case Study of The Sustainable Residential Settlement in Pieve Di Cento*. 2nd PALENC Conference and 28th A I V C Conference on Building Low Energy Cooling and Advanced Ventilation Technologies in the 21st Century, September 2007, Crete island, Greece.
- Moore, G. T. (1979). Environment behaviour studies. In Snyder, J. C. and Catanese, A. J. (Eds.), *Introduction to Architecture*. pp. 46-71. New York: McGrawHill.
- Nasiri, N. (2007). *Sustainable Features of the Vernacular Architecture: 4 Case Study of Climatic Controls in the Hot-Arid Regions of the Middle Eastern and North African Regions*. Retrieved September 10, 2010 from <http://www.solaripedia.com/files/488.pdf>
- Oluigbo, S. N. (2010, February 23). *Evaluation of architectural design determinants for sustainable tourism facilities in North-Western Nigeria*. Ph.D Research Seminar, Department of Architecture, Faculty of Environmental Design, Ahmadu Bello University, Zaria Nigeria.
- Osuala, E. C. (2005). *Introduction to research methodology*. Onitsha: Africana-First Publishers Ltd.
- Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods*. Thousand Oaks, London, New Delhi: Sage.
- Ragin, C. C. and Becker, H. S. (1992). *What is a Case? Exploring the Foundations of Social Inquiry*. Cambridge, USA: Cambridge University Press.
- Schon, D. A. (1991). *The Reflective Practitioner: How professionals think in action*. Aldershot, Hants: Arena.
- Stake, R. E. (1995). *Art of case study Research*. Thousand Oaks, London, New Delhi: Sage.
- Uji, Z. A. (2002). *Evolution of Design Thought*. Yola: Paraclete Publishers.
- Veal, A. J. (2006). *Research Methods or Leisure and Tourism. Third Edition*. London: Prentice Hall.
- Yin, R. (2009). *Case Study Research: Design and Methods*. Thousand Oaks, London, CA: Sage.

SUSTAINABLE ARCHITECTURAL DESIGN PRACTICE IN NIGERIA: AN EVALUATION OF THE 'PRE-BUILDING PHASE' IMPLEMENTATION IN LAGOS

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ABSTRACT

The need for architects to focus on the achievement of sustainable built environment in Nigeria has been the theme of many professional and academic forums in recent times. However, there is little evidence of the implementation of recommendations and strategies emanating from these deliberations. Sustainable design begins with intentions and decisions taken right from the conception of a project - the pre-building phase. This study aims at determining the extent to which sustainable design requirements are considered in the pre-building phase by architects in Lagos, Nigeria. Questionnaires were administered on architects present at a Lagos state chapter meeting of the Nigerian Institute of Architects (NIA). The data was subjected to descriptive analysis. The result shows generally high mean scores, with energy efficiency (4.19), and design integration (3.96) scoring highest. However, the key sustainable design features applied by the respondents in their works were passive design features such as; building orientation, natural lighting, and natural ventilation. There appears to be very little innovation. There is therefore the need for architects in Lagos, and Nigeria in general, to exploit the ingenuity which architects are noted for, and explore innovative approaches and technologies for sustainable design, right from the pre-building phase of a project.

Keywords: Architects, built environment, life-cycle, pre-building phase, project, sustainable design.

1.0 INTRODUCTION

Sustainable design has become a major concern in the building industry. This is because building activities poses a great threat to the global environment and resources. The built environment is the biggest contributor to Green House Gas (GHG) emissions and accounts for up to 50% of global carbon dioxide emissions (Raynsford, 1999). Building construction accounts for 24 per cent of global raw materials removed from the earth. In addition, the extraction, processing, transport and installation of materials associated with construction consume large quantities of energy and water (European Commission (EU, 2010). The embodied environmental impacts generated by the building during its whole life-cycle, can be of the same order of magnitude as those generated during the utilization stage (Citherlet, 2001). The building construction industry consumes 40% of the materials

entering the global economy and generates 40-50% of the global output of GHG emissions and the agents of acid rain (California Integrated Waste Management Board, 2000).

In Nigeria, sustainable architectural design has become one of the regular themes or focus of presentations and discussions in architectural forums. Such forums include the annual architects' colloquium organized by the Architects Registration Council of Nigeria (ARCON), Annual and Biennial General Meetings of the Nigerian Institute of Architects (NIA), and academic conferences. It has also become a regular feature in many academic publications. Despite all these, there appears to be little visible evidence of a move towards this direction in practice. However, studies by Oluigbo (2013) raises some level of optimism about the recognition of sustainable design as an important concern by architects. The questionnaire survey conducted at three schools of architecture in Nigerian universities showed that 51.50% of architectural educators considered themselves to be more aligned to the green/eco/sustainable architecture ideology, this at least signifies some level of awareness on the necessity for sustainable design. However, there is little knowledge on the steps taken by practicing architects in Nigeria towards integrating sustainable design principles into their works.

Sustainable design should begin with a decision or intention. Such intentions must be made at the conceptual or pre-building phase of a project, and decisions taken at this stage affects the entire life-cycle of the building. It is in view of this that this study was embarked on in order to determining the extent to which sustainable design principles are considered at the pre-building phase by architects in Lagos, Nigeria. The objectives of the study are:

- (I) To determine the level of consideration given by architect, to sustainable design at the pre building phase; and
- (ii) To determine the aspects of sustainable design which are considered.

2.0 THE CONCEPT OF SUSTAINABLE DESIGN

Definitions of sustainability fall into two groups. The

first group focuses on humans and their existing and future needs. The second group – the systems definition - focuses on how systems can, and should be maintained and developed (Gibberd, 2003). Gibberd's study concluded that all developments can be evaluated based on their ability to fulfil needs without increasing limitations. Similarly, Hui (2002) noted that sustainability was based on two concepts; the concept of *needs*, comprising of the conditions for maintaining an acceptable life standard for all people, and the concept of *limits*, the capacity of the environment to fulfil the needs of the present and the future. The concept of needs was clearly visible in the World Commission on Environment and Development's (WCED) (1987) definition of sustainability as meeting present needs without compromising the ability of future generations to meet theirs. This connotes the maintenance and enhancement of environmental, socio-cultural and economic resources, in order to meet the needs of current and future generations (Gilbert *et al.*, 1996, Commonwealth Association of Architects (CAA), 2006 *op cit*; Del Matto, 2007). Other definitions of sustainability have also been offered. These include: Improving the quality of human life while living within the carrying capacity of supporting ecosystems (International Union for the Conservation of Nature and Natural Resources (IUCNNR) *et al.*, 1991); the capacity of development projects to endure organizationally and financially (Bread for the world, 1993); use of natural renewable resources in a manner that does not eliminate or degrade them or otherwise diminish their renewable usefulness for future generations while maintaining effectively constant or non-declining stocks of natural resources such as soil, groundwater, and biomass (World Resources Institute (WRI), 1992).

3.0 SUSTAINABLE DESIGN AND THE PRE-BUILDING PHASE

Achieving sustainable design requires critical consideration of the entire life-cycle of a building, and design decision taken at the inception affects all phases of a building project. Kim (1998) categorized the life cycle of a building into three phases - *pre-building, building, and post-building phases*. Sustainable design requires an understanding of the building processes in each of these three phases and requires a broad view of how a building's design, construction, operation, and disposal affect the larger ecosystem. However, decisions taken at the pre-building phase is critical since it largely determines what becomes of the other phases (building and post-building).

The pre-building phase includes site selection, building design, and building material processes, up to but not including installation (Kim, 1998). Seattle Department

of Planning and Development (SDPD) (2006) stated that sustainability should be clearly articulated as a guiding principle and incorporated from the earliest stages of a project. Key considerations in the design include the following: Design integration; energy efficiency; water efficiency; site characteristics; materials selection; and, local built heritage (Kim, 1998; Bristol City Council, 2006; SDPD, 2006; Bunz, *et al.*, 2011).

3.1 Design Integration

Sustainable building design begins right from the initial pre-design meetings with the client, case studies of similar projects with sustainable features, and definition of initial goals for the performance of the sustainable building throughout the design process (Bunz *et al.*, 2011). SDPD (2006) listed the following measures for sustainable design integration:

- (i) Apply a whole systems approach to design, balancing social, economic, and environmental factors;
- (ii) Incorporation of sustainability into the earliest design discussions;
- (iii) Inclusion of input from user groups, tenants, maintenance staff, and stakeholders, to confirm design criteria;
- (iv) Exploration of opportunities for innovation with a collaborative, multi-disciplinary design team;
- (v) Familiarization of design team members with sustainability concepts and basic sustainable building practices and philosophy.

3.2 Energy Efficiency

Energy efficiency issues includes energy conservation and improved building performance and comfort through effective use of controls and technologies, efficient lighting strategies and presence of on-site renewable energy systems (Williams, 2007). Rajapaksha and Hyde (2005) observed that the need to minimize operational energy in the running of active systems has focused attention on two sets of factors, the demand side and supply side efficiency. The supply side efficiency comes from the elements of the building that drive the need for power in the building whilst the demand side efficiency is related to elements that use power. Sustainable design of energy features incorporates supply side and demand side efficiencies through low energy technologies and passive design strategies in building. In particular, the use of passive

design strategies aims at minimizing operational energy demand in buildings and therefore optimizing demand side efficiency whilst the use of low-energy technologies aims at optimizing the increased use of renewable, thus reducing the circumstances for greenhouse gas emissions and resource depletion (Kim, 1998; Rajapaksha and Hyde, 2005). Passive design strategies are based on site climate and are therefore environment friendly. They reduce operating costs by relying on the site's natural features thus downsizing mechanical systems through smart and efficient energy systems.

3.3 Water Efficiency

Water usage and efficiency demands the provision of guidelines and definition of targets. This should also include a description of various methods and means by which these targets can be achieved. Consideration should be given to the avoidance of disturbance of the water table, reduced water consumption, and reuse/recycling of water on site. (Kim, 1998; BunzeZ *al.*, 2011). The reuse of water applies to both within the buildings and for site irrigation and other purposes.

3.4 Site Characteristics

Sustainable site location and selection considerations are evaluated in a number of sustainable building guidelines and methodologies. The various areas concerning sustainable sites include urban sprawl, brownfield redevelopment, effects of proposed project on localecosystems, and interaction with the surrounding natural and built environment (BunzeZ *al.*, 2011). With regards to the natural environment, consideration should be given to the respect for natural drainage and topography, and preservation of existing flora and fauna (Kim, 1998).

3.5 Material Selection

Material usage includes the selection of materials with recyclable properties, reusable products, and the implementation of recycling procedures throughout building operation. Recommendations for the amount of materials with recycled content are provided in various sustainable guidelines as well as the amount of products that are being functionally reused in a building; use of renewable materials, use of local materials, specification of long life and low maintenance materials; specification of materials harvested or extracted without ecological damage, and selection of materials with low embodied energy (Kim 1998; Bunze/ct./, 2011).

3.6 Local Built Heritage

International Committee on Monuments and Sites (ICOMOS, 1999) listed the following as characteristics of the built vernacular heritage:

- i. A manner of building shared by the community;
- ii. A recognisable local or regional character responsive to the environment;
- iii. Coherence of style, form and appearance, or the use of traditionally established building types;
- iv. Traditional expertise in design and construction which is transmitted informally;
- v. An effective response to functional, social and environmental constraints;
- vi. The effective application of traditional construction systems and crafts.

4.0 METHOD OF STUDY

Literature study was conducted to establish key considerations for sustainable design at the pre-building phase as contained above. This provided the basis for the development of the data collection instrument (questionnaire). The questionnaires were administered based on judgement sampling, to all present at a general meetings of the Lagos state chapters of Nigeria Institute of Architects (NIA). A total of 18 questionnaires were validly completed and returned. The questionnaire contained largely closed-ended questions based on a five-point Likert scale. The last question in the questionnaire was open-ended, and was aimed at determining the aspects of sustainable design which were applied in the respondents' works. Analysis was based on descriptive statistics.

5.0 RESULTS

5.1 Consideration for Design Integration

The result shows that consideration for design integration has a group mean of 3.96 on a five-point scale. Also, respondents paid the most attention to balancing environmental, economic, and socio-cultural sustainability concerns, with a mean of 4.22, while the least consideration was given to exploration of opportunities for sustainable design innovation, with a mean of 3.56 (Table 1).

Table 1: Consideration for Design Integration

Item	Mean	Group Mean
Emphasis on natural heating and cooling	4.06	4.19
Emphasis on natural ventilation	4.78	
Emphasis on natural lighting	4.78	
Materials with low embodied energy	3.83	
Renewable energy options	3.50	

5.2 Consideration for Energy Efficiency

The result shows that consideration for energy efficiency has a group mean of 4.19. Also, respondents laid the most emphasis on natural

lighting, and ventilation, each with a mean of 4.78, while the least attention was given to renewable energy options, with a mean of 3.50 (Table 2).

Table 2: Consideration for Energy Efficiency

Item	Mean	Group Mean
Reuse and recycling	3.06	3.71
Reduction of waste	4.06	
Long life/low maintenance	4.33	
Low environmental impact	3.89	
Renewable materials	3.22	

5.3 Consideration for Building Materials. The result shows that consideration for building materials has a group mean of 3.71. Also, respondents laid the

most emphasis on long life/low maintenance, with a mean of 4.33, while the least attention was given to reuse and recycling, with a mean of 3.06 (Table 3).

Table 3: Consideration for Building Materials

Item	Mean	Group Mean
Minimise flooding	4.50	3.77
Avoid disturbance of water table	4.11	
Reuse onsite water	3.33	
Reduce water consumption	3.28	
Minimise wastage of water	3.61	

5.4 Consideration for Water Efficiency. The result shows that consideration for water efficiency has a group mean of 3.77. Also, respondents laid the

most emphasis on minimising flooding, with a mean of 4.50, while the least attention was given to reducing water consumption, with a mean of 3.28 (Table 4).

Table 4: Consideration for Water Efficiency

Item	Mean	Group Mean
Preserve flora	4.00	4.04
Preserve fauna	3.72	
Preserve topography	4.22	
Preserve visual quality	4.22	
Avoid erosion	4.06	

5.5 Consideration for Site Characteristics The result shows that consideration for site characteristics has a group mean of 4.04. Also, respondents laid the most emphasis on preserving topography, and

preserving visual quality of site, each with a mean of 4.22, while the least attention was given to preservation of flora and fauna, with a mean of 3.72 (Table 5).

Table 5: Consideration for Site Characteristics

Item	Mean	Group Mean
Reflection of indigenous spatial concept	4.00	3.67
Use of local materials	3.61	
Indigenous architectural expression	3.78	
Indigenous ornaments and decorations	3.33	
Indigenous skills and technology	3.61	

5.6 Consideration for Local Built Heritage The result shows that consideration for local built heritage has a group mean of 3.76. Also, respondents laid the

most emphasis on reflection of indigenous spatial concept, with a mean of 4.00, while the least attention was given to indigenous ornaments and decorations, with a mean of 3.33 (Table 6).

Table 6: Consideration for Local Built Heritage

Item	Mean	Group Mean
Reflection of indigenous spatial concept	4.00	3.67
Use of local materials	3.61	
Indigenous architectural expression	3.78	
Indigenous ornaments and decorations	3.33	
Indigenous skills and technology	3.61	

5.7 Reflection of Sustainable Design in Respondents' Works

The open-ended section of the questionnaire was used to obtain data on some of the sustainable features of the works of the respondents. While some of the respondents did not give any concrete response to this section, others itemized the features as follows:

- i. Introduction of courtyards;
- ii. Orientation of buildings to reduce exposure to solar radiation;
- iii. Adoption of simple building forms;
- iv. Extensive reliance on natural lighting and ventilation;
- v. Preservation of site topography;
- vi. Integration of building with site;
- vii. Reflection of local architectural heritage;
- viii. Use of local materials, ornaments and decorations;
- ix. Extensive use of soft landscape elements;
- x. Water conservation through use of grey water for landscape irrigation;
- xi. Use of prefabricated building components to minimise waste;
- xii. Use of low-maintenance materials;
- xiii. Use of heat insulating building materials for wall finishes, roofing and ceilings; and
- xiv. Use of solar panels.

6.0 DISCUSSION

A look at the result suggests that majority of the respondents believe that they have reasonably considered sustainable design at the pre-building phase of their architectural works. The group mean scores showed that consideration for design integration has a group mean of 3.96 (Table 1), consideration for energy efficiency has a group mean of 4.19 (Table 2), consideration for building materials has a group mean of 3.71 (Table 3), consideration for water efficiency has a group mean of 3.77 (Table 4), consideration for site characteristics has a group mean of 4.04 (Table 5), and consideration for local built heritage has a group mean of 3.76 (Table 6). When all these are added together, the overall mean is 3.91. This gives an indication of an above-average score.

While these results appear to be positive, ironically, under the consideration for design integration, two out of the five items scored the least. These are; exploration of opportunities for sustainable design with a mean of 3.56, and collaborative/multi-disciplinary design team for sustainability, with a mean score of 3.72 (Table 1). This suggests that many of the respondents did not set out to explore sustainable design options, and neither have they recognised the importance of collaboration to sustainable design. Therefore, whatever achievements they made in this direction may have been unconscious.

While the fact that energy sources for building operations is one of the greatest contributors to GHG emissions has been globally recognised, on the local scene, Nigeria is faced with the challenge of providing adequate energy for its citizens. The result shows that under consideration for energy efficiency, exploration of renewable energy options had the lowest mean score

of 3.50 (Table 2). Architects appear not to have adequately taken advantage of the abundance of renewable energy options to power buildings. Two key potentials are the use of building integrated photovoltaic panels and wind turbines. Other areas which scored low and calls for concern are renewable materials, with a mean of 3.22 (Table 3), and consideration for reuse of onsite water, with a mean of 3.33 (Table 4). These call for concern, considering the long standing recognition that extraction of materials have caused enormous damage to our environment, and the challenge of portable water provision which is persistent all over Nigeria.

The result also shows that the respondents considered aspects such as building orientation, natural lighting and ventilation, and use of courtyards among others. These appear to be basic climatic design consideration for tropical climates such as Nigeria. That does not take away the fact that they are perhaps some of the most important requirements of eco-centric sustainable design requirements.

7.0 CONCLUSION

This paper is the outcome of a study conducted in Lagos, Nigeria, and aimed at determining the extent to which sustainable design principles are considered at the pre-building phase by architects in Nigeria. The result shows that there is an above-average level of consideration for sustainable design at the pre-building phase by the respondent architects. Whether there is a correlation between these results and the works of the respondents can only be determined by case studies of the works. This has been identified for future studies. However, the features of sustainable design listed by the respondents as being applied in their works such as building orientation, natural lighting, and natural ventilation, are basic requirements for climatic design in the tropical climatic zone, under which the study area falls. None of the respondents listed any innovative design feature. There is therefore the need for architects in Lagos, and Nigeria in general, to exploit the ingenuity which architects are noted for, and explore innovative approaches and technologies for sustainable design, right from the pre-building phase of a project.

REFERENCES

- Bread for the World (1993). *Bread for the World*. Background Paper No. 129, Washington, DC.
- Bristol City Council (2006). *Sustainable Building Design and Construction*. Supplementary planning document No. 5. Retrieved December 12, 2011 from <http://www.bristol-city.gov.uk/sustainabledevelopment>.
- Bunz, K. R., Henze, G. P., and Tiller, D. K. (2011). Survey of sustainable building design practices in North America, Europe, and Asia. Retrieved December 11, 2011 from www.rpdmoheer.com/.../survey%20of%20sustainable%20building%20design.pdf
- California Integrated Waste Management Board (CIWMB) (2000). *Designing with Vision: A Technical Manual for Material Choices in Sustainable Construction*. California: California Environmental Protection Agency.
- Citherlet, S. (2001). *Towards the Holistic Assessment of Building Performance Based on an Integrated Simulation Approach*. Lausanne: Swiss Federal Institute of Technology EPFL.
- Commonwealth Association of Architects (2006). *An Architect's Guide to Design for Sustainability*. Pretoria: Built Environment Unit.
- Del Matto, T. (2007). Conceptualizing a sustainable ski resort: A case study of Blue Mountain Resort in Ontario. Unpublished MSc Thesis, University of Waterloo, Ontario, Canada.
- European Commission (EU) (2010). Reducing the environmental impact of building materials. Science for Environment Policy, European Commission DG Environment News Alert Service. Edited by SCU, The University of the West of England, Bristol. Retrieved December 12, 2011 from ec.europa.eu/environment/integration/research/newsalert/pdf/232nal.pdf.
- Gibberd, J. (2003). Integrating sustainable development into briefing and design processes of buildings in developing countries: An assessment tool. Unpublished PhD thesis, Department of Architecture, University of Pretoria.
- Hui, C. M. (2002). Sustainable architecture. Retrieved September 10 2007 from

<http://www.arch.hku.hk/research/BEER/index.html>.

ICOMOS- International Council on Monuments and Sites. (1999). Charter on the Built Vernacular Heritage. Ratified by the ICOMOS 12th General Assembly, Mexico. Retrieved from www.international.icomos.org/charters/vernacular_e.pdf

International Union for the Conservation of Nature and Natural Resources (IUCN), **World Conservation Union**, United Nations Environment Programme (UNEP), and World Wide Fund for Nature (WWF) (1991). *Caring for the Earth*, pp.10, IUCN/UNEP/WWF, Gland, Switzerland.

Kim, J. (1998). *Sustainable Architecture Module: Introduction to Sustainable Design*. Ann Arbor: National Pollution Prevention Center for Higher Education.

Oluigbo, S. N. (2013). Theoretical, philosophical and stylistic leanings of architect-educators in Nigerian universities. *Journal of the Association of Architectural Educators in Nigeria (AARCHES-J)*, 2, 21-26.

Rajapaksha, U., and Hyde, R. (2005, September 27-29). *Sustainable by passive architecture, using courtyards in non-domestic buildings in Southeast Queensland*. Paper presented at the World Sustainable Building Conference, Tokyo.

Raynsford, N. (1999). The UK's approach to sustainable development in construction. *Build Res. Inf*, 27, 419-423.

Seattle Department of Planning and Development (SDPD) (2006). Checklist for **sustainable design**. Retrieved December 12, 2011 from <http://www.seattle.gov/dpc/citygreen>.

Williams, D. E. (2007). *Sustainable design: Ecology, architecture, and planning*. New Jersey: John Wiley and Sons, Inc.

World Commission on Environment and Development (1987). *Our common future*. New York: Oxford University Press.

World Resources Institute (1992). Dimensions of sustainable development. *World Resources: A Guide to the Global Environment*, pp. 2, New York: Oxford University Press.

EVALUATING THE IMPACT OF GLOBALISATION ON HOUSING TRANSFORMATION IN TANGALE LAND, NORTH-EAST NIGERIA.

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Abstract

Globalisation has exerted a lot of influences on many aspects of traditional life of many Nigerian communities. These influences include physical transformation of the residential dwellings and the spatial configuration of the settlements. This paper presents a descriptive evaluation of the impact of globalisation on housing and spatial organisation in Tangale land a traditional community in Gombe State, North-East Nigeria. The study employed the survey and case study approaches to provide a descriptive account of the various aspects of transformation in the residential dwelling. It was revealed that changes in the physical form and residential structure of the dwellings, material use and the spatial organization of the settlement have occurred over the last 50 years. The findings of the study have implications for housing and urban policy planning that is adopted for the area.

Key words: globalisation, residential dwellings, spatial organisation, Tangale land.

Introduction

Many studies on housing in Nigerian communities have been carried out by several authors from different perspectives which according to Maina (2013), ranges from documentation of housing and vernacular typologies, construction technologies and techniques, use of materials, compound transformations and use of space. There are other studies that centre on post occupancy evaluation, Ibe et al (2013), user satisfaction, Ajiboye (2013). Most of these studies have concentrated on urbanized communities. There is need however to examine the housing processes in smaller communities especially in the face of globalisation.

The process of globalisation has transformed many aspects of traditional life leading to changes in the social and production relationships. One of the outcomes of the manifestation of globalisation is the changes and transformation that has occurred in the traditional housing processes as observed in the changing house forms and patterns.

Mirmoghtadael (2009) points out that this change occurred so rapidly that it represented replacement, rather than adaptation, earlier, Behsh (1993) had observed that local architectural forms, which had responded to the physical and cultural requirements of people for thousands of years were completely neglected.

This paper presents an account of the transformation and changes in housing and spatial configuration that have taken place over in the study area over the last five decades as way of understanding the effects of globalization in the area.

The study area

Tangale Land is situated in Southern part of Gombe State between lat. 11.00° and 11.52° and Longitudes 9° and 10°N. Tangale Land occupies three Local Government Areas, Billiri, Kaltungo and Shongom, even though some Tangale villages are found in Akko and Alkali Local Governments Areas. Tangale Land is an area covered by great impressive masses, crag and mountain range giving the land beautiful scenery. A major landmark of the area is the "Tangale Peak" locally referred to as *Pand- Kilangwikh* a height estimated at 1600ft and stand at 3000ft above sea level (Maiture, 2008).

Today, the Tangale people are divided geographically into four namely: Kaltungo in the north, Ture in the east, both in Kaltungo Local Government Council, while Shongom is to the south in Shongom Local Government Council, and the Tangle to the west is in Billiri Local Government Council, Maiture (2008). Figures 1, shows Tangale land within Gombe State.

However, Maiture, (2008) has pointed out that, early writers have grouped the people into eastern and western Tangale or Kaltungo and Billiri, even though the two people share a great deal of similarity in culture, clannish naming and village names.



Figure 1 Tangale Land within Gombe State

This study centres on evaluating the impact of globalisation on housing in Shongom Local Government Area which is one of the Tangale communities that little documentation has been made of their housing. The local government area was created in 1996 out of Kaltungo Local Government Area with Boh town as the headquarters. The main Tangale towns in the Local Government Area are, Boh, Lapan and Kulishin, see figure 2. Secondly, Kaltungo and Billiri are the two main towns of the Tangale and have a longer history of urbanization and lies on the Gombe – Yola highway, while Shongom is in the interior, and also studies have already been carried out on housing in Billiri (Maina, 2009, 2013). This study will therefore give some insight on the effect of globalisation on housing smaller interior communities.



Figure 2 Shongom Local Government Area

Literature on Traditional Housing Studies

Eyuce (2012), points out that, traditional buildings has been and continues to be the subject of interest of scholars from a wide variety of disciplines which includes historians, art historians, geographers, ethnographers, anthropologist, folklorist, urban planners, architects and many others. Lim (2007) opines that, vernacular architecture is a manifestation and a physical representation of the culture of a people. All forms of vernacular architecture are built to meet specific needs and to accommodate value and economies. According to Mohammad (2007) traditional houses are the most fundamental architectural phenomenon, performing as humanistic, folklore, and cultural instrumentation in which adopted for daily needs of society demands. Langhein (2005) had concluded that the design aesthetic quality of traditional architecture was based on inherent needs of people for creating enduring place adapted to its environmental conditions. Iskandar (2001) asserts that, the forms of traditional houses influenced by cultural aspects are environmental factors while the design process of traditional houses fulfils the most characteristics requirements of society such as preservation toward adjustment of an identical form of dwelling. This identical form as a variable has been capable of modification due to specific demands of families and conditions of built environment.

Traditional housing are therefore not just artefacts but their form and structure evolved to meet specific needs of each society.

Methodology

The study utilised the case study approach to present an evaluation and a descriptive account of the social and physical changes that have taken place in the area based on, spatial configuration, house form, residential structure and use of materials. The case study approach allows the author to gather data from documentation, archival records, interviews, direct observations, participant observation and physical artefacts (Yin, 1994). Yin (1984) had earlier defined the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in

which multiple sources of evidence are used. Based on the variables to be evaluated, an approach was developed for the study.

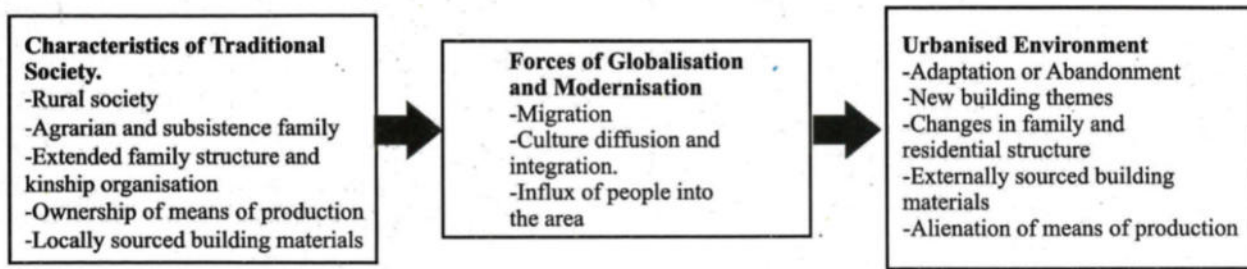


Figure 3. Approach for evaluation of changes in the society

Several factors influence and affect the use of space in any society, Maina (2013) is of the opinion that, spatial configuration evolves from the way space is organized by its use in a culture and the relationships between them. Societies invest in space depending on the degree to which the space is structured, the type of the configured space and the specific social meaning that is assigned to that space Hillier (2007).

Ozaki and Lewis, (2006) refers to house form as the plan shape of a house distinct from its style or elevation. The house form in any given society is a product of many factors, ranging from the belief system, available technology, and materials. While residential structure looks at the visual characteristics and appearance of a built space.

This study adopts the compound as the unit of analysis. A compound consists of a group of dwelling units with a common entrance, cooking space, toilets and other services. The analysis is illustrated with field observations of compounds in the study area. Seven compounds (7) were purposively selected for observation, compound lay-outs were recreated to capture the original pattern prior to the changes that have taken place.

Spatial configuration of the settlements

The Tangale people live in a sparsely and thinly scattered settlement pattern based on kinship Maina (2009). The settlement pattern is influenced by the major occupation which is farming, Maiture (1993) points out that, they are organized according to a system called “tub – mana”. The settlements consist of clusters of compounds, each consisting of several huts,

built from clay with thatched roofs and surrounded by fence constructed from sticks and com stalks.

The clusters are based on clans which are further divided in households which live in family compounds. Each family compound is surrounded by a piece of land known as “Pimana or lalugu” Maiture, (1993); and “yaiya mana”, Maina, (2009), which is used for planting short term crops.

The study shows that in the traditional pattern of settlement, the clusters of compound grouped according to clannish and kinship ties are dispersed allowing the land between to be used as farm land plate 1.



Plate 1 showing the disperse nature of the Traditional Tangale settlement at Layashaklal in Shongom Local Government Area.

House form and Residential Structure

The house form in any society is determined by several factors, Lim (2007) asserts that it is a manifestation and a physical representation of the culture of the people; it

comprises dwellings and all other buildings. The Tangale people like most communities in the north east of Nigeria, built cylindrical shaped buildings as residences with conical shaped roofs that blends well with the hilly environment. Plate 2 a, b. showing the cylindrical shaped buildings built of mud with conical thatched roof, while plate 2c is a combination of both traditional and contemporary rectangular shaped bungalow. However, unlike in some Hausa traditional houses especially those of the well to do, who decorate the facades of their houses to show their social status in the society '(Schwerdtfeger, 1981)the Tangale houses carry no special decorations.



Plate 2c. A compound with combination of traditional cylindrical house form with thatched roof and rectangular house form in the background with corrugated galvanized iron hip roof



Plate 2a. A house in Layashaklal Village



Plate 2b. A house in Layashakla! Village

Use of Material and construction

The abundance of mud in the area forms the most basic building materials. The mud is often dug from a suitable burrow pit and it is wetted for some days after that it is mixed by marching it with the foot until it achieved certain level of plasticity. Afterwards, some straw is added to it before it is moulded by the builders into some spherical balls and used for building. The construction process is a collective effort, where the adult members of the family all participate and reward for the work is usually through the provision of feeding and refreshment. The big stones or boulders broken to size are carefully arranged on the perimeter and used as foundation for the house or hut. The roof is made of conical shaped thatch, while the opening is covered with mat (*atau*) made up from the leaves of deleb palms. Plates 2a-c and 8 shows the use of the available locally source building materials as elucidated.

Changes in the spatial configuration of the settlements

The impact of globalization is not limited only to the developed countries or large towns and cities, it effects in noticeable in every part of the globe at varying levels. Mirmoghtadael (2009) had shown that early in the 20th century, a drastic change in architecture took place in many developing countries, as the traditional architectural style was replaced by modern style. Yildrum and Korkmaz (nd) also pointed out that the historical environment is subject to rapid changes in scientific, aesthetic and architectural values because the world is increasingly connected economically and culturally.

A survey of the study area has revealed the occurrence at various levels of changes in the spatial configuration of the settlements. It is observed for example, that the level of change in the spatial organization of the compounds in Boh, Lapan and Kulishin, the three main Tangale settlements in Shongom Local Government Area, is more than that of the other villages of the area

of study, even though the houses are still sparsely spread over the settlements. This agrees with the observation by Maina (2013) that, the spatial organization of the compound in Tangale land has changed over the course of time, pointing out that, in traditional times, huts and rooms were arranged around the perimeters of open courtyards. Most often the traditional compound is either circular or irregular in shape; however, due to the influence of globalization changes have occurred in the layout of the compound. Plate 2 shows a satellite image of a section of kalkwari in Lapan, Shongom Local Government showing the spatial configuration of the settlement. The houses are dispersedly distributed with rectangular or irregular shaped rectilinear compound settings.

Figure 4 Layout of a traditional compound with its circular stand - alone huts

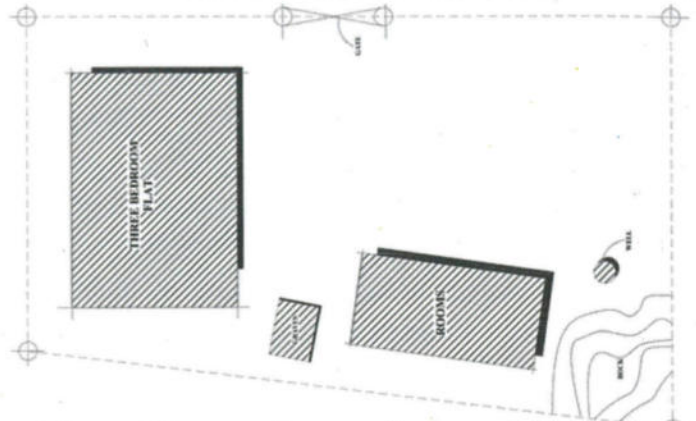


Figure 5 Layout of a transform compound with rectangular house forms



Plate 4 Contemporary house in Lapan, a four bedroom bungalow constructed of concrete blocks and corrugated galvanized iron roofing sheets.

Survey of house forms in the area has shown that the form of the traditional houses which

was usually circular or cylindrical, (Plate 2a - c) with each room standing alone with conical roofs and arranged in circular form around an open courtyard has been transformed into a rectangular form of varying configuration. Plates 4–8, shows the various configurations of contemporary house forms and compound layouts in the study area.



Plate 3, Section of Kalgwari in Lapan, Shongom Local Government Area

Changes in physical forms of the dwelling

Maina (2013) had identified several patterns of compound transformation in Billiri. These transformations according to her were largely due to changes in family size and composition. An aspect of globalization and urbanization that has affected family composition is migration of people from one location into another in search of better opportunities of work and study. This has led to the break-up of the traditional extended family system and the creation of nuclear families and consequently leading to changes in house form and housing needs.

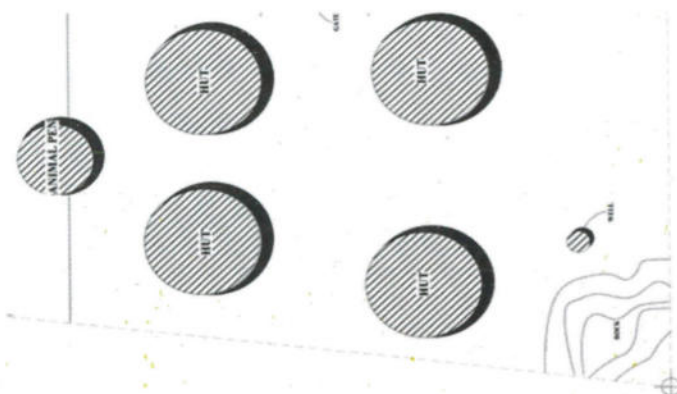


Plate 5 Contemporary house in Lapan, rectangular houses constructed of mud and plastered with sand - cement mortar and corrugated galvanized iron roofing sheets.



Plate 6 Contemporary house in Lapan, rectangular houses constructed of concrete and plastered with sand – cement mortar and corrugated Almunium roofing sheets.

Figure 4 is a reconstruction of a pre- 1985 compound with the cylindrical shaped stand-alone huts constructed in mud with thatched roofs within the boundaries of the compound. However, from 1990, the cylindrical shaped huts where replaced with two rectangular shaped dwellings with the compound as shown in figure 5. Similarly, from the layout in plate 2, the various compound layouts can be traced out.

Most people have adopted the bungalow house type with all the rooms under one roof as against the old practice where each room stands alone. Some others have adopted a rectangular form with the rooms arranged in row and access along a long corridor. The shape of the compound is determined by whether the land is a family land or it is purchased, for instance, plate 6 is a compound on an inherited family land, while the house in plate 4 is a house built in a newer layout where the plots are parcelled in rectangular manner.



Plate 7, Contemporary rectangular houses constructed of concrete and plastered with sand – cement mortar and corrugated roofing sheets.

Changes in the use of materials and technology

The traditional housing process and production often utilizes material obtained from the site or near the site because it is readily available. The material most available is mud which is used for raising the walls, while thatch is used for covering the room. In the advent

of globalization however, the use of mud is gradually being replaced with hollow sandcrete blocks, while corrugated galvanized iron roofing sheets has replaced thatch roof. Another material which was not found in traditional building is rendering and finishing materials, the modern buildings are usually rendered with cement sand mortar which is painted after it has dried. The traditional building techniques has this impeded into the building process as the mud mould is fused into one another as if it is a lift slab and the wall comes out as whole rather than pieces of units joint with mortar. The building construction process requires the use of a skilled mason or bricklayer, a carpenter and a painter to complete a building which is not so in the traditional process.



Plate 8, Contemporary rectangular house constructed of mud blocks and corrugated roofing sheets.

Globalisation and the housing process

The traditional housing process places the responsibility of the design and construction of the house on the users. When the decision to build is made, the user and family members will move to the location and clear site afterwards the decision on the size is made. The process involves the participation of family members and very close friends. However, the process of globalization and modernization has led to the complete alienation of the user from the building process. The user may however participate in the design decision by proposing a brief. The designer and the builder are often separated from the user. Plates 9 and 10 shows a contemporary residential building constructed of materials that are brought from outside the locality, the scheme is designed by an architect who is resident outside the locality.



Plate 9, Contemporary compact rectangular house constructed of concrete blocks and corrugated roofing sheets.



Plate 10, Contemporary compact rectangular house constructed of concrete blocks and corrugated roofing sheets.

Conclusion

This paper examined the different aspects of traditional housing in Shongom community that has undergone some form of transformation as a result of globalization. The main observed changes occurred in the spatial configuration of the compounds, house form and structure and in the use of materials. The circular form of spatial configuration whereby the rooms and huts are arranged in a circular form around the periphery of the compound has given way to rectangular or irregular linear forms of arrangement. Similarly, the circular and conical house form with conical thatch roofs have been transformed into rectangular forms either as flat or bungalow or row, with gabled or hipped roofs using corrugated galvanized roofing sheets or other material. The observed changes has led to abandonment of traditional housing practices and replacing them with new materials and technology, house forms and spatial arrangements rather than adopting new technologies to modify the traditional.

References.

Behsh, M- B. (1993) Towards Housing in Harmony with Place. Sweden: Lund Institute of Technology, Lund University.

Eyuce, A. (2012) Interdependence of Traditional House Form and Settlement Pattern. Intercultural Understanding, Vol. 2

Hillier, B. (2007) Space is the Machine: A Configurational theory of Architecture Space Syntax: Press Syndicate

Iskandar, S. A. (2001) Order in traditional Malay house
September, 2015. VOL.1&2

form, Doctor of Philosophy, School of Architecture, Oxford Brookes University.

Langhein, J. (2005) Proportion and traditional Architecture, International Network for Traditional Building, Architecture and Urbanism 1(10).

Lim, R. M. (2007) Cultural Sustainability and development: Drukpa and Burman Vernacular Architecture, in: Zetter, R.; Watson, B. (eds), Designing Sustainable Cities in the Developing World, Wiltshire: Antony Rowe Ltd.

Maina, J. J. (2009) Determinants of House Form and Residential Structure in Tangale Land of Gombe State, Nigeria. Archisearch, International Journal of Architecture and Environment. Vol. 1 No.1

Maina, J. J. (2013) Constant Admist Change: Socio-cultural Factors Influencing House Form in TangaleLand , Northeast Nigeria. Journal of the International Society for the Study of Vernacular Settlements Vol. 2, No. 4

Maiture, R. G. (1993) A Missio- Historical Study of S. I. M. Presence in Tangale (1915 – 1960) An unpublished Master of Arts dissertation in Church History, University of Jos, Nigeria.

Maiture, R. G. (2008) Contributions of Tangale Missionary agents in the Christianization of Northern Nigeria, (1917- 1976) An unpublished Doctor of Philosophy Thesis in Church History, University of Jos, Nigeria.

Mirmoghtadael, M. (2009) Process of Housing Transformation in Iran. Journal of Construction in Developing Countries. Vol. 14 No.1

Mohammed, H. A. (2007) The interdependency of house layout, privacy and culture from the user – behavioural perspective of urban Malays, *^ Masters in Human Ecology, University of Putra, Malaysia, Putra Jaya.

Ozaki, R., and Lewis, J. R. (2006) Boundaries and the meanings of social space: A study of Jap^pese house plans. In: Environment and Planning: Society and Space 2006, Vol. 24.

Yildrum, M., and Korkamaz, M. (nd) Changes in the Built Environment and in Vernacular Architecture through Globalization: the case of Battalrazi in Turkey

Yin, R. K. (1994). Case study research: Design and methods (2nded.). Newbury Park, CA: Sage Publications.

INVESTIGATIVE STUDY ON THE USE OF ACRYLIC LIGHT RODS AS ALTERNATIVE MATERIAL TO CONVENTIONAL WINDOWS FOR DAYLIGHTING IN BUILDINGS

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ABSTRACT

It is generally assumed that daylight through a medium into a given room can usually only be achieved through a window. This paper investigates the alternative of using glass rods in a given opening in a room/chamber to replace the conventional glazed window with experiments carried out under controlled laboratory conditions. The study was carried out in order to find alternatives to conventional windows which are a source of heat gains and losses in buildings. The light rods aid visual contact with inter connecting spaces and provide light whereout-to-in contact is not necessary. Consequently, light rods can efficiently provide required lighting for specified spaces as well as the desired reduction of heat losses/gains and can also be efficient in aspects of light sharing. Three sets of tests were conducted under similar laboratory conditions and settings. Given the given glazed area in the window, it had the ability to convey more light in the room. However, this acts as a conduit for heat gain/losses (depending on the climes). When replaced by light rods – which require small surface area - in the first case with 13 light rods, there was a significant light gain of an average of 87lux whilst when employing 25 light rods, there was an average illuminance of 145lux. It can thus be concluded that where ventilation was not a priority, light rods can replace the conventional window in bringing daylight into a defined space.

INTRODUCTION

Windows tend to throw light onto walls (generally of high reflectance) and so there is significant reflection inside a given room (Jenkins & Muneer 2003), as such, windows are desirable for the lighting purposes, but may cause a problem in temperature control. Thus, tests were carried out with the aim to ascertain the suitability of the replacement of the double glazed conventional window with acrylic light rods.

Windows, though ideal for visual contact with the ideal world given the various choices of fenestrations in buildings, have been found to be sources of heat losses and heat gains. In terms of energy efficiency, windows have been identified to have heat losses of up to ten times higher than walls (Haoyang, 2012). It was thus seen through the tests carried out that these losses can be reduced through the replacement of these windows

with light rods. Windows are the commonest forms of fenestrations in residential buildings which serve a dual purpose of providing either or lighting and ventilation (Tukur, 2013). In several cases however, the windows are required only for lighting purposes especially in areas where both acoustic privacy and lighting are required (Tukur, 2013). It is for this reason, therefore, that light rods are introduced to replace windows.

MATERIALS AND METHODS

The test rig had an area of 7.5m² (2.5m x 3.0m), and consisted of a well-insulated single layer plywood and 100mm celotex* board closed envelope. The tests were carried out under 3 parameters

- i. Conventional glazed window (tests to act as control base line test)
- ii. 13 light rods insert, in wall (within same area as window space)
- iii. 25 light rods insert, in wall (within same area as window space)

The Equipment/Instruments Used for all the 3 different parameter include 1.0m x 1.0m double glazed window/light rods) DT500 Datataker (datalogger) Skye® Lux Sensors “K” type Thermocouples Flood Lights (used for solar irradiation) Well Insulated room measuring 2.5m x 3.0m x 2.5m (internal dimensions) *Control Test for Daylighting with a Double-Glazed Window in a Room-Chamber in the Laboratory*

The following tests were undertaken to investigate the use of light rods in place of the conventional window so as to reduce heat penetration into the room by solar radiation as well as to maintain the temperature in the room with little interference.

Method of Test

Skye® Lux Sensors were placed on the opposite far end of the interior wall parallel to the wall fitted with the light rods as seen in Figures 1 and 2.

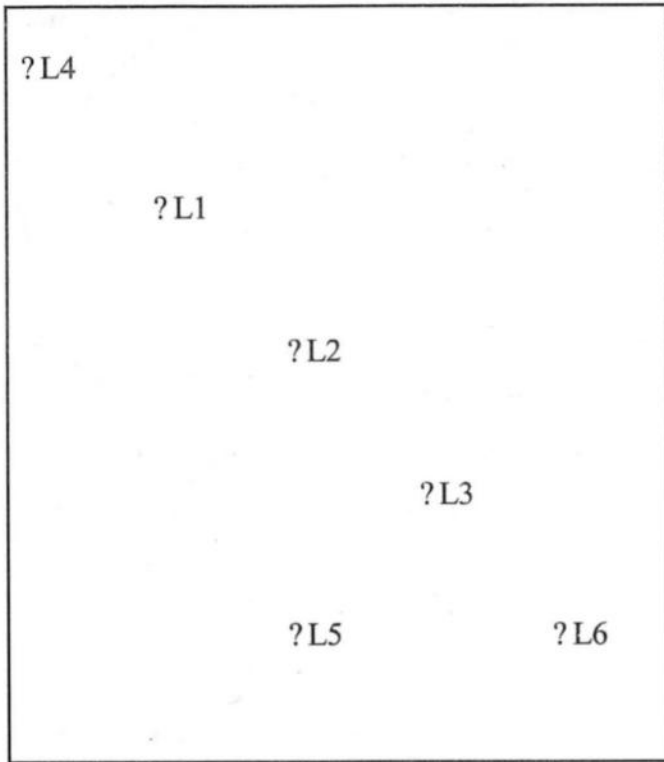


Figure :Schematic Position of L1, L2, L3, L4 L5 and L6 lux sensor against the interior rear wall opposite the wall bearing the window.

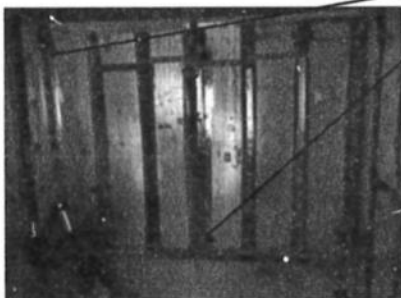


Figure interior of Test Rig Showing the Skye* Lux Sensors in Position

The Control test window had light irradiated on it with an average irradiance of 570W/m² at a distance of 800mm away from the window surface. Temperature reading was taken inside the box, at the point of entry on the window outside the box and the ambient temperature of the laboratory was also monitored throughout the duration of the test. Lux sensor readings were taken in 6 positions (L1, L2, L3, L4 L5 and L6) simultaneously as shown in Figure 1.

The spatial positioning of the light sensors were chosen whilst taking into cognisance the occupants in dwellings performing a variety of tasks in different locations in the home, as shown in Tables

1 and 2. These activities include children seated on the floor level for example playing in the carpet in the living room/bedroom; there should be sufficient illumination such that they can perform their simple tasks which do not require excess illumination as taken by light sensors L5 and L6. Light sensors in positions L2 and L3 are at seated levels whilst L1 is at standing level and L4 are for tasks requiring over head lighting.

Table ."Illumination Requirement for Various Area/Activities across the

Area or Activity	Under (lux) 25	25-65 (lux)	Over (lux) 65
Passageways	21.5	43	86
Conversation	27	54	108
Grooming	162	324	648
Reading/Study	269	538	1076
Kitchen Counter	404	807	1615
Hobbies	538	1076	2153

(Source: <http://www.iesna.org/PDF/Education/Li%htlnDesi%n.pdf>)

Table ".Level of Illuminance required in Day-to-day tasks

Class of Visual Task	Typical Examples	Recommended Horizontal Illuminance
Difficult	Colour matching, Inspection of fine work (e.g. precision instruments)	800 lux
Moderately Difficult	Office work with poor contrast: Drawing offices	600 lux
	Routine Office Work: typing, filing, reading, writing	400 lux
Simple	Waiting rooms, social activities	200 lux
Orientation	Corridors, Stairs, Restrooms	100 lux

Source: Vergara-Salvat, 2011

Results and Analysis

The results obtained showed that given the various positions of the lux sensors, the light was evenly distributed ranging on the average, from 310lux -330 lux as shown in the graph in Figure 3

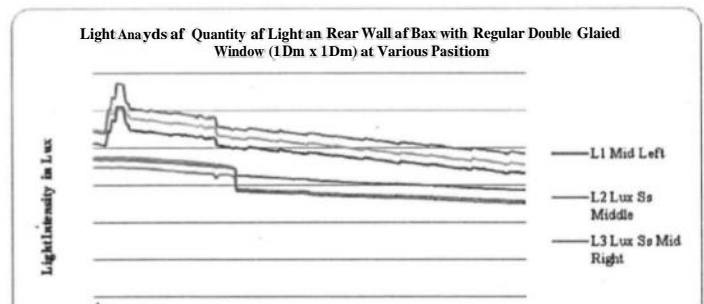


Figure :Light Analysis with the baseline test of employing a conventional double-glazedwindow

As seen in Figure 4, temperature inside the box remained constant at approximately 26°C throughout the duration of the test, so also, the laboratory ambient temperature remained constant at approximately 16°C. However, the temperature at entry rose steadily from

27°C to 37°C due to the intense solar radiation. The insulation of the box deterred the temperature of the box rising beyond the 26°C so there was a difference (AT) in temperature between outside (ambient) to inside of 10°C. Furthermore, there was a difference ranging between 1°C and 11°C between the temperature at entry and the temperature in the box.

This result shows that the insulation properties of the box was such that despite the level of heating from the lights the temperature of the box remained reasonable unaffected and had better thermal comfort than the ambient temperature. The temperature in the test box was found to be slightly higher by 5.69% more than the recommended ASHRAE standard of 24.6°C (Tyler, Stefano, Dustin and Kyle 2012). However, it is expected that this would be the highest that can be recorded since the irradiance level of 570W/m² can only be recorded in the hottest months of the year..

Figure 4 also shows the ambient laboratory temperature constant at 16°C, whilst the temperature in the box was at an average of 27°C. This connotes that a temperature difference (between ambient and room) AT being 11°C, much lower still to the temperature at entry on the surface of the window being an average of 30.9°C (peaking at a significant 37°C). Consequently, the heat dissipated into the room through the window AT₂ less than 5°C.

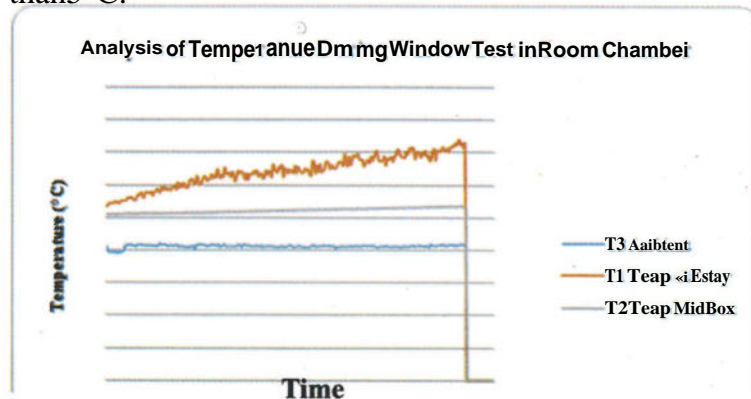


Figure :Temperature Analysis with a Double-glazed window

DAYLIGHTING ANALYSIS WITH 13 LIGHT RODS IN A ROOM-CHAMBER

In this test, thirteen (13) light rods as seen in Figure 6 were fitted in the same room chamber of 7.5m² as previously used in the window chamber earlier discussed in section 5.1 to a life size control room within the laboratory. The irradiation was also through the use 12 number 500 Watt flood light, as seen in Figure 7 a & b.

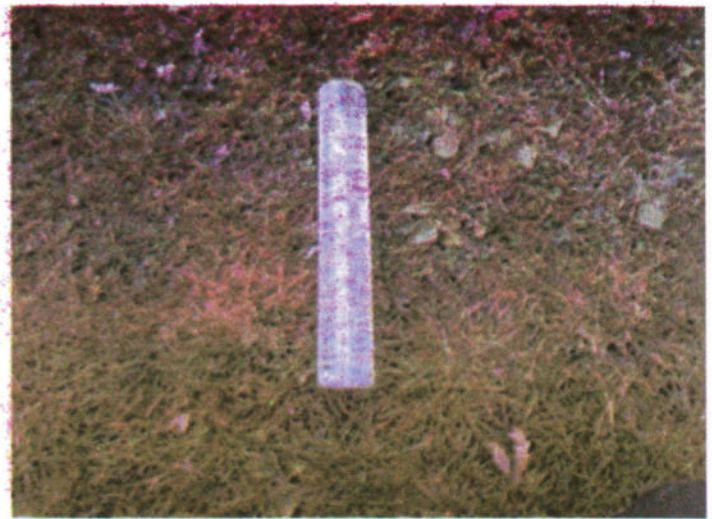


Figure :300mm, 50mm dia. Light Rod (a) without collar;



(b) with a wooden collar (gasket)

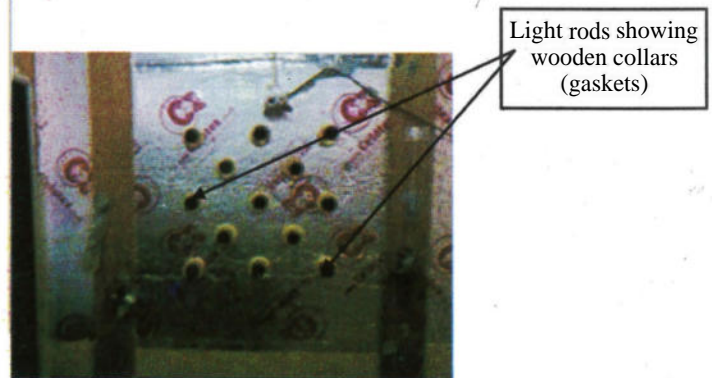
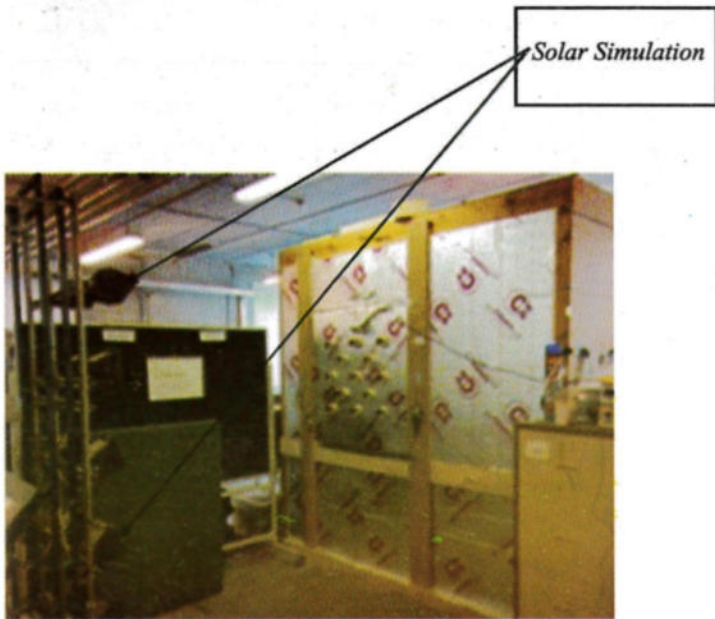
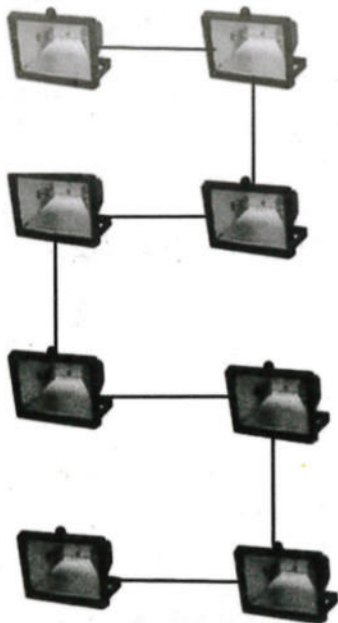


Figure :Exterior facade of the wall showing the 13 light rod inserts



(a) Lights Mimicking Solar Simulation



(a) 500 watts Light Array as used to simulate the sun's radiation in the laboratory

Figure a & b: Exterior facade of the wall showing the source of solar radiation and the 13 light rods inserts

Results and Analysis

The initial test to determine the quantity of light in the box was performed with 13 light rods and subsequently, the number of light rods was increased to 25. For these tests, all light rods used were 50mm diameter by 300mm length. The light in the room was mapped out to determine the difference in the quantity of light in the room in relation to the number of light rods used.

The results on Figure 8 show that the quantity of light in the room ranged from an average of 60 lux to 110 lux with the lowest being recorded from lux sensor L6 at the bottom. Going from table 1, 60 lux is still sufficient for a range of areas & activities varying from lighting passages ways or for quiet and conversational activities. The results show that the quantity of light in the room ranged from an average of 60 lux to 110 lux with the lowest being recorded from lux sensor L6 at the bottom. The highest illuminance was recorded on the L1 sensor with an average of 110 lux.

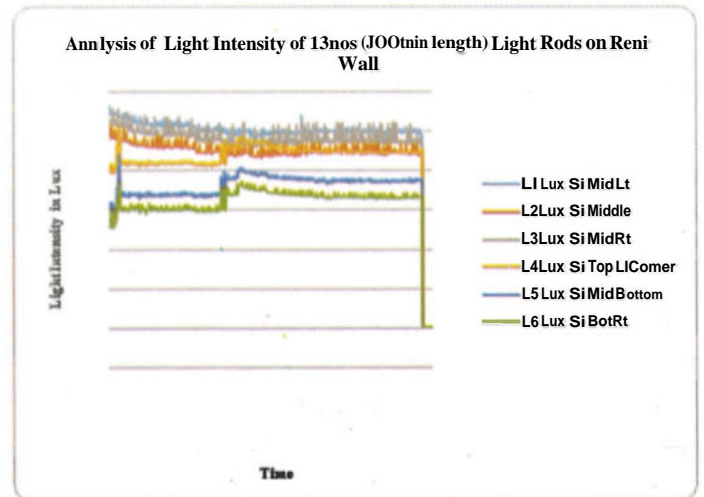


Figure :Light Analysis with 13 Light Rods Insert

With employment of 13 light rods, the temperature (as seen in Figure 9) at entry (T1) was at an average 26°C, and that of the interior middle of the box (T2) and the ambient temperature of the laboratory (T3) were 21.3°C and 21°C respectively. In this case the ambient temperature was also the same temperature maintained inside the box and very little heat was dissipated inside the room chamber, thus leading to the assumption that the light rods are poor conductors of heat and thus do not carry heat along with them. They therefore do not cause discomfort from what would have been the heat radiated, however, they are able to carry sufficient light into the chamber.

Analysis of Temperature Recorded with 13 Light Rods

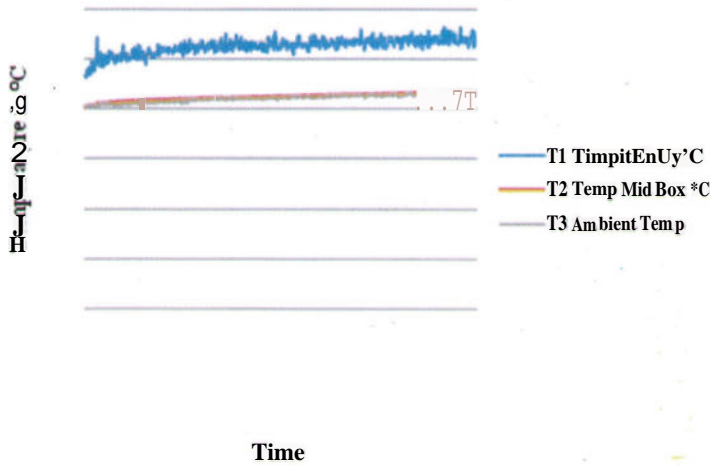


Figure :Temperature Analysis with 13 Light Rods Insert

DAYLIGHTING WITH 25 LIGHT RODS IN A ROOM-CHAMBER

Under the same conditions as that of 13 light rods, in this test, 25 light rods of equal lengths of 300mm were employed within the 1m x 1m square box (same area as the window) with the same lux sensor positions L1, L2, L3, L4, L5 and L6.

Results and Analysis

The result as shown in Figure 10 shows that the minimum light intensity observed was approximately 125 lux at the L6 Position sensor (bottom right of the wall), and the highest light intensity recorded an average of 172 lux and peaking at 180 lux on L2 Position sensor being at the centre of the wall.

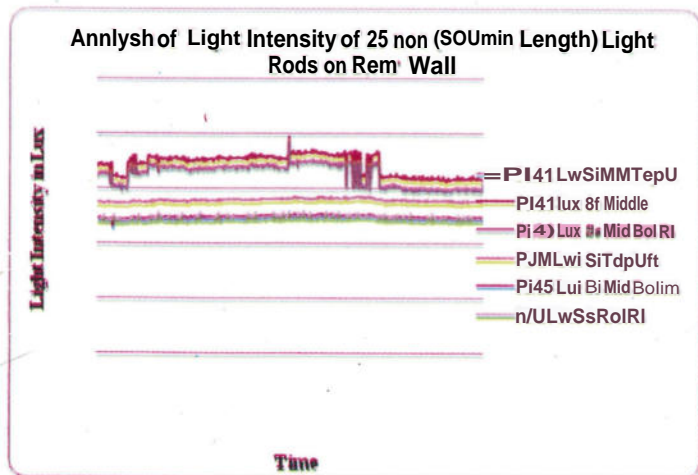


Figure .Light Analysis with 25 Light Rods Insert

The temperature analysis can be seen in Figure 11. The temperature recorded at entry was an average of 27°C peaking at 30°C. The ambient temperature was at an average of 21.8°C and the temperature in the box was average of 22°C. There was significant change in temperature with the ambient temperature. However a temperature difference of up to 10°C was recorded with the window which means the employment of light rods would be just ideal for the tropics where higher temperatures are not desired with the requirement for light.

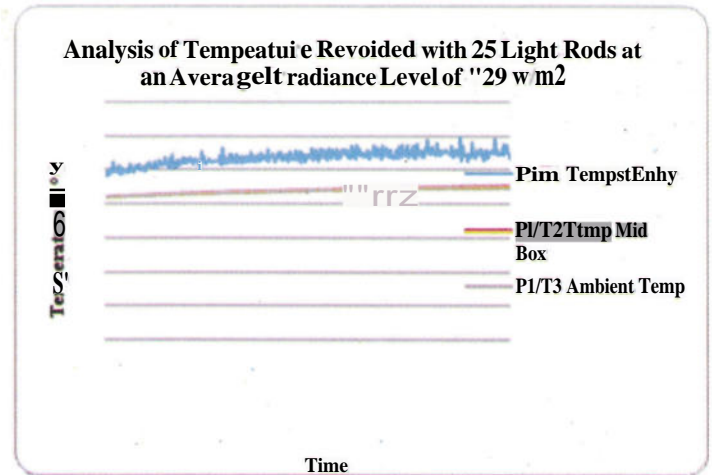


Figure :Temperature Analysis with 25 Light Rods Insert

DISCUSSION

Comparison of Light Analysis between the Window, 13 and 25 LightRods

The idea for the employment of light rods for the purpose of lighting was brought on initially by the need to deploy light to areas where it was construction-wise impossible to have a window or it was aesthetically unsuitable to have one. For architectural purposes also, the spaces in the residences which require light but would rather not have a window, due to the lack of privacy that comes with it, as well as the loss of heat or heat gain therein. For this reason therefore, considerations were made to come up with workable alternatives within an economical cost range, so as to proffer the best solution. Thus, the light rods were introduced into the same position as a window and the various tests as discussed above, were carried out.

Table :Room Chamber Light Analysis

	Average Illuminance	Highest Illuminance	Lowest Illuminance
Window	332 lux	343 lux	325 lux
13 Light Rods (0.026m ²)	85 lux	95 lux	82 lux
25 Light Rods (0.049m ²)	145 lux	152 lux	139 lux

Table 2 shows the various room illuminance for the different applications used, i.e. light rods and window. Table 2 is also indicates that where high illuminance and visual contact is desired, there is no doubt that the window with 325lux offers the best alternative. However, where there is no priority for visual contact, 25 light rods will suffice, as 13 light rods will suffice for spaces where little light is desired.

CONCLUSION. From the foregoing, we can conclude that the test show that the greatest illuminance was from the window, which has a glazed area of 1m² compare to that of the 13 light rods with an area of 0.026m² (13 x $\pi D^2/4$) and 25 light rods with an area of 0.049m² (25 x $\pi D^2/4$) both spread within a square grid of 1m². The average luminance by either of the light rod formation gave sufficient illumination to light a corridor/ passage and a toilet, and in the case of the 25 light rods, there was sufficient illumination to light a kitchen, living room or bedroom (see Tables 1 and 2).

Whilst the window gave the greatest illumination as expected, peaking at 343 lux, it also dissipated the most heat into the room, peaking at 27°C as against that of the 13 and 25 light rods peaking at 23°C. The test also showed that even with a 48% increase in the number of light rods from 13nos to 25nos, the heat dissipated into the room did not record any significant increase. However, there was an increase of 41% in terms of illuminance, with the increase in number of light rods.

It can thus be concluded that where visual contact with inter connecting spaces and in-to-out contact is not necessary, light rods can efficiently provide required lighting for specified spaces as well as the desired reduction of heat losses/gains. Light rods will also be efficient in aspects of light sharing.

REFERENCES

- ASHRAE Standards Handbook
<https://www.ashrae.org/standards-research-technology>-Retrieved August 2012.
- Haoyang, L. (2012) The development of novel window systems towards low carbon buildings. PhD Thesis, University of Nottingham.
- IESNA
<http://www.iesna.org/PDF/Education/LightInDesign.pdf>. Retrieved January 2013
- Jenkins, D. and Muneer, T. (2003). Modelling Light Pipe Performances – a natural Daylighting Solution. Science Direct – Elsevier, Building and Environment, Pp 965-972.
- Tyler, H., Stefano, S., Dustin, M., and Kyle, S.(2012).CBE Thermal Comfort Tool for ASHRAE- 55.Center for the Built Environment, University of California Berkeley, <http://cbe.berkeley.edu/comforttool/>
- Tukur, R. B. (2013). Harnessing Daylight for the Visual and Thermal Comfort in Residential Buildings.Unpublished PhD Thesis, University of Nottingham, UK.
- Vergara-Salvat, M. (2011) Comfort Vs Efficiency or Comfort with Efficiency?M.Sc Thesis University of Nottingham.

