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for Research and Innovation
in Building and Construction**



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THEME

**CONSTRUCTION IN DEVELOPING COUNTRIES
AND ITS CONTRIBUTION
TO SUSTAINABLE DEVELOPMENT**



Conference Date

28th -30th January, 2014

Conference Venue

**ORCHID HOTELS & EVENTS CENTRE,
Lekki , Lagos, Nigeria.**

Hosts:



**University of Lagos, Akoka,
Yaba, Lagos, Nigeria**



**Heriot-Watt University,
Edinburgh, UK**

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FORWARD

Construction is known to play a very significant role in the growth and development of every economy. Indeed, buildings, roads, dams, airports, power plants, stadia, ports and so on are *sine-qua-non* of development and all these are construction products. It therefore means that construction is the bedrock of development and no country can think, dream and experience development without an efficient and effective construction industry. However, the construction industries of most developing countries have remained a serious concern to all because they lack the capacities and capabilities to provide the enabling environment for sustainable development.

Against this background, the University of Lagos, Lagos, Nigeria decided to host the 2014 edition of the Conference of International Council for Research and Innovation in Building and Construction (CIB) W107 Commission on Construction in Developing Countries. The conference holding in Lagos, Nigeria has as its theme **Construction in Developing Countries and its Contribution to Sustainable Development**. The conference effectively covers all aspects of the theme in five sub-themes. The sub-themes are: Environmental Planning, Design, Management, Technology and Education and Research. In the conference, attempts are made to create a high level of awareness on the importance of **Construction Industry Development Board (CIDB)** through highly educative keynote papers presented by international experts. Further attempt is made to use the conference as a spring board for **Construction Industry Development Board (CIDB), Nigeria** through the **CIDB Stakeholders' Forum** that is planned as part of the conference events.

The conference attracts paper submission from across the globe in particular UK, USA, Australia, Singapore, South Africa, Kenya, Ghana and the host country Nigeria. This reflects the global nature of the conference. In all, 7 keynote papers and 78 research papers will be presented in the conference. The research papers consist of 46 papers on Management, 8 papers on Technology, 6 papers on Design, 4 papers on Education and Training and 14 papers on Environmental Planning. The research papers underwent a two-stage paper review process. The first stage involved the review of each abstract by members of the Conference International Scientific Committee. The second stage involved the review of the full paper of each accepted abstract by at least two members of the Conference International Review and Scientific Committees. The two-stage review process helped to improve the quality and standard of the papers accepted for the conference.

It is the hope of the organisers of the conference that participants would derive significant benefits both in terms of research and professional practice from the keynote and research papers presented at the conference.

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THE TRAINING AND EDUCATION OF BUILDING SERVICES PROFESSIONALS IN THE NIGERIAN CONSTRUCTION INDUSTRY

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ABSTRACT

Challenges' currently facing the construction industry is skill mismatch. Shortage of professionals in the building services subsector have led to the influx of inadequately trained persons. One of the major problems the society is facing today is the issue of homes, schools and offices having a poor indoor environmental quality. This leads to ill-health, learning difficulties and poor productivity often reported by occupants. Human beings spend about 70-80% of their time indoors this implies the need for a healthy indoor environment. This study aims to understand the training provisions of building services professionals in Nigeria. Mixed method research approach will be employed. The case study will in part, comparatively evaluate the Nigerian and UK building services curricula by collecting information on the curricula in use, semi-structured interviews with professionals to gain an understanding based on their experience and questionnaires to identify relationships and trends in training provisions. A framework for educating and training of building services professionals will be proposed to improve the performance and efficiency of the built environment. The study is part of an ongoing PhD programme aimed at finding solutions to the industry's Building services problems in Nigeria and presented at this stage in theory prior to data collection.

Keywords: *Building services, Curriculum, Education, Professionals, Training*

INTRODUCTION

The building construction industry plays a vital role in the transformation of the physical terrain of any nation in its march towards greater civilisation and economic independence. The industry continuously strives to enhance the performance of buildings to make them safe, healthier, more comfortable to the user; more durable; faster and less expensive to construct; and to a greater extent easier to manage and maintain.

Over the decade, several changes have occurred in Nigeria which has helped developed most of the sectors of the economy including the Building construction industry. However, Sanusi (2008) is of the opinion that the building industry contributions to the Nigerian GDP and employment of labour are very low. The building construction industry is characterized with: severe and prolonged shortages in manpower both in quality and quantity, waste, cost overrun, delay, errors, inefficiency, poor quality and low profits (FMI/CMAA, 2005; Cornnor, 2006). Nigeria is a developing country faced with peculiar problems. In particular, the economic issues, which has a resultant effect on the construction industry demands a well trained workforce (Awe, Stephenson & Griffith, 2009).

To obtain a workforce competent to face a technologically competitive market, Aniekwu and Ozochi (2010) emphasized the need for expertise in the management of the participants in relation to risks, materials, workmanship and coordination of professionals who may not be directly responsible for the final product and limited opportunity to control. One of such professionals in the industry is the building services personnel. Building services is described by the Chartered Institute of Building Services Engineers as the design, installation and maintenance in domestic, commercial and industrial buildings of energy supply (gas , electricity and renewable sources),heating and ventilating, water (drainage and plumbing), daylighting and artificial lighting, escalators and lifts ventilation and refrigeration, harnessing solar, wind

and biomass energy, communications(telephones and IT networks), security and alarm systems, fire detection and protection, air conditioning and refrigeration.(CIBSE,2013)

Basically, training and education enable professionals to be theoretically and practically oriented in solving problems and doing things better. Skill is acquired through experience while knowledge comes from learning in a real and stimulated environment (Aniekwu, *et al.* 2010).Akintola (2010) argued that technological advancement serves as a major key to a nation's development. In addition, facilities that would encourage training and education could be proper curriculum development, appropriate professional policies in institutions and proper skill acquisition. The corner stone of the Building profession is a curriculum that balances practical training knowledge with academic inquiry (Adesanya, 2012). According to Lush (1994) the end result of the contribution of Building services professionals is to create an environment which determines a functional success of the completed building. Most developing countries find it difficult to impact adequate knowledge and training at different levels. The primary aim of the study is to understand the career path of the Building services professional in Nigeria. What are the problems militating against the supply of and demand for Building services professionals?

PROBLEM DEFINITION

Indoor quality and environment quality can affect the health and work efficiency of the occupants and it is crucial as a component for a sustainable building. The ingredients for a sustainable indoor quality is ventilation, thermal comfort, air quality and access to day light. One of the major problems the society is facing today is the issue of homes, schools and offices having a poor indoor environmental quality. This can lead to ill-health, learning difficulties and poor productivity. This is expected since human beings spend about 70-80% of their time indoors this implies the need for a healthy indoor environment. Interior air quality is a very important factor in maintaining user's health safety and productivity (Lush, 1994; Tarcán, Varol & Ates, 2004; Dennis, 2007).Building Services professionals are seen to be in the fore front in the design to sustain efficiency in the performance of buildings and reduce energy use and carbon emissions.

The issue of workforce shortages is one of the most serious threats to the economic health of many nations around the globe (Awe, *et al.* 2009). Similarly, Kashiwagi and Massnar (2006) observe that the construction industry's greatest challenge is getting qualified people to execute specific task. The training provision of Building Service professionals is not adequate to meet the technological complexity of the present day Building construction industry challenges.

The Nigerian construction industry currently experiences influx of non-core professionals into the industry due to shortages being experienced. This trend dates back to the early seventies when construction workers were in high demand during the oil boom. The Building projects were awarded to foreign construction firms while electrical and plumbing works were executed in-house. Mechanical and electrical engineers trained in hard core machines and equipment design ended up in doing electrical and plumbing works offering shallow system design rather than offering equipment design, manufacture and fabrication (Akniekwu, *et al.* 2010). This trend needs to change and the right people should do the job therefore this study is relevant in understanding the skills and knowledge deficiencies that exist in the field of building services.

This study looks at central problems of building service professionals not having the right level of skill and knowledge to meet the needs of the industry in the areas of mechanical and electrical services as it relates to Building production in this rapidly changing and sophisticated industry. Skill mismatch should be limited in an era, where buildings are expected to be energy and resource efficient.

Workplace environment conditions such as lighting ergonomics' indoor quality and acoustics, thermal comfort, noise control water, waste disposal and cleanliness. Have grown to be areas of interest to clients

and users of the buildings and studies showing the relationship between workers satisfaction with their environment and performance are increasing (Tarcen *et al.* 2004).

This study therefore seeks to fill the gap in the existing knowledge by investigating building services professionals training and education, to investigate the curricula for the Building science /technology as well as the building professionals and make a comparison to investigate the level or quality of knowledge in building services. Thus, this study aims to address the following:

- i. the problems militating against the training and education of building services professionals
- ii. Skills and knowledge deficiencies that exist among building services professionals
- iii. Curricula that exist for building services professional, and
- iv. a workable frame work to be developed for the training and education of building service professionals in Nigeria?

WHY BUILDING SERVICES

The end result of the contribution of Building services professional is to create an environment which determines an occupational success of the completed building. In the United Kingdom, buildings consume about 50 percent of the total energy consumption which in turn responsible for 50 percent of the CO₂ emissions in the country. Sustainability in houses; environmental issues and green buildings, Building services professionals are seen to be in the fore front in the design to sustain efficiency in the performance of buildings (Lush, 1994).

The training and educational needs of Building service professionals is an essential ingredient in the development of the industry drive towards sustainability and the socio-economic development of the nation. The structure and organization of the construction industry is dependent on the work to be done, the technology of choice and the social and economic environment (Awe, *et al.* 2009). This structure needs competent professionals in skill and technique to meet the desired goals in today's competitive market and the quest to sustain performance in buildings. According to Akniekwu, *et al.* (2010), the most affected trades in terms of poor workmanship are the plumbers and electricians with inadequate supervision and improper coordination of work from building services professionals. Therefore, competent building services professionals successfully meeting the demands of project delivery in terms of quality, time, cost and client satisfaction is important. Also building performance as it relates to issues of sustainability and retrofits in present day advancement in construction will be significant.

OVERVIEW OF THE NIGERIAN CONSTRUCTION INDUSTRY

The construction industry is no doubt one of the most important sectors of every economy, it accounts for between 5% and 10% of the Gross Domestic Product (GDP) and over 50% of the Gross Capital Formation (GCF) and about 10% of the work force of most countries (Ogunlana, 2002). Several development is springing up creating opportunities for both indigenous and expatriates' and creating avenues for foreign investments therefore the construction industry indeed is the leading and big player of the economy growth in Nigeria (Idoro, 2008).

Odusami, Oyediran and Oseni (2007) are of the opinion that this growth is as a result of implementations of capital and maintenance projects with increase in housing projects from government and private speculators. Recently a number of development projects by government and private sector companies have created opportunities for construction contractors. For instance most states of the country's infrastructural projects like road construction, housing projects, bridge construction, drainage, dams, rural electrification city expansion projects among others have been on the increase especially in Lagos, Akwa Ibom, Rivers States were massive amount of money have been voted for capital projects.

Awe, *et al.* (2009) observed that the increase is both in volume and complexity. He also stated that developing countries do not have the stock of skilled manpower to match the level economic activities and development being observed.

The industry faces a significant number of challenges including the lack of local skilled labour, power shortage, and unavailability of materials, time over-run, and poor quality works, and cost overrun, collapse of building and unethical practices which are common in the industry (Odusami, *et al.* (2007); Oloyede, Omoogun and Akinjire, 2010).

BUILDING SERVICES TRAINING IN NIGERIA

Builders in Nigeria are trained in universities, polytechnics and colleges of technology to obtain Bachelor of Science degree (B.Sc) or Bachelor of technology (B.Tech) and higher national diploma (HND). Undergraduates specialise in their field of interest namely Construction Management, Building Structures, Building Services and Building Maintenance in the final year of study. It is mandatory to spend five years of study in the university to be a graduate of building. Graduates are expected to register with the Nigerian Institute of Building to undergo training to become professionals.

The Nigerian institute of Building is the professional body for professional Builders in Nigeria. It was established to oversee the affairs of Building practice in Nigeria. It gained autonomy from the chartered institute of Building United Kingdom in 1970 and gained backing as a profession in Nigeria in with Decree 45 of 1989. According to the Nigerian Institute of Building, a Builder is a person who has received an approved standard of professional training and practice in building and found competent with the responsibility of buildings, construction, project management, building maintenance, reactivation of abandoned projects, building survey, feasibility and variability studies, litigation and arbitration, resident supervision and prime consultancy.

It is important to note that the Institute lacks the scope for the graduate who specialized in building services to be trained as a professional in its definition of responsibilities for a professional Builder whereas Adesanya (2012) stated that in academia, Building services is seen as an area of specialization in Building science/technology in Nigerian universities.

The Chartered Institute of Building Services Engineers UK described Building services as a profession that make buildings come alive and Building services professionals deal with the installation, design and maintenance of lighting, heating and ventilation, refrigeration, lifts, escalators, acoustics, plumbing (water, drainage) power supply and energy management systems, security and safety system and communication (telephone and IT network). Building services is an expanding specialization in today's construction bringing the building to life and providing comfort to the occupants. The descriptions above distinguish a builder from a Building services professional. These definitions were compared since the Nigerian Institutes of Building/Council of Registered builders of Nigeria are seen as the bodies that promote education and regulate building profession training and education in Nigeria respectively.

METHODOLOGY

The study will comparatively evaluate the Nigerian building services curricula from selected universities by collecting information on the curricula in use, with a selected university Building services curriculum from the United Kingdom. The curricula would be tested using content analysis. A structured Questionnaire (in relation to the set objectives for the study) will be used to collect information from Building professionals and client in the industry. This is to identify relationships and trends in training provisions. Semi-structured interviews with Building services professionals will be carried out to gain an understanding based on their experience. The data retrieved from the survey will be analysed using both descriptive and inferential statistics. Pilot studies will be carried out to ensure clarity and relevance of the question-

naire to the selected sample. It will also help to validate and improve the questionnaire in terms of format, layout and the overall content.

SCOPE AND DELIMITATION OF STUDY

The scope of the study will be limited to the training and education of building services professionals. The study will focus on the Nigerian construction industry since the overall aim is to understand the training and educational needs of building services professionals in the Nigerian construction industry. The study will compare curricula of one federal university in each geo-political zone offering building science/technology, electrical electronics, and mechanical engineering. The study will also assess at the curriculum of a selected building services programme at the undergraduate level in the United Kingdom to form the baseline information for developed countries. The study will also examine lecturers and professionals in the industry. A sample of universities offering Building science/ technology will be selected from cities where they are located in Nigeria. This study limits the scope of coverage to the cities within the country where those universities are located. This study is also only limited to Building science/technology curricula for undergraduate and post graduate schools in Nigeria.

CONCLUSION

Having the right professionals carry out specific jobs they have been trained for is a mandatory requirement for effective functioning of the Nigerian construction industry. Competent professionals will meet the desired goals in today's competitive market and the industry will be better for it. More so, clients' satisfaction will be achieved and there will be value for the client and the contractor.

The findings will provide a workable curriculum for the training and education of building services professionals in the industry and the performance of Building services professionals will be enhanced. This will improve the efficiency of the built environment.

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