



WEST AFRICA BUILT ENVIRONMENT RESEARCH (WABER) CONFERENCE

**24-26 July 2012
Abuja, Nigeria**

BOOK OF ABSTRACTS

Editors

Dr Samuel Laryea
Dr Sena A. Agyepong
Dr Roine Leiringer
Professor Will Hughes



Book of abstracts of the West Africa Built Environment Research (WABER) Conference
2012
Abuja, Nigeria, 24-26 July 2012

Editors

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Declaration

All papers in this publication have been through a review process involving initial screening of abstracts, review by at least two referees, reporting of comments to authors, modifications of papers by authors and re-evaluation of re-submitted papers to ensure quality of content.

FOREWORD

A big welcome to every participant at this WABER 2012 Conference. Our first three conferences, 2009-11, took place in Accra, Ghana. Nigeria is hosting the WABER Conference for the first time, 24-26 July 2012, and it is a delight to be in this beautiful city of Abuja. Thank you for coming and we hope you enjoy the conference.

Time really flies! I still have a vivid recollection of our first event in Accra on 2-3 June 2009. So soon we are having a 4th WABER Conference already. Every credit for the rapid development of the WABER Conference in the last four years should really go to those of you who have participated in the past as well as those attending the conference this year. In the past four years, many of us have become friends through WABER. Many young academics and researchers have also been helped to develop their research work and skills through WABER and thereby found an opportunity to move their careers and ideas forward. The story of WABER just goes to show that we are stronger when we come together and there is nothing we cannot achieve when we work together and support each other. With most of the countries in Africa pushing for development, the WABER Conference provides an essential channel for bringing built environment academics, researchers and practitioners together for the generation of knowledge, interaction and leadership on the key issues that we need to tackle in order to address our challenges and opportunities of the 21st century particularly in relation to the construction sector and built environment.

Since 2009, WABER has brought together more than 500 built environment academics, researchers and practitioners to work together towards the development of the built environment field in Africa. We strive to: support young built environment researchers in West Africa (WA) especially to develop their research work and skills through constructive face-to-face interaction with their peers and experienced international academics; supply a platform for more senior academics to network and share ideas on their current research work; and serve as a vehicle for developing the built environment field in Africa.

In addition to the 500+ people involved in WABER, we also have about 60 institutions in the WABER Conference network, comprising mainly of universities and polytechnics. This network of people has enabled us to develop a new textbook on “Construction in West Africa” which will be launched at this conference in Abuja. The WABER Book was written by ten academics of West African origin based in six different countries. This contribution is another example of what we can collectively achieve when we work together and combine our ideas. A big thank you to all authors and our partners who have supported us and helped to publish the book.

We have engaged in some outreach activities within the past year. In January 2011, some members of our team visited built environment departments in six polytechnics and two universities in Ghana to interact with lecturers and postgraduate students and deliver research workshops. We also donated textbooks to some departmental libraries as a means of supporting students and teaching and learning activities. In August 2011, visits to six universities in Nigeria enabled us to interact directly with staff and students in built environment departments. These visits continue to foster closer interaction with our friends in various institutions. I would like to express our sincere thanks to colleagues in all institutions visited for your warm hospitality.

This year’s conference proceedings consist of 125 papers. We initially received and screened 278 abstracts with the help of our Scientific Committee. 182 full papers were eventually submitted and each went through a peer review process. Thus, the papers accepted for publication represent around 68% of full papers received. We congratulate the authors of papers that made it into the proceedings for a job well done. We also thank the 56 members of our Scientific Committee and 84 members of our Review Panel for your expertise and input into the quality of this conference.

The published papers cover a wide array of topics including: Building services, Construction design and technology, Construction economics, Construction finance, Contract law, Contracting, Contract administration, Decision support systems, Economic development, Engineering, Energy,

Environment, Facilities Management, Health and safety, Housing, Human resources and skills, Information technology, Materials science, Procurement, Project management, Quantity surveying, Real estate and planning, Risk management, Supply chain management, Sustainable technologies, Urban development. As such they reflect various areas of socio-economic development aspirations of countries in West Africa. With most countries in Africa pushing for development, some of the research findings here can play an important role in helping to realize the development aspirations of African economies.

An important and impressive statistic is that the 329 authors of the papers in this year's conference proceedings come from 87 different institutions and 10 different countries. This provides plenty of scope for cross-boundary learning. It also provides for a rich intellectual, international and multicultural blend and platform for networking and developing new knowledge and longer-term collaborations. We hope that all delegates at this conference will make good use of this opportunity. Going forward into the future WABER will develop strategic initiatives for helping more people to develop their work and achieve their potential. The Micheletti & Co. Ltd Prize for Best Masters Research Dissertation is a scheme to recognise and encourage younger researchers.

On that note, we wish to record our thanks and gratitude to a number of individuals and organizations who have supported us in various ways: Vector Morrison Ghana Ltd; A-Kon Consults Limited (Ghana); Oladele Construction Ltd (Nigeria); K+H Limited (Ghana); HLB Ltd (Ghana); Laurus Development Partners; PPMC Ltd (Ghana); Micheletti and Co. Ltd; Mr. Michael Kwadwo Frimpong (President of the Africa Association of Quantity Surveyors (AAQS)); Mr. Afolabi Abdulsalam Dania (University of Reading, UK); Professor Kabir Bala (Ahmadu Bello University, Nigeria); Professor Stella Zubairu and a number of our colleagues in Nigeria.

A common tradition at academic conferences is to have keynote speakers. We are blessed this year to have some really experienced international academics who will be speaking to us: Professor Roger Flanagan (University of Reading, UK); Dr Roine Leiringer (University of Hong Kong, Hong Kong); Dr Chris Harty (University of Reading, UK); Professor Stella Zubairu (Federal University of Technology, Minna, Nigeria) and Professor Will Hughes (University of Reading, UK). It is great to have these academics contributing a keynote to the conference.

I wish to express appreciation to Dr Sena Agyepong, our Regional Organising Director, and members of our LOC particularly Mr Oladele Ishaq for your hard work and capable management of local organising arrangements. Above all, many thanks to all those of you who have come to take part in this conference. Enjoy Abuja and have a safe journey back home.

Dr Samuel Laryea
School of Construction Management and Engineering
University of Reading, UK
July 2012

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We are grateful to the following academics for leading the refereeing process for papers relating to their research areas:

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REVIEW PANEL

The peer review process for an international conference of this nature requires the expertise and contribution of a number of international academics. We wish to thank the following people who carried out the review of abstracts and papers for the WABER 2012 conference in addition to the members of our Scientific Committee. Thank you for your contribution.

- Prof Denis F. Cioffi, George Washington University, USA
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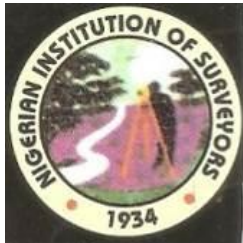
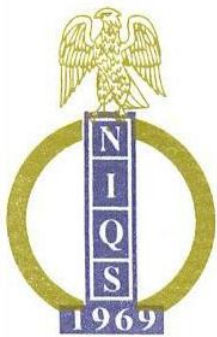
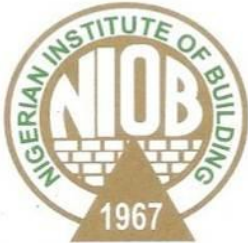
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A-Kon Consults Ltd opened its doors for business on 21st October, 2002. After starting the company from his dining table, Samuel Asare-Konadu used all the capital he had to pay for the rent of a small 20 m² office space for \$2,200. The first five years was a slow but steady walk to building a brand presence and reputation in the industry. The company often took on unpaid jobs by small contractors until the first big contract for a residential apartments’ project in an exclusive suburb of Accra. Since then, we have experienced rapid, profitable growth and expansion in projects and services.

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Infrastructure is essential to a developing economy which in turn is based on the development of knowledge and skills in construction and engineering. A-Kon Consult thus focuses on education as its vehicle of social impact. The company supports programmes that seek to advance the training and continuous professional development of students, quantity surveyors and other stakeholders in the construction industry.

OUR FUTURE

A-Kon Consults Ltd is proud to be celebrating 10 years and rises to the challenge of shaping a sustainable future due to technological changes and evolution of the industry, by innovating and executing on improved solutions for its clients.

CONTACT US

A warm welcome awaits you if you would like to contact us through any of the following coordinates:

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We are delighted to be part of the 4th WABER Conference taking place in Abuja, Nigeria on 24-26 July 2012. As a firm we always strive to drive high standards, professionalism and development of the construction industry. A vibrant and well organised construction industry can create growth and opportunity for our people. A lot of those participating in this year's WABER Conference are future leaders of the construction industry either as academics, researchers or practitioners. You have ideas. We need your ideas and innovations to develop the industry and regional economy and take it forward to the next level. That is why we are happy to be part of this conference during the celebration of our 10th Anniversary.



Samuel Asare-Konadu

Managing Director

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PROGRAMME

TUESDAY 24 JULY 2012 08:00-17:30

08:00-09:00 REGISTRATION

OPENING SESSION (Main auditorium)

- 09:00-09:10 Welcome address
09:10-09:15 Opening remarks by Professor Will Hughes (Editor-in-chief of Construction Management and Economics journal, Professor of Construction Management and Economics, University of Reading, UK)
09:15-09:25 Address by Guest of Honour
09:25-09:35 Chairman's remarks
09:35-09:45 Official WABER 2012 Group Photograph
09:45-10:00 Break

A-KON CONSULTS KEYNOTE ADDRESS

- 10:00-10:05 Introduction of Keynote Speaker
10:05-10:35 Keynote address by Professor Will Hughes (University of Reading, UK)
10:35-10:45 Q&A
10:45-11:00 Break

DOCTORAL WORKSHOP SESSION (11:00-13:00)

Chairperson Dr Ahmed Doko Ibrahim, Ahmadu Bello University, Nigeria

- 11:00-11:10 Estimating cost contingency for construction projects: The challenge of systemic and project specific risk - Joseph Ignatius Teye Buertey, Emmanuel Abeere-Inga and Theophilus Adjei Kumi
11:10-11:20 Investigating the Practice of Cash flow forecasting by Contractors in Nigeria - Mustapha AbdulRazaq, Yahaya Makarfi Ibrahim and Ahmed Doko Ibrahim
11:20-11:40 Discussion
11:40-11:50 Assessing Project Governance Structures in Construction Procurement: The Search for a Unified Theory - Olusola Ogunsina and Deji Rufus Ogunsemi
11:50-12:00 An appraisal of indigenous limited liability Construction Company in South-western Nigeria - O. Oladimeji and G.K. Ojo.
12:00-12:20 Discussion
12:20-12:30 Mass housing in Nigeria, customize the brief: Provide a desired house - Folaranmi Adedayo Olatunde
12:30-12:40 The mobilization of formal housing finance by co-operative societies: Prospects, challenges and strategies - Basirat Oyalowo
12:40-13:00 Discussion

13:00-14:00 **Lunch and networking break**

PPMC LTD KEYNOTE ADDRESS

14:00-14:05 Introduction of Keynote Speaker
14:05-14:30 Keynote address by Dr Roine Leiringer (University of Hong Kong, Hong Kong)
14:30-14:40 Q&A
14:40-15:00 **Break**

WORKSHOP SESSION (15:00-17:30)

Chairperson Dr Taibat Lawanson, University of Lagos, Nigeria

15:00-15:10 An integrated Supply Chain Relationship Management theoretical framework for improving Engineering and Design Service Delivery (EDSD) to Building Contractors in Ghana - N. K. Orgen; Divine K. Ahadzie; Joshua Ayarkwa and Edward Badu
15:10-15:20 Outsourcing of facilities management services in Nigeria's public universities - Dubem I. Ikediashi, Stephen O. Ogunlana, Graeme Bowles, and Ikemefuna Mbamali
15:20-15:40 Discussion
15:40-15:50 A case for the construction of green buildings in Lesotho - F.A. Emuze, W.M. Shakantu and K. Ntsihlele
15:50-16:00 Managing conflicts relating to property management: The role of estate surveyors - Michael Ayodele Olukolajo
16:00-16:20 Discussion

Chairperson Professor Anny Nathaniel Aniekwu, University of Benin, Nigeria

16:20-16:30 Effect of client pressure on market valuation of residential properties in Minna, Nigeria - Namnso Bassey Udoekanem
16:30-16:40 Lessons learnt in the maintenance of public schools' infrastructure in the Gauteng Province, South Africa - Mojela, T.W. and Thwala, W.D.
16:40-17:00 Discussion
17:00-17:10 Competing models of how motivation, opportunity and ability drive performance behaviours - Martin Morgan Tuuli
17:10-17:20 Influence of curing regime on compressive strength development of high strength concrete - O.G. Okoli and A.E. Abalaka
17:20-17:30 Discussion
17:30 Close

SOCIALISING

19:30 Socialising at Transcorp Hilton Abuja
<http://www3.hilton.com/en/hotels/nigeria/transcorp-hilton-abuja-ABUHITW/index.html?WT.srch=1>

WEDNESDAY 25 JULY 2012 09:00-17:30

RESEARCH SKILLS WORKSHOP (MAIN AUDITORIUM)

09:00-10:30 Research Skills Workshop facilitated by Dr Chris Harty (University of Reading, UK)

10:30-11:00 **Refreshments and networking break**

PARALLEL SESSIONS (11:00-13:10)

STREAM 1 (MAIN AUDITORIUM)

Chairperson Prof. O.O. Morenikeji, Federal University of Technology, Minna, Nigeria

11:00-11:10 Perception of educators and practitioners on the relevance of architectural curriculum of Nigerian universities to the building industry - Abdullahi Abubakar

11:10-11:20 Entrepreneurial characteristics of architecture and building students of Covenant University - Tunji – Olayeni Patience

11:20-11:30 Discussion

11:30-11:40 Assessment of development of technicians/technologists in the built environment disciplines in Nigeria - Emmanuel Achuenu, Bulus Gwom Pam and Stella Ache Achuenu

11:40-11:50 The reach and limits of architectural theory in practice: Interpretations from a Nigerian perspective - Elizabeth T Dassah, Erepitan O. Ola-Adisa and Michael C. Odoala

11:50-12:00 Discussion

Chairperson Prof Kabir Bala, Ahmadu Bello University, Nigeria

12:10-12:20 Multi-skilling barriers in the construction industry in North-Western Nigeria - Nasiru Adamu, Mohammed Hassan Nensok and Adefemi Aka

12:20-12:30 Correlates of job satisfaction amongst quantity surveyors in consulting firms in Lagos, Nigeria - Henry N Onukwube

12:30-12:40 Discussion

12:40-12:50 A holistic understanding of the concept and measurement of productivity in the construction industry: A New Zealand perspective - Mbachu, J. and Shahzad, W.

12:50-13:00 Knowledge and skills required for contractors' high productivity and performance in construction project delivery: An exploratory study of the up-skilling needs of the New Zealand contractors - Jasper Mbachu

13:00-13:10 Discussion

13:10-14:25 **Lunch and networking break**

STREAM 2 (SEMINAR ROOM)

Chairperson Dr Noah Karley (Heriot Watt University, Scotland)

- 11:00-11:10 Using indoor climatic measurements for occupancy monitoring - Tobore Ekwevugbe, Neil Brown and Denis Fan
- 11:10-11:20 Foundation for a decision support framework for optimal sequencing of emissions savings refurbishment options in non-domestic buildings - Taofeeq Ibn-Mohammed , R.Greenough; S.Taylor; L. Ozawa-Meida and A. Acquaye
- 11:20-11:30 Discussion
- 11:30-11:40 Minimization of the heat of gains in Buildings: The case of domestic buildings in Cape Coast metropolis, Ghana - Ansah, Samuel K. and Bamfo-Agyei Emmanuel
- 11:40-11:50 Quantity and quality assessment of artificial lighting system of buildings in Nigeria - Dalhatu Abdulsalam, Yunusa M Saleh, Abdullahi A Mati and Aliyu Suleiman Shika
- 11:50-12:00 Discussion

Chairperson Prof Stella Zubairu, Federal University of Technology, Minna, Nigeria

- 12:10-12:20 Benefit of conducting energy calculations in the built environment of Nigeria - Amina Batagarawa
- 12:20-12:30 Energy overview of Botswana: generation and consumption - Eng L Ofetotse and Emmanuel A Essah
- 12:30-12:40 Discussion
- 12:40-12:50 Evaluating the adequacy of installed ventilation systems in high rise buildings in Nairobi, Kenya-James Olabode Bamidele Rotimi and Rodgers Kimutai Kiptala
- 12:50-13:00 Achieving thermal comfort in residential buildings using expanded polystyrene (EPS): A study of citec buildings in Abuja - Augustina K Nwogo and S. A. Ganiyu
- 13:00-13:10 Discussion
- 13:10-14:25 **Lunch and networking break**

STREAM 3 (SEMINAR ROOM)

Chairperson Prof K.T. Odusami, University of Lagos, Nigeria

- 11:00-11:10 An assessment of housing sanitation and waste management practices in the residential core areas of Osogbo, Osun State Nigeria - Hezekiah A. Ayoola, A. F. Lawal and M.L. Akinluyi
- 11:10-11:20 Assessment of the rental values of residential properties in urban slums: the case of Osogbo, Osun State Nigeria – I.D. Dabara, A.S. Okunola, A.G. Odewande and A. Okorie
- 11:20-11:30 Discussion
- 11:30-11:40 The Effects of Ghana’s oil discovery on land and house prices on communities nearest to the oil filed in Ghana (Case study: Kumasi and Sekondi-Takoradi) - Yalley, P. P. and Ofori-Darko, J
- 11:40-11:50 Achieving a salubrious residential environment through residents participation in Nasarawa, Nigeria - Yacim, Awoamim Joseph ; Lawal, Kolawole Shuaib; Ahmed, Alhassan Abdullahi; Ayodele, Kayode David and Umar, DanAzumi Yusuf

11:50-12:00 Discussion

Chairperson Dr Bola Babalola, Obafemi Awolowo University, Nigeria

12:10-12:20 Determinants of vacancy rate in shopping centres in Akure, Nigeria - N B Ezeokoli, V A Bello and O S Adebisi

12:20-12:30 Trends in Residential Land Values in Akure, Nigeria - M B Ogunleye

12:30-12:40 Discussion

12:40-12:50 Poverty and environmental conditions in informal settlements of Lagos Megacity: A time-line study of Ajegunle Community (1998 – 2008) – Lawanson, Taibat; Nwokoro, Immaculata and Olajide, Oluwafemi

12:50-13:00 Relevance of Hernando de Soto's principle of land titling to Lagos Metropolis - Emmanuel Adesina Aladeloba

13:00-13:10 Discussion

13:10-14:25 **Lunch and networking break**

LAURUS DEVELOPMENT PARTNERS KEYNOTE ADDRESS

14:25-14:30 Introduction of Keynote Speaker

14:30-14:55 Keynote address by Professor Stella Zubairu (Federal University of Technology, Minna, Nigeria)

14:55-15:05 Q&A

PARALLEL SESSIONS (15:10-17:30)

STREAM 1 (MAIN AUDITORIUM)

Chairperson Prof D.R. Ogunsemi, Federal University of Technology, Akure, Nigeria

15:10-15:20 The preference of Ghanaian contractors in providing occupational health and safety items; an exploratory study - Frederick Owusu Danso, Edward Badu and Divine Kwaku Ahadzie

15:20-15:30 The use of personal protective equipment (PPE) on construction sites in Nigeria - Bruno L Tanko and N.A. Anigbogu

15:30-15:40 Discussion

15:40-15:50 An evaluation of disaster safety performance of the high-rise-buildings in Abuja - I H Mshelgaru

15:50-16:00 Geospatial analysis of landslide vulnerability in Kuje and environs, Abuja Nigeria - M. L. Ojigi; Emmanuel E Achema and T. A. Alade

16:00-16:10 Discussion

16:10-16:30 **Networking break**

Chairperson Dr Yahya Makarfi Ibrahim, Ahmadu Bello University, Nigeria

16:30-16:40 Contributing factors of delay in the Nigerian construction industry: A comparative analysis with other selected countries - Emmanuel O Fatoye

16:40-16:50 Applicability of Bromilow's Time – Cost Model on Building Projects in Ghana - Collins Ameyaw ; Sarfo Mensah and Yarhands Dissou Arthur

17:00-17:10 Discussion

- 17:00-17:10 Effect of climate change on construction project planning in Nigeria - Wasiu A. Bello, R. A. Adekunle and O. E. Ogunsanmi
 17:10-17:20 Sustainable procurement: the challenges of practice in the Ghanaian construction industry - Sarfo Mensah and Collins Ameyaw
 17:20-17:30 Discussion
 17:30 Close

STREAM 2 (SEMINAR ROOM)

- Chairperson Dr Chinwuba Arum, Federal University of Technology, Akure, Nigeria
 15:10-15:20 A need to re-define the status of professional valuation: The Nigerian perspective - Thomas A Ashaolu
 15:20-15:30 Client influence on valuation process: Means, motive and impact - Chukwuma C. Nwuba ; Uche S. Egwuatu; Babatunde M. Salawu
 15:30-15:40 Discussion
 15:40-15:50 Stage building inspection: A possible solution to building failures in Nigeria - Ebun Funmilayo Rotimi and John Tookey
 15:50-16:00 The lifecycle assessment of interlocking blocks and bricks - Akinsanya Kehinde Olukanyin
 16:00-16:10 Discussion
 16:10-16:30 **Networking break**

Chairperson Dr Chris Harty, University of Reading, UK

- 16:30-16:40 Second hand smoke (SHS) exposure in public places, any lesson to learn from other nations? - Haruna M. Musa and A. Clayson
 16:40-16:50 Agrochemicals Presence in Water Sources and their Effects on Human Health and the Environment: Case of Zaria Dam Reservoir and Environs - J A Tanko; I Abubaka; S K Balla and E A Oluwadamisi
 17:00-17:10 Discussion
 17:00-17:10 Evaluation of involvement of built environment professionals in housing transformation processes in three government housing estates in South-Western, Nigeria - Victor Olufemi Adegbehingbe
 17:10-17:20 Housing Delivery via Housing Cooperatives as a Tool towards achieving National Development; An Empirical Study - A A Yakub; A O Salawu and S D Gimba
 17:20-17:30 Discussion
 17:30 Close

STREAM 3 (SEMINAR ROOM)

Chairperson Prof Emmanuel Achueni, University of Jos, Nigeria

- 15:10-15:20 Cost-check procedure for verifying the appropriateness of loans for housing in Nigeria - Musa Nuhu Madawaki
 15:20-15:30 An exploration of the use of Delphi methodology in housing satisfaction studies - Clinton Aigbavboa and Wellington Thwala
 15:30-15:40 Discussion
 15:40-15:50 Sustainable housing development and communal provision of infrastructures in Asuwamo residential estate Akure, Nigeria - Mary Adebola Ajayi and Felix Kayode Omole
 15:50-16:00 An examination of the Nigerian sustainable urban development strategies and governance - Louis Ikechukwu Osuocha and John Didacus Njoku
 16:00-16:10 Discussion
 16:10-16:30 **Networking break**

Chairperson Prof Leke Oduwaye, University of Lagos, Nigeria

- 16:30-16:40 Role of beneficiaries in the delivery of low-income housing in South Africa: A literature review - Wellington D. Thwala and N.T. Ramovha
16:40-16:50 Factors affecting quality of low income houses in a South African province - L Wentzel; F A Emuze and Winston M Shakantu
17:00-17:10 Discussion
17:00-17:10 Urban housing delivery: expanded polystyrene panels initiative in Abuja, Nigeria - Ibukunoluwa A. Ogundiran and Yomi M. D. Adedeji
17:10-17:20 Constraints to land accessibility by urban residents in Akure, Nigeria - T.B. Oyedokun , A.O. Adewusi , B. Ojo, B.O. Onakoya & S.P. Akinbogun
17:20-17:30 Discussion
17:30 Close

SOCIALISING

- 19:30** Socialising at Nikon Luxury, Abuja
<http://www.niconluxury.com/about.htm>

THURSDAY 26 JULY 2011 09:00-17:30

KEYNOTE ADDRESS

09:00-09:25 Video presentation of Keynote Address on *International Construction* by Professor Roger Flanagan (University of Reading, UK)

LAUNCHING OF WABER BOOK ON “CONSTRUCTION IN WEST AFRICA” AND PRESENTATION OF MICHELETTI & CO. LTD. PRIZE FOR BEST MASTERS RESEARCH DISSERTATION

09:30-09:45 WABER Book Overview and Official Launching

09:45-09:55 Presentation of Micheletti & Co. Ltd Prize for Best Masters Research Dissertation in West Africa

PARALLEL SESSIONS (10:00-13:10)

STREAM 1 (MAIN AUDITORIUM)

Chairperson Prof Wellington Thwala, University of Johannesburg, South Africa

10:00-10:10 Greening Accra: The use of landscape architecture to enhance the city's environment - Karen Evans Halm

10:10-10:20 Sustained beautification of Nigerian cities through landscaping: The case of Akure - Dorcas A Ayeni and Charles A Olalusi

10:20-10:30 Discussion

10:30-10:40 Biophilic design: A sustainable response to climate change – the economical ecological solution of a modern day ecocity - the case study of ecopark, Hanoi, Vietnam - Rita Obiozo

10:40-10:50 Sustainable schools: Whose responsibility? – Aliyu Muhammad Sani

10:50-11:00 Discussion

11:00-11:30 **Refreshments and networking break**

Chairperson Dr Immaculata Nwokoro, University of Lagos, Nigeria

11:30-11:40 The implications of user redesigns of public housing on the architectural design process - Nghai Ezekiel Suleman and Musa Lawal Sagada

11:40-11:50 Efforts in Rural Development by African Governments; Focus on Nigeria's Niger Delta - Prince E. England and A A Yakub

11:50-12:00 Discussion

12:10-12:20 Analysis of spatial types and social space in Ile-Ife domestic architecture - C O Adeokun

12:20-12:30 The kitchen in domestic space: A comparative study of kitchens cooking and culinary practice in Ile-Ife, Nigeria - Folake Isaacs-Sodeye

12:30-12:40 Discussion

- 12:40-12:50 Interplay of Islamic ethics and architecture in an African city: focus on some selected local government areas in Kano - Ahmad Yahya
 12:50-13:00 Bridging the cultural gap between traditional and modern building designs - Oluwatosin Olufunto Ijatuyi and Abraham Adeniyi Taiwo
 13:00-13:10 Discussion
 13:10-14:30 **Lunch and networking break**

STREAM 2 (SEMINAR ROOM)

Chairperson Dr Roine Leiringer, University of Hong Kong, Hong Kong

- 10:00-10:10 Investigating optimum conditions for public-private partnership in health, education and housing sectors in Nigeria - Luqman O Oyewobi; A.D Ibrahim; S. Isa and Y.M Ibrahim
 10:10-10:20 Public-Private Partnerships (PPPs) in Housing Provision in Ogun State, Nigeria: Opportunities and Challenges - Eziyi O. Ibem and Egidario B. Aduwo
 10:20-10:30 Discussion
 10:30-10:40 Success factors for implementation of private public partnerships in the construction industry in Uganda - Henry Alinaitwe, Robert Ayesiga and Albert Rugumayo
 10:40-10:50 Assessment of Public-Private-Partnership Regulatory Framework for Infrastructure Development in Nigeria - Alhassan Dahiru
 10:50-11:00 Discussion
 11:00-11:30 **Refreshments and networking break**

Chairperson Dr Martin Tuuli, Loughborough University, UK

- 11:30-11:40 An assessment of the procurement strategies for the provision of potable water to low-income urban areas in Nigeria - Mohammed A. Kaltume , A.D. Ibrahim and Y.M. Ibrahim
 11:40-11:50 Modelling the performance of traditional contract projects in Nigeria: An artificial neural network approach - Baba Shehu Waziri
 11:50-12:00 Discussion
 12:10-12:20 Mortgage Investment in Osun State: An Evaluation of the Role of Estate Surveyors and Valuers - Okorie, Augustina ; Daniel, Dabara I ; Abdullahi .I
 12:20-12:30 Evaluation of public private partnership (PPP) as alternative procurement route for infrastructure development: Case of Nigeria mega city - Oluwaseyi A. Awodele, Stephen O. Ogunlana and Olusola F. Akinradewo
 12:30-12:40 Discussion
 12:40-12:50 Towards understanding client quality requirements on public building projects- John M. Kakitahi, Robert Agren, Anne Landin, Henry Alinaitwe
 12:50-13:00 Assessment of bid evaluation strategies for construction projects in Lagos State, Nigeria - I. O. Famakin, I. O. Aje. and O. Olajide
 13:00-13:10 Discussion
 13:10-14:30 **Lunch and networking break**

STREAM 3 (SEMINAR ROOM)

Chairperson Prof Abiodun Olukayode Olotuah, Federal University of Technology, Akure, Nigeria

- 10:00-10:10 Examining the effect of quality management practices used on construction project performance - Ademeso Olatunji, Windapo Abimbola and Fasina Nureni
 10:10-10:20 Client perspective for the implementation of lean construction in Nigerian construction industry - Ograbe Ahiakwo, David Oloke, Subashini Suresh and Jamal Khatib

- 10:20-10:30 Discussion
 10:30-10:40 Impact of total quality management (TQM) on Nigerian construction firms - J. A. Akinola, O. F. Akinradewo and S. O. Olatunji
 10:40-10:50 Determining critical project success criteria for public housing building projects (PHBPs) delivery in Ghana - T. E. Kwofie ; E. Adinyira ; E. Botchway and S. O. Afram
 10:50-11:00 Discussion
 11:00-11:30 **Refreshments and networking break**

Chairperson Dr Gabriel Nani, KNUST, Kumasi, Ghana

- 11:30-11:40 A holistic survey of risk management in building construction project - John C Ugwoeri
 11:40-11:50 An analysis of contractors' approaches to risk management practices in Lagos state, Nigeria - Irewolede Ijaola
 11:50-12:00 Discussion
 12:10-12:20 The use of risk registers by Project Managers - Thomas Saffin and Samuel Laryea
 12:20-12:30 Mitigating construction project risk using Building Information Modeling (BIM) - D.B. Hammad; A. G. Rishi and M. B. Yahaya
 12:30-12:40 Discussion
 12:40-12:50 Stakeholder Perception of Risks and Risk Factors in Infrastructural Projects: The Case of the Niger Delta - Tarila Zuofa; E G Ochieng and B O Awuzie
 12:50-13:00 Improving Labour Productivity in Masonry Work in Nigeria: The Application of Lean Management Techniques - John Ebhohimen Idiako and Kabir Bala
 13:00-13:10 Discussion
 13:10-14:30 **Lunch and networking break**

PARALLEL SESSIONS (14:30-16:40)

STREAM 1 (MAIN AUDITORIUM)

Chairperson Dr Folake Isaacs-Sodeye, University College London, UK

- 14:30-14:40 Investigation of a financial model for small, medium and micro-enterprises contractors in South Africa - Ndlovu S and Thwala W D
 14:40-14:50 Mitigating informal economic sectors' proliferation through microcredit scheme for small and medium scale entrepreneurs in metropolitan Lagos - Olubukola Aina Olunloyo
 14:50-15:00 Discussion
 15:00-15:10 Ayoade, A.A., Olurotimi, K. and Babatunde, A. A. (2012) Slum development in 3rd world countries: Causes, effect and way out. A case study of Ibadan South East local government, Nigeria
 15:10-15:20 An investigative study of the effect of design decisions on the cost of buildings - D. O. Mac-Barango
 15:20-15:30 Discussion

Chairperson Professor Okedele Olaniyi, Caleb University, Nigeria

- 15:40-15:50 Assessment of contractors' cost control practices in Metropolitan Lagos - Afeez Olalekan Sanni and Olufemi Daniel Durodola
 15:50-16:00 Causes of financial loss to contractors in the Uganda construction industry - Christopher Semyalo, Henry Alinaitwe and Anthony Kerali
 16:00-16:10 Discussion
 16:10-16:20 Impact of risk on performance of design and build projects in Lagos State, Nigeria - O M Ajayi, O E Ogunsanmi, O A Salako and B A Mafimidiwo

- 16:20-16:30 An assessment of the impact of insurance in managing residential and commercial risk - Ndibe Leonard O.
- 16:30-16:40 Discussion
- 16:40-16:50 An appraisal of the provision of urban infrastructural facilities as a means of realising latent residential property values in Akure, Nigeria - A.E. Nwosu and S.A. Olofa
- 16:50-17:00 Assessment and management of stormwater drainage facilities in residential areas of Enugu city - Kevin Ejike Chukwu and B. O. Uwadiogwu
- 17:00-17:10 Discussion

STREAM 2 (SEMINAR ROOM)

Chairperson Prof G.W.K. Intsiful, KNUST, Kumasi, Ghana

- 14:30-14:40 An examination of the properties of laterite and clay as construction materials for sustainable buildings in Kano and Kaduna metropolis, Nigeria - Muntari Mudi Yar' adua and Aliyu Ahmad Aliyu
- 14:40-14:50 Effect of calcination on oxides composition of Dutsin Dushowa volcanic ash of Jos plateau - James Babatunde Olawuyi
- 14:50-15:00 Discussion
- 15:00-15:10 Optimising Soil-Cement-Ash Stabilisation mix for Maximum Compressive Strength: A Case Study of the Tropical Clay Sub-base Material Stabilised with Cement-Locus Bean Waste Ash - Osinubi K J and Oyelakin M A
- 15:10-15:20 Waste to Wealth: A Study of laterite bricks produced using blended Incinerated corn-cob ash Cement - E.B. Ogunbode and J.A. Apeh
- 15:20-15:30 Discussion

Chairperson Dr Jasper Mbachu, Massey University, New Zealand

- 15:40-15:50 Water hyacinth (eichhornia crassipes) leaves extract as corrosion inhibitor for AISI 1030 steel in sea water - Daniel. T Oloruntoba, Jenny A. Abbas and Sunday J Olusegun
- 15:50-16:00 Effect of used oil on the strength and compressibility behavior of lateritic soil - Ijimdiya, T S and Igboro, T
- 16:00-16:10 Discussion
- 16:10-16:20 Morphing the rules: advanced adaptations of mud in Nigerian buildings - Stephen Babatunde Ajadi
- 16:20-16:30 A comparative study of the potential properties of Nigerian rice husk ash (RHA) blended cement concrete - Mohammed Hassan Nensok , Adefemi Aka and Nasiru Adamu
- 16:30-16:40 Discussion
- 16:40-16:50 Evaluation of the pozzolanic activity of Kajuru pumice tuff as sustainable Cementitious materials for cement blending - D W Dadu, A M Stanley, K S N Gora and P E Ehoche
- 16:50-17:00 Effects of curing conditions on compressive strength development of high strength concrete - A.E. Abalaka and O. G. Okoli
- 17:00-17:10 Discussion

STREAM 3 (SEMINAR ROOM)

Chairperson Dr Henry Alinaitwe, Makerere University, Uganda

- 14:30-14:40 Effect of packing densities of aggregates on the workability and compressive strength of concrete - Chinwuba Arum
- 14:40-14:50 Strength performance of laterized concrete at elevated temperatures - J. A. Apeh and E.O Ogunbode

- 14:50-15:00 Discussion
15:00-15:10 Rational design of concrete mixes using uncrushed aggregates - T. O Alao
15:10-15:20 An evaluation of the concrete production in typical construction sites in Nigeria - Dauda Dahiru and Nasiru Shehu
15:20-15:30 Discussion

Chairperson Prof Winston Shakantu, Nelson Mandela Metropolitan University, South Africa

- 15:40-15:50 Durability characteristics of concrete produced with date seed as light weight aggregate - A Aka, N Adamu and M H Nensok
15:50-16:00 Effect of crude oil impacted sand on the properties of concrete - Wasiu Olabamiji Ajagbe, O A Agbede and B I O Dahunsi
16:00-16:10 Discussion
16:10-16:20 Assessing the structural integrity of existing building structures - A. D. Abdul’Azeez; I. K. Zubairu; D. Dahiru and U. A. Ahmed
16:20-16:30 Wayleaves and spider’s web development patterns in oil and gas pipeline networks - selected cases from Nigeria - Iyenemi Ibimina Kakulu
16:30-16:40 Discussion
16:40-16:50 Assessment of the impact of transportation facilities on the patronage of tourism sites in Ondo State - E. O. Omisore and O. P. Fadoyin
16:50-17:00 A comparative study of maintenance management of tertiary institutions in South Africa and Nigeria - I. A. Jimoh and R. O. Iyagba
17:00-17:10 Discussion

CLOSING SESSION (MAIN AUDITORIUM)

- 17:15-17:25 Conference summary – Dr Roine Leiringer
17:25-17:45 Presentation of certificates and prizes – WABER Team & Micheletti and Co. Ltd.
17:45 **Close and refreshments**

SOCIALISING

- 19:30 Socialising at Sheraton Abuja Hotel
http://www.sheratonabuja.com/?PS=EAME_aa_Starwood_AFIO-343_Google%20UK_sheraton%20abuja_01/12/11

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SECTION 1: KEYNOTES

THE BUSINESS OF CONSTRUCTION PROCUREMENT: SELECTING, DEFINING AND MANAGING PROCUREMENT

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INSTITUTIONAL PERSPECTIVES

At one level, procurement means buying – or even more simply, obtaining something. Most organizations of any size seem to have a procurement department to manage the purchasing of the supplies required in the day-to-day business. The purchasing of things other than raw materials and means of production is sometimes referred to as indirect procurement in the business literature. Construction procurement seems to be a special case of indirect procurement when it comes to commercial clients, for example. It is rarely mentioned in the literature on purchasing and supply. However, it is difficult to see whether it is a means of production or an indirect supply, because it does not fit into either of the definitions. It has successfully been described by some researchers as the procurement of a complex system, which may help to offer insights from the procurement of other types of complex systems, such as defence and IT. One thing is clear – it is difficult to characterize construction procurement unambiguously.

There are some important characteristics that explain why construction is difficult to deal with. First, it is organizationally very complex, involving hundreds of specialized contractors, sub-contractors, consultants and advisors, as illustrated in an in-depth analysis of roles and responsibilities in construction projects (Hughes and Murdoch 2001). Second, construction projects are large and expensive, typically representing a significant part of the buyer's and seller's annual turnover. This makes the risks of non-performance very hazardous indeed, with potential losses being sufficiently large to bankrupt the contractor or the client. Third, construction projects typically occupy years, with the need for extensive professional work prior to design, during design and in parallel with construction. It is not unusual for construction projects to extend over more than a decade from inception to completion. Finally, the high degree of specialization in design disciplines and construction disciplines leads to serious fragmentation of the process, with highly differentiated tasks being carried out in different firms, locations and times creating a strong demand for very sophisticated project management and co-ordination functions. Thus, construction can be thought of as a complex, expensive, time-consuming, fragmented process.

Typically, there are many different institutions and organizations who each have different views about how various participants might or should become involved in the process. One question that is raised by this phenomenon is whose interests are served by professional institutions (Hughes 2003)?

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FRAGMENTED SUPPLY CHAINS

Construction supply chains are fragmented in many ways, for different reasons. In each construction project, various roles are offered by particular specialists:

- developers (owners, investors)
- design consultants (architects, engineers)
- advisory consultants (quantity surveyors, lawyers)
- co-ordination and management (contractors, project managers)
- installation (trade contractors, sub-contractors)
- manufacture (materials and components)

Understanding how these have evolved in different countries at different times is key to understanding construction procurement. For example, Figure 1 shows how the role of the architect in UK building projects has become an overarching co-ordinating role of many distinct specialisms.

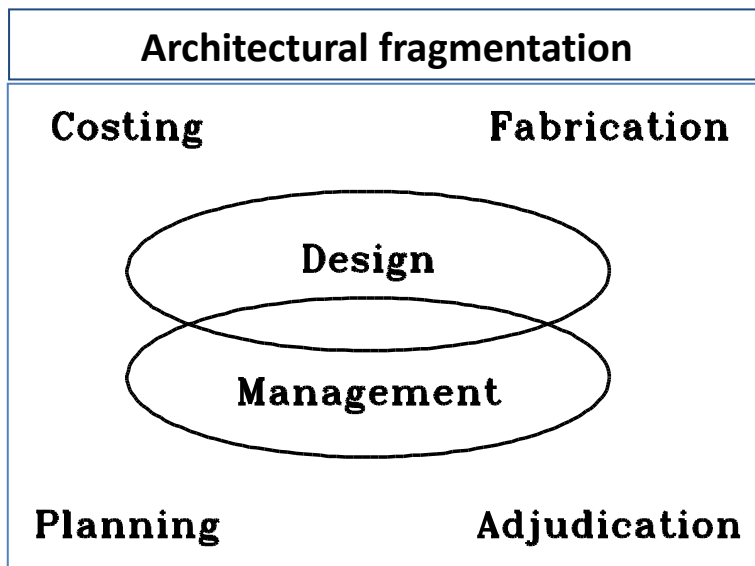


Figure 1: An example of how a historically unitary role evolved into a number of distinct specialist roles

IMPROVING CONSTRUCTION SUPPLY CHAINS

Much has been written about supply chains – but what do they look like? Figure 2 shows how we might characterize the different organizations involved in delivering a single product from raw materials to end user. The solid lines show contractual or legal relationships and the broken lines indicated part of the agenda for those who wish to improve supply chains.

By contracts, Figure 3 shows a real supply chain mapped from a construction project as part of the research carried out in Reading about procurement and market-supply relationships in the construction sector.

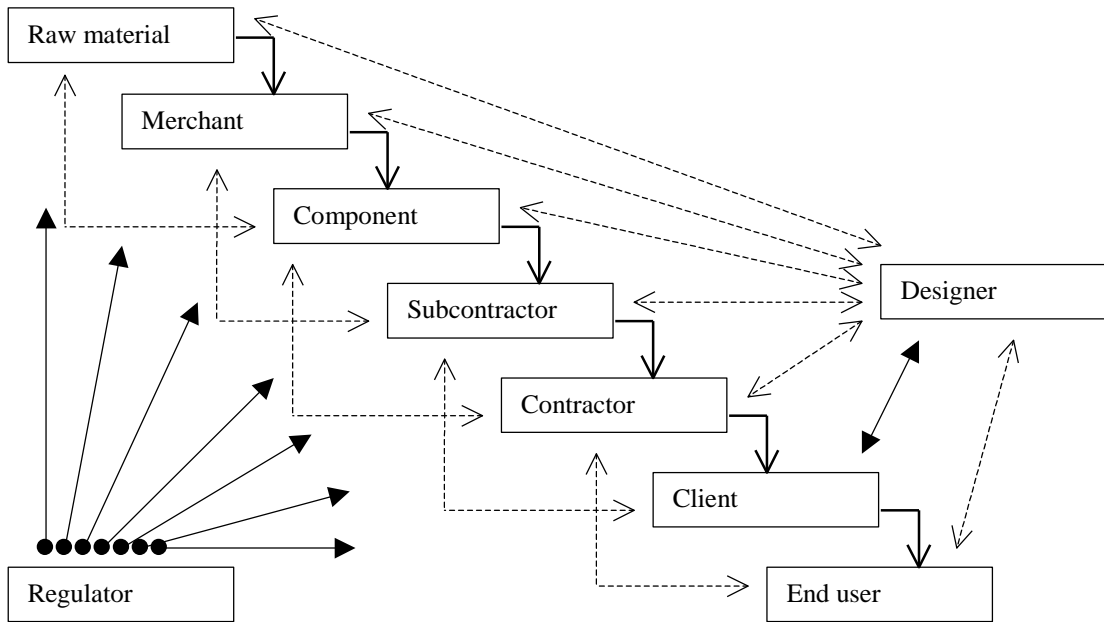


Figure 2: An idealized supply chain concept map

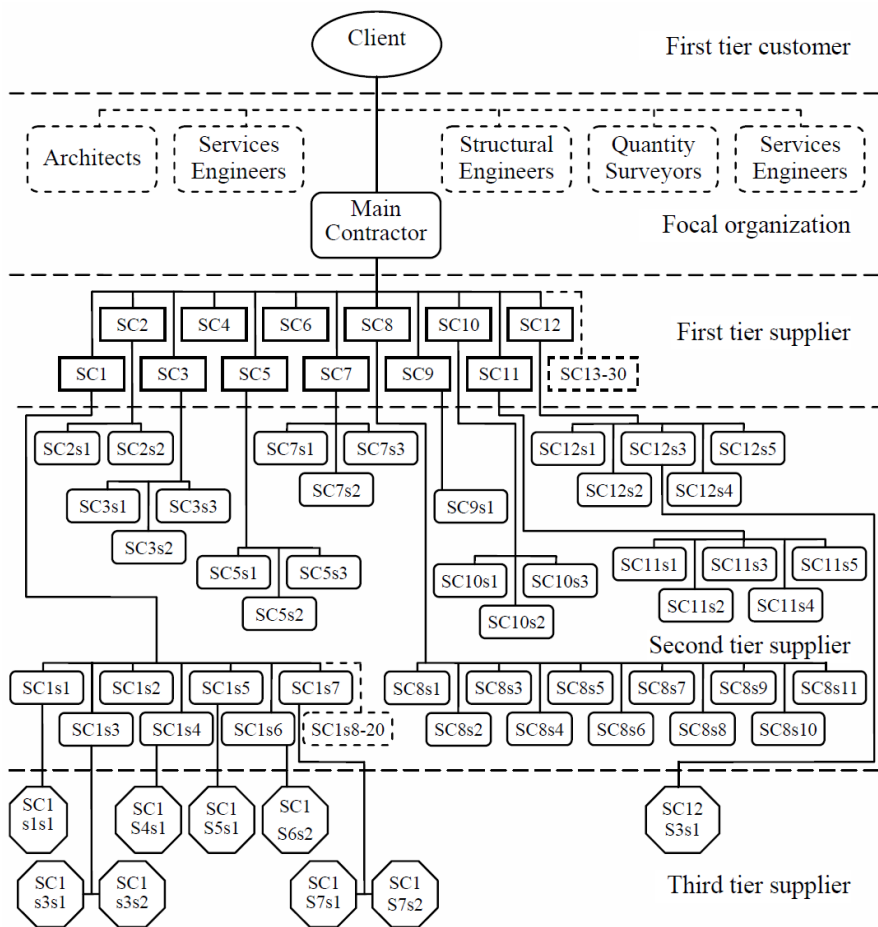


Figure 3: A supply chain from a case study project in the UK

CONSTRUCTION PROCUREMENT ISSUES

The transformation and development of construction procurement raise a series of issues that were discussed in an essay regarding the future of the built environment professions (Hughes 2003), as summarized in this list:

- Institutionalism or professionalism?
- Managerialism or public service?
- Knowledge or judgement?
- Capital acquisition or service rental?
- Partnering or integration?
- Customization or original design?
- Product/service development or cutting corners?
- Supply-side or demand-side innovation?

CONSTRUCTION PROCUREMENT ROUTES: INSTITUTIONAL VIEW

Most descriptions of construction procurement tend to focus on the roles of the key supply chain partners. Any construction audience would recognize most of the terms in this list:

- General contracting
- Design-build
- Construction management
- Management contracting
- Partnering
- Private finance initiative (*design, build, finance, operate*)
- Engineer, procure and construct
- Performance-based contracting

The key thing about this list is that it has little meaning out of the construction sector context. You need to understand how the industry currently works in order to make sense of this list. Worse, each item differs from the others on a unique basis. They are not at the same level of focus, and are not exclusive categories. Therefore, the list could be extended indefinitely.

WHAT IS CONSTRUCTION PROCUREMENT?

Thus, the question is how can we distinguish types of procurement with a few key variables? What are the minimum necessary and sufficient characteristics or variables that could usefully describe any procurement method? (Even those that have not yet been invented!)

Some years ago, Masterman (1992) among others, pointed out that the typical process for selecting a procurement method is so unstructured and haphazard as to lead to

inappropriate approaches to procurement being selected. This problem has been echoed more recently by many writers on the topic.

Luu, Ng and Chen (2003) suggest that the problem of inappropriate procurement decision can be overcome by using a common list of 34 procurement selection parameters that were derived from a close examination of previous research papers in this field. A survey of 84 practitioners provided them with some reflections on their list, and analysis of the results enabled them to trim their list to 25 parameters. In a later paper (2005), they develop this into a decision support tool using case-based reasoning. Drawing on 14 previously published papers, they categorize, group and filter a large number of procurement selection criteria. From their work it would seem that every writer in this topic develops his or her own set of criteria. Their proposal for a decision-support system using case-based reasoning may produce an answer to the question, which procurement system, based on what has worked in the past. But rather than enter data into such a system, surely, it would be better to help people to understand how to put together a procurement strategy?

CONSTRUCTION PROCUREMENT ROUTES: FUNCTIONAL VIEW

Rather than try to create a set of procurement methods that overlap, describe different levels of analysis and heap confusion on to confusion, the functional view begins with the questions that a client might ask when considering how best to organize the process. The following list delineates the basic six variables that arise from an analysis of the wide range of procurement routes in existence, giving example of each variable in turn.

- **Source of funding:** Owner-financed, public sector-financed, developer-financed, PFI, PPP
- **Selection method:** Negotiation, partnering, frameworks, selective competition, open competition
- **Price basis:** Work and materials as in bill of quantities (approx or full), whole building, managed facility, performance
- **Responsibility for design:** Architect, engineer, contractor, novation, in-house design teams
- **Responsibility for management:** Client, lead designer, principal contractor, management contractor, JV
- **Supply chain integration:** single-source, integrated, fragmented, competitive, collaborative

This list provides five examples for each of six variables, explains the complexity of procurement more generally, such that anyone who is familiar with business could understand the options, without needing a BSc in a construction-related discipline. Moreover, there are 15,625 permutations of the items in this list. This explains a lot of different procurement routes in a little space!

ROUTINES AND STANDARDS

Traditionally in construction, routines and standards have been institutional and fundamentally protectionist often designed to ensure continuing workload for professionals. However, the collaborative working agenda has driven interest groups

together, outside traditional stakeholder boundaries. As a result, all of the various guidance documents have started to converge on a widely accepted understanding of what constitutes good business practice in construction. Thus, codes of practice and standards are emerging for processes rather than for products. Two examples follow:

ISO 10845: CONSTRUCTION PROCUREMENT

- **Fair:** Impartial and providing simultaneous and timely information. Not prejudicing interests of the parties.
- **Equitable:** Non-award to a compliant bidder only if restrictions from doing business, incapability or incapacity, legality, conflicts of interest.
- **Transparent:** Procurement process and criteria publicized. Decisions publicly available with reasons, and verifiable.
- **Competitive:** System provides for appropriate competition to ensure cost-effective and best value outcomes.
- **Cost-effective:** Processes standard with flexibility to attain best value outcomes in respect of quality, timing and price.
- **Promotion of other objectives:** (SMEs, poverty, job creation, local economic development, etc) permit qualified tenders, criteria measurable, quantifiable and monitored.

BS 8534: CONSTRUCTION PROCUREMENT POLICIES, STRATEGIES AND PROCEDURES – CODE OF PRACTICE

- **Procurement policy** (cross-ref to ISO 10845)
- **Initiation:** business need, roles, responsibilities, objectives, outcomes, scope, stakeholder identification...
- **Procurement strategy:** client brief, procurement routes, work packages, market engagement, control, approvals...
- **Procurement tactics:** contracts, selection, liability, pre-quals, award, performance, progress, evaluation ...
- **Exit strategies:** discharging contractual obligations, settling disputes, signing off, moving on ...

CONCLUSIONS – AGENDA FOR RESEARCH

This outline of problem areas in construction procurement provides an interesting agenda for future research, which may be a healthy testing ground for theories about business economics and organizational behaviour, among other things. For example:

- Construction procurement as a complex process
- What features does construction procurement share with other forms of complex procurement like defence and IT?
- How does the business context of construction help us to understand processes?
- Do routines and standards provide a rational and economic response to complexity?

- Can flexibility and standardization co-exist?
- How does the value of constructed assets affect the ability of the supply chain to innovate collaboratively?

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THE IMPORTANCE OF EVALUATION AND SUSTAINABILITY IN THE BUILT ENVIRONMENT

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It is with great pleasure that I welcome participants to the 4th WABER conference which is taking place in Nigeria for the first time. Nigerians are known for their hospitality so we aim to make you feel at home. In this keynote address, I would like to focus on some aspects of the built environment that I feel deserve the attention of researchers. The first is the importance of evaluating buildings after they have been occupied and this is called Post-Occupancy Evaluation. The second is the very topical issue of sustainable buildings.

Keywords: post-occupancy evaluation, sustainability, sustainable buildings

POST-OCCUPANCY EVALUATION

Buildings are an important necessity to provide for human needs for shelter and support for operations and equipment. Therefore by understanding how existing buildings affect occupants, designers can minimise problems and capitalise on successful design features. Evaluation and feedback are known to be cornerstones for the continuous improvement in building procurement. Thus, for an effective feedback system there is a need for Post Occupancy Evaluation (POE). Post Occupancy Evaluation involves systematic evaluation of opinion about buildings in use, through careful analysis of buildings from all relevant viewpoints, particularly the users of the buildings. It is equally a tool used by facilities managers to account for building quality, most especially when planning refurbishment of existing buildings. It helps clarify perceived strengths and weaknesses in order to focus resources where they are needed.

From past researches carried out (Brill, Wilson and Decker, 1984; Ellis, 1988; Wolfgang, Harvey and Edward, 1988; Van Wagenberg, 1989; Zubairu and Olagunju, 2003), the participation by the users has been found to generate greater commitment to solutions and more willingness of users/owners to accept shortcomings. Consequently, POE of existing buildings involves relevant groups such as architects, engineers, estate surveyors, developers, manufacturers but predominantly users. There is growing global desire to assess and investigate performance of buildings after being occupied due to its enormous influence on the occupants' health, safety, performance in the workplace and stakeholders' needs.

THE PROCESS OF POST-OCCUPANCY EVALUATION

Post-occupancy Evaluation is a method of measuring the performance of a building in use, with respect to the brief, the goals of the design team, and the activities and feelings of the users (Van Wagenberg, 1989; Zubairu, 2006). The building's

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occupants evaluate the suitability of the building to meet their particular needs (Barrett, 1995). The term Post Occupancy Evaluation (POE) was coined over 25 years ago and comprises all activities that originate out of an interest in learning how a building performs once it is built and occupied, including if and how well it has met expectations and how satisfied building users are with the environment that has been created. Precisely, Post Occupancy Evaluation involves systematic evaluation of opinions about buildings in use, from the perspective of the people who use them. Preiser, Rabinowitz and White (1988) further defined POE as a process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time. Many actors participate in the use of buildings, they include investors, owners, operators, maintenance staff, and perhaps most important of all, the end users. Post Occupancy Evaluation (POE) differs significantly from conventional surveys and market research. It uses the direct, unmediated experiences of building users as the basis for evaluating how a building works for its intended purpose.

There are three levels of POE: Indicative, investigative and diagnostic. The indicative POE is the first level carried out in a short period of time to determine whether there are serious problems in the building. The next level is the investigative POE which is carried out after an indicative POE has identified issues that need further investigation. The third level is the diagnostic POE which may take from several months to a year and the results are long-term oriented to improve not only a particular facility but also the state of the art in a given building type.

Post occupancy evaluation involves measuring the suitability and convenience of facilities through the following:

- (i) Systematic consideration of opinions of users about buildings in use
- (ii) Onsite inspection of existing infrastructure
- (iii) Prescribing possible means of improvement of these facilities

Equally, POEs are used for many purposes including;

- (a) Developing new facilities
- (b) Managing and improving on existing buildings
- (c) Establishing better building and maintenance standards.

In conclusion, as in every endeavour in life, it is important for one to stop, look back and assess or evaluate his or her performance over a period of time, it is necessary to evaluate buildings to determine their strengths and weaknesses. All buildings are substantial investments and their effective functioning is often critical to success of businesses in office environments, while the safety and comfort of users is critical to optimum performance by the users. Therefore the importance of Post-occupancy evaluation in the area of research in the built environment cannot be overemphasised.

The next topic I want to briefly discuss is sustainable buildings.

SUSTAINABLE BUILDINGS

One of the Millennium Development Goals (MDGs) is to ensure environmental sustainability. In the building construction sector, most often the environment is adversely affected – trees are cut down, bushes and grasses are cleared, soils are excavated, and the construction process generates air and noise pollution (Gonchar, 2007; Jimoh and Banuso, 2008). Raw materials extraction for building, leads to depletion of natural resources which are often not replenished. Decisions made at the drawing board stage have long-term environmental consequences. Building professionals, as the designers of buildings, have to be aware of the importance of the design of sustainable buildings. Sustainable buildings are buildings which are

environmentally friendly, that is, buildings which have minimal adverse effect on the environment, utilizing renewable sources of energy and as much of re-cycled materials as possible. Passive use of solar and wind energy can be achieved if the building is properly designed and oriented. With the poor power generation and distribution in Nigeria, the design of energy efficient buildings becomes even more imperative. This can also be achieved in sustainable buildings (Zubairu, 2009).

The average Nigerian is not aware of the importance of sustaining the environment. This lack of awareness needs to be addressed in universities where both lecturers and students need to be made more conscious of the dire need for sustainability of the environment.

WHAT ARE SUSTAINABLE BUILDING MATERIALS?

Sustainable building materials, also known as ‘green’ or environmentally friendly building materials, are materials which can be easily replenished or re-cycled, have lower toxicity and higher energy efficiency. Building construction consumes 40% of the raw stone, gravel and sand used globally each year; it consumes 25% of the wood, 40% of energy and 16% of water used worldwide (Rodman and Lenssen, 1995). Timber for example, is a common and frequently used building material. As trees are cut down to provide timber for building and other purposes, are new trees being planted to replace those cut down? Building professionals have a responsibility to ensure that the materials we specify are environmentally friendly or sustainable. This knowledge must be imparted to students of environmental sciences so that it becomes a basic part of their thinking process.

Building professionals may ask what attributes make a building material sustainable? How can environmental sustainability of a building material be measured? This is where research institutions like universities and research centres come in. Such important issues require in depth and continuous research.

Research into sustainable building materials was carried out by Dr Jong-Jin Kim and his research team from the University of Michigan in the United States of America. They determined that the presence of one or more of the following features would help in determining a building material’s relative sustainability (Kim, Rigdon and Graves, 1998):

Pre-building Phase: Manufacture

1. Waste Reduction
2. Pollution Prevention
3. Recycled Content
4. Embodied Energy Reduction
5. Use of Natural Materials

Building Phase: Use

1. Energy Efficiency
2. Water Resistance
3. Use of non- or less-toxic Materials
4. Renewable Energy Systems
5. Longer Life

Post-building Phase – Disposal

1. Biodegradability
2. Recyclability
3. Reusability

The survey results indicated that positive gains have been made in the production of sustainable building materials but less emphasis has been given to the post-building stage i.e. how degradable is the building material, can it be re-cycled or re-used after the building has exhausted its life span? These are questions which building professionals also need to look into.

RESEARCH AND TEACHING OF ENVIRONMENTAL SUSTAINABILITY IN ARCHITECTURE

Dr Kim also carried out a survey of architectural educators to determine the extent of environmental education in the field. The survey involved all accredited schools of Architecture in the United States and Canada. The results indicated that there was a significant shortage of teaching materials designed specifically for sustainable architecture.

I have carried out a survey of schools of Architecture in Nigeria (Zubairu, 2007) and have discovered that there is no school of Architecture with an environmental laboratory to enable staff and students to carry out various tests on building materials to ascertain their environmental sustainability. Some departments of Building have laboratories but they focus more on concrete tests such as slump test and crushing tests for bricks and sandcrete blocks. Research students in Architecture and Building should be able to subject natural materials such as timber to various tests to determine its behaviour under specific environmental conditions in specific parts of the country.

What is the anticipated life span of for example, a brick building exposed to constant harmattan dust as opposed to such a building in the Niger Delta area of Nigeria? These are the types of experiments that can be conducted and the results will enable researchers to produce a compendium of sustainable building materials indicating the life spans of various building materials under different environmental conditions. Recycling tests can also be carried out as well as biodegradability tests. From the results of such experiments, the possible innovations in material use are numerous.

CONCLUSION

Sustaining the environment in which we live is very crucial to the survival of man on this planet. Every individual must be an active participant in ensuring this sustainability. Building professionals, as active participants in the built environment, are expected to lead the way in this global concern. Research into sustainable building materials and sustainable buildings should be accorded the importance it deserves. Adequate funding is essential and research institutions in West Africa should initiate an aggressive drive to seek for funds to facilitate the research process. Researchers should make environmental sustainability an integral part of their thinking process; this process should be continued in practice so that every building professional will focus on sustainability in the construction industry.

On this note, I wish all the participants at this conference a very fruitful discourse and it is my hope that the final research findings of these scholars will result in improvements in the quality of the built environment in West Africa in particular and the whole world in general.

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SECTION 2: CONFERENCE PAPERS

EFFECTS OF CURING CONDITIONS ON COMPRESSIVE STRENGTH DEVELOPMENT OF HIGH STRENGTH CONCRETE

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Compressive strength development of high strength concrete (HSC) cubes cured in water and ambient air (uncured) were investigated at different ages and free water/cement (w/c) ratio of 0.35, 0.45 and 0.55. In both conditions, the results show substantial compressive strength decrease of cube specimens with increase in free w/c ratio at all the ages tested. Compressive strength decreases were recorded for all the ages tested for uncured specimens compared to water cured specimens at w/c ratio of 0.35. The maximum compressive strength decrease recorded for uncured cubes was 26.28% lower than water cured cubes at 28 days at free w/c ratio of 0.35. The results show that wet curing is very important in compressive strength development of concrete and the absence of wet curing would result in substantial compressive strength reduction.

Keywords: compressive strength, curing, hydration

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ASSESSING THE STRUCTURAL INTEGRITY OF EXISTING BUILDING STRUCTURES

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Generally building structures are often exposed to several factors that lead to their decay. It is therefore necessary to periodically establish their integrity, safety and reliability in order to ensure their serviceability. Thus, this paper presents the results of condition assessment of selected building structures in Ahmadu Bello University, Zaria, Nigeria with a view to establishing structural adequacy, safety and reliability. Visual inspection and detailed condition assessment to obtain general information of the buildings and structural defects, damages, distress, deformation and/or material deterioration was carried using some of the non-destructive test (NTD) techniques. A total of eight buildings were considered and in each building three structural elements (each) namely columns, beams and slabs were studied. Results show that although deterioration was observed which was mainly due to environmental factors, and lack of regular maintenance. The result of the study shows that all the buildings examined have a mean compressive strength, ranging between 51N/mm² and 57.3N/mm², which is well over and above the minimum provided by British Standards of 21N/mm². This is very important in view of the fact that emphasis is made on sustainability in almost all development activities. Thus, this research would enable authorities/management to take an informed decision of maintaining these structures, instead of demolishing them. It also enables users of such buildings to have rest of mind – that the structural integrity of the buildings are, indeed, intact; as such, no need for apprehension.

Keywords: building structure, non-destructive test, structural integrity

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PERCEPTION OF EDUCATORS AND PRACTITIONERS ON THE RELEVANCE OF ARCHITECTURAL CURRICULUM OF NIGERIAN UNIVERSITIES TO THE BUILDING INDUSTRY

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Architectural educators and practitioners have on different occasions questioned the relevance of architectural curriculum used by the Nigerian schools of architecture to the building industry. The main aim of this study is therefore to assess the perception of the educators on the relevance of the architectural curriculum to the Nigerian Building industry. In order to achieve this aim Survey research method was employed. A total of 322 questionnaires were administered on lecturers, lecturer-practitioners and practitioners, out of which 277 (86%) were returned/retrieved. Based on the total responses, 63% of respondents are of the opinion that the current curriculum as taught by the schools of architecture is still relevant to the needs of the building industry, while 37% responded in the negative. Areas like ICT, Management and Entrepreneurship have been identified as some of the areas for improvement in the architectural curriculum. Finally, some of the recommendations made are that i) the National Universities Commission (NUC) in conjunction with the Nigerian Institute of Architects (NIA)/ Architects Registration Council of Nigeria (ARCON) should use the study findings as a guide in improving the architectural curriculum and; ii) the government should provide adequate funding to facilitate beeping up the existing human and material resources for the effective implementation of the improved curriculum in order to facilitate the continued relevance of the architectural curriculum to the Nigerian building industry.

Keywords: architectural curriculum, building industry, educator, perception, practitioner

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INVESTIGATING THE PRACTICE OF CASH FLOW FORECASTING BY CONTRACTORS IN NIGERIA

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Previous researches have shown that delayed payment is one of the major reasons for abandonment of construction projects in Nigeria. Despite this, there is a dearth of literature on the practice of cash flow forecasting, a fundamental step in curtailing delayed payment, by Contractors in Nigeria. This report is a pilot study that will form part of a larger on-going research seeking to develop a cash flow forecasting model suitable for use by contractors in Nigeria. The study was undertaken to investigate cash flow forecasting practices by construction contractors in Nigeria. A qualitative approach was used for this purpose. Contractors engaged by the Central Bank of Nigeria (CBN) were interviewed for the purpose of the study. The study revealed that the practice of cash flow forecasting depends on the contractors' background. Indigenous contractors do not have a formal practice while semi-indigenous contractors and multinational corporations practice formal cash flow forecasting even if not in conformity with existing literature.

Keywords: cash flow, forecast, Nigeria

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ASSESSMENT OF DEVELOPMENT OF TECHNICIANS/TECHNOLOGISTS IN THE BUILT ENVIRONMENT DISCIPLINES IN NIGERIA

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This research work evaluates the development of technicians/technologists for the built environment disciplines in Nigeria. It carried out a comprehensive review of development of National and Higher National Diploma products in the built environment disciplines in Nigeria with particular reference to the military era from 1993 to 2000. Two methods were used in collecting the data used for the analysis. The first part involved the data collected from the records of National Board for Technical Education (NBTE) headquarters, Kaduna. It consists of output by programme from 1993 to 2000. The second part involved the use of questionnaires to obtain information from the graduates who are now in various areas and the employers and the teachers. From the study it was revealed that 32% of the technicians/technologists handle projects under little or no supervision while 54% under medium supervision and 12% with strict supervision. It was also reported that at least 80.6% of the ND and HND graduates who work as technicians and technologists have fairly good theoretical background. 90% percent of the lecturers opined that reports received on employers' rating of diplomats from the industry confirmed the performance of their products to be good. It is recommended that more improvement in the area of provision for learning facilities in the polytechnics be made to enable more practical works to be carried out in the institutions during the period of study.

Keywords: built environment, discipline, professional, technologists

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MULTI-SKILLING BARRIERS IN THE CONSTRUCTION INDUSTRY IN NORTH-WESTERN NIGERIA

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The need to improve productivity and cost effectiveness has made some companies to adopt a multi-skilling labour strategy where workers can work across their traditional occupational boundaries. The study assessed the problems and barriers of multi-skilling using a cross-sectional survey of construction workers in some selected cities in north-western Nigeria. Descriptive statistics was used in the analysis. Results show that lack of training and limit on human skill retention by workers are among the major barriers of multi-skilling. It was concluded that multi-skilling can lead to improved productivity and cost effectiveness if these barriers are minimised. It was recommended that construction companies should provide adequate training for their workers so that they can be multi-skilled.

Keywords: construction industry, multi-skilling, productivity

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EVALUATION OF INVOLVEMENT OF BUILT ENVIRONMENT PROFESSIONALS IN HOUSING TRANSFORMATION PROCESSES IN THREE GOVERNMENT HOUSING ESTATES IN SOUTH-WESTERN, NIGERIA

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Residential buildings in government estates in Nigeria are often transformed by addition of structures or modifications of existing spaces, since these buildings do not in most cases conform to the expectations of occupants. Residential buildings were often built without consultations with the end-users, who usually indulge in transforming the houses. This paper discusses the level of involvement of Built Environment Professionals (Architect, Engineers, Quantity Surveyors and Town Planners) in Housing transformation process in three government estates. The three oldest estates in three out of the six states that make up of South-Western, Nigeria were selected for the study. Data for the study was collected through structured questionnaires administered on 87 built environment professionals. Variables investigated include:- design, construction and management of transformed buildings, finding solutions to problems encountered; rating of aesthetic standards and quantifying transformed buildings. Results from the survey were analyzed using descriptive statistics. Findings indicated that one out of every four of the respondents (22.98%) carried out the construction of transformed buildings, while one out of every three of the respondents (27.58%) carried out design of transformed buildings. 94.2% rated aesthetic standard after transformation processes as Good/Very Good. 51.7% of the problems encountered were found to be inadequate cash flow while delay of approval of drawings was identified as a major problem (26.4%). This is against a prior that lack of cash flow will be the most prominent problem. The need to address the causes of delay of approval of drawings is one major recommendation emphasized in the study

Keywords: built environment professional, housing transformation, aesthetic standard

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SLUM DEVELOPMENT IN 3RD WORLD COUNTRIES: CAUSES, EFFECT AND WAY OUT. A CASE STUDY OF IBADAN SOUTH EAST LOCAL GOVERNMENT, NIGERIA

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Slums and squatting areas accommodate the majority of the population of cities in developing countries and it is estimated to be home to over 800million people, which is predicted by the UN-Habitat (2003) to grow to between 1 and 2 billion by 2020. This case of slum development is not alien to Nigeria. This study considers the case of Ibadan Metropolis. The major factors as discovered, contributing to slum development include rural-urban migration, unplanned neighborhood, over-population, non-compliance with laid down rules and illiteracy. The resultant effects of this are overcrowding, outbreak of diseases, loss of man hours, insecurity of life, and decline in property values amongst others. To get out of this web which keeps entangling us like a vicious cycle, the government at all levels have a major role to play by providing and implementing enabling laws and regulations, improving waste disposal, drainage and sanitary system as well as implement urban renewal.

Keywords: cause, development, effect, Ibadan, slum

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EXAMINING THE EFFECT OF QUALITY MANAGEMENT PRACTICES USED ON CONSTRUCTION PROJECT PERFORMANCE

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The paper investigates the quality management practices used on construction sites in Nigeria. The paper examines whether the quality management practice used by contractors during the project execution phase has any significant relationship with the level of satisfaction of construction professionals and the client in the project delivered. The rationale for the examination stems from concerns raised by public and private institutions in Nigeria over the construction of poor quality buildings; spike in the incidences of building collapse and fears for end-users' safety. The paper proposes a framework of quality management practices that will lead to higher levels of satisfaction by construction professionals and clients in the building projects delivered.

Keywords: building collapse, contractors, management, quality and satisfaction.

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ANALYSIS OF SPATIAL TYPES AND SOCIAL SPACE IN ILE-IFE DOMESTIC ARCHITECTURE

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This paper focuses on the diachronic development of spatial morphologies in Yoruba domestic architecture (SW Nigeria) and the social rules implicit in domestic space use, utilizing data about the households, and activity and object locations. The results presented revolve around how activities (and objects) 'spill over' designated boundaries within the domestic space, the impact of activities and objects on the specialized or non-specialized use of space, and the intensity of focus on each space label as the conventional location for activities and objects. Six spatial types were identified, and a 'core' set of function/space labels was found in each type, although these have 'expanded' in the newer types, partly in response to new connotations of privacy. Many activities and objects were consistently shown to have flexible boundaries, thereby having an effect on space specialization. Newer geometric types were characterized by slightly increased specialized use of certain space labels (although the prevalent pattern was non-specialization), and a modest reduction in the degree of extensibility, and intensity of focus. The study demonstrated that there are stronger points of continuity than difference between the spatial types.

Keywords: architecture, Ile-Ife, social space, spatial, domestic

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ASSESSMENT OF CONTRACTORS' COST CONTROL PRACTICES IN METROPOLITAN LAGOS

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A survey was conducted on probabilistically determined seventy medium sized indigenous contracting organizations in metropolitan Lagos with specific objective of assessing the degree of effectiveness of their cost control practices. Data were collected from the contracting organizations' quantity surveyors. Systematic sampling method was used while sample size of seventy was determined using Nwanna (1981) proposition that if a population is in few hundreds, forty percent or more could serve as a good sample. Data analysis was executed using descriptive statistical and relative importance index. The result showed that the majority of the contractors applied the use of cost control mechanics in their management of construction works but the benefits were not being felt on their overall performance due to the poor implementation of those methods. It is recommended that the contractors should annex the opportunities of the information technology in their cost control practices.

Keywords: budgeting, cost control, post contract stage, cost monitoring

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CLIENT PERSPECTIVE FOR THE IMPLEMENTATION OF LEAN CONSTRUCTION IN NIGERIAN CONSTRUCTION INDUSTRY

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The concept of lean construction offers very valuable techniques that can be used to successfully manage construction in terms of workflow processes and waste minimization and it is already being practised in some developed and developing countries like the UK, US, Germany, Australia and Singapore etc. Lean construction was developed from lean production system where it accounted for huge successes in the manufacturing industry. This paper however, examines the level of client awareness and their perspective of this relatively new paradigm 'Lean'. The paper also discusses the potential and measureable benefits of 'Lean' in the Nigerian construction industry – an industry which is currently characterised by delays in project completion, cost overruns and poor quality work. The findings from this review paper reveal the level to which clients within the industry perceive 'lean' or are even aware of the lean principles. However, the main idea behind the lean concept is to maximise the client value whilst minimizing waste within the processes. This review paper forms part of an on-going PhD research and it is on this basis that further research on this topic is being proposed.

Keywords: client, industry, lean construction, waste minimization, work flow

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AN EXPLORATION OF THE USE OF DELPHI METHODOLOGY IN HOUSING SATISFACTION STUDIES

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The Delphi technique has become generally accepted in the past decade by a broad range of institutions, government departments, and policy research organizations. The Delphi method was originally developed in the 50s by the RAND Corporation after a series of studies in Santa Monica, California. This approach consists of a survey conducted in two or more rounds and affords the participants in the second round with the results of the first so that they can alter the original assessments if they want to - or stick to their previous opinion. It is commonly presumed that the method makes better use of group interaction whereby the questionnaire is the medium of interaction. The Delphi method is especially useful for long-range forecasting, as expert opinions are the only source of information available. The objective of this paper is to outline how the Delphi technique process was used to predict and to understand issues encircling housing satisfaction in South Africa low-income housing. The paper objective is based on the premise that the technique has never been used to study housing satisfaction amongst the low income group in South Africa despite the numerous empirical studies that has been conducted; hence the framework. This is because the Delphi approach solicits expert's view on subjects surrounded with confusion. The methodological approach adopted for the study was a content analysis of published peer reviewed journal articles with regards to the use of the techniques in housing studies. The Delphi technique is discussed because it is an approved and credible research technique which helps to overcome experts' disagreement with issues.

Keywords: Delphi technique, methodology, housing studies, low-income housing

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MORPHING THE RULES: ADVANCED ADAPTATIONS OF MUD IN NIGERIAN BUILDINGS

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Mud is a ubiquitous building material in Nigeria, perhaps this is the reason why it is hardly seen as the outright building material that it is. The most popular contribution of mud to Nigerian architecture can only be seen in the ancient traditional huts all over the country. Although still a building material in the suburbs of the country, mud is seen as a relic of the past, a symbol of a primitive tale of Nigerian building construction. The primary effort here is to redefine mud as a 'skin' with infinite possibilities of imagery and texture, rather than its typical application as a wall in Nigerian architecture. Mud is attempted to be expressed via a new geometric vocabulary by re-evaluating its surreptitious properties including its ability to behave like a formally defined NURBS² surface. The properties of mud and clay are unconventionally simulated in computer modelling and analysis software to understand the ways in which it can be optimized for advanced building applications. Streamlined calculations and algorithmic calculations serve as tools to discover the NURBS-propensity of Mud. This provides a whole new low-cost construction opportunity for the building of irregularly flowing structures.

Keywords: morph, mud, skin, spline, texture

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² NURBS - Non Uniform Rational Basis Spline

EFFECT OF CRUDE OIL IMPACTED SAND ON THE PROPERTIES OF CONCRETE

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This study investigates the effect of Crude Oil Impacted Sand (COIS) on some engineering properties of fresh and hardened concrete. Total Petroleum Hydrocarbon (TPH) test was carried out on samples from the study area to determine the level of crude oil contamination. Based on the test results, six levels (2.5%, 5%, 10%, 15%, 20% and 25%) of artificial contaminated sand were prepared and engineering properties including slump, compacting-factor, flow-table, compressive-strength, flexural-strength, water-absorption, linear-shrinkage, surface-resistivity, and fire-resistance were determined using standard methods. Predictive models were developed and concrete mixes were designed using COIS for reinforced concrete structures. TPH of the soil samples varied from 8.6 to 14.1%. The slump, compacting-factor, flow-table, and surface-resistivity of the COIS concrete increased with levels of contamination. Compressive-strength, flexural-strength, shrinkage, water-absorption and fire-resistance of the COIS concrete reduced with increased level of contamination. Coefficient of determination, R^2 , of the models ranged from 0.823 to 0.998. Mix ratio of 1: 1.6 : 2.4 of cement : COIS: coarse aggregate was found to be appropriate at 0.45 w/c. The Crude Oil Impacted Sand concrete with not more than 10% contamination is suitable for use in low strength structures.

Keywords: crude oil, contaminated sand, concrete, compressive strength, durability

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SUSTAINABLE HOUSING DEVELOPMENT AND COMMUNAL PROVISION OF INFRASTRUCTURES IN ASUWAMO RESIDENTIAL ESTATE AKURE, NIGERIA

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The provision of adequate housing to the citizenry has been a major challenge to governments in both developed and developing nations of the world. Housing is a combination of characteristics for the purpose of providing a unique home within a given neighbourhood, thus, it is an array of economic, social and psychological phenomenon. This paper examines the development of housing units in a residential neighbourhood in Akure, Nigeria and the provision of infrastructures with a view to ascertaining the sustainability of the housing environment. Questionnaires were administered in 40% of the houses in the Estate to 63 homeowners using systematic random sampling technique. The study revealed that for housing development to be sustainable, basic infrastructures such as electricity, water supply and waste disposal system had to be put in place. Considering the different models against which to measure the sustainability of the housing environment, there is still a lot to be achieved in the study area in the provision of basic infrastructures. The study recommends that the communal efforts in infrastructural provision need to be enhanced by the government by planning ahead for the adequate provision of infrastructures as the city grows.

Keywords: Akure, community development, housing development, infrastructure, sustainable home

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IMPACT OF RISK ON PERFORMANCE OF DESIGN AND BUILD PROJECTS IN LAGOS STATE, NIGERIA

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Design and Build procurement method was first developed in 1960, but is now a common and preferred procurement method used for complex construction projects in Nigeria by developers in order to minimize risk especially when such projects involved numerous parties and organisation. It shows that despite the advantages of this method of procurement there are numerous risks been involved, hence this study intends to identify the risk inherent in design and build and evaluate the impact of the identified risks on project performance. A cross-sectional and explanatory research survey is used for this study. Snowballing and convenience sampling technique was adopted via the used of questionnaires. The population entails contracting organization, consultant and clients' organization involved in design and build projects. A total of 39 questionnaires were distributed and 27 were returned and used for the analysis. Statistical package for social scientist was used for analyzing the data collected using mean item score and chi-square. The most prominent risk is change in quantity/scope of work in terms of cost related risk while in term of time related risk, the most prominent is design changes. Errors or omission during construction is the risk prominent in term of quality. In conclusion risk in design and build procurement can be group under cost, time and quality standard as such each of the risk identified in these categories must be well defined.

Keywords: building project, design, impact, procurement, risk

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DURABILITY CHARACTERISTICS OF CONCRETE PRODUCED WITH DATE SEED AS LIGHT WEIGHT AGGREGATE

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In conventional concrete production, coarse aggregate (crushed granite) plays an essential role in the resulting functional properties of concrete. However due to the high cost of coarse aggregate and its scarcity in some areas in Nigeria, this research investigated the suitability of Date Seeds (DS) as light weight aggregate in concrete production. This was achieved by producing lightweight concrete using cement, sand (fine aggregate) and DS (coarse aggregate) in the ratio 1:2:4. Samples of concrete with Crushed Granite (CG) as coarse aggregate were equally produced and served as control. For the purpose of the research, (15) concrete cubes were produced with DS and 15 concrete cubes with crushed granite. Water- cement ratio of 0.6 was used for the two specimens. The concretes produced (6) from each specimen were immersed in chemical concentrated solutions of 5% Magnesium Sulphate ($MgSO_4$) and 5% Sulphuric Acid (H_2SO_4) for 28 days. The remaining concrete Specimens (9) from each specimen were equally immersed in ordinary water for 28, 56 and 84 days. Specimens in chemicals were crushed at 28 days while those in ordinary water were crushed at 28, 56 and 84 days curing periods. At 28 days, there was a significant difference in the damaging effects of $MgSO_4$ on DS concrete when compared with that of CG concrete. Increase in strength was observed in DS concrete at 56 and 84 days in ordinary water. The research concluded that DS can be used as an alternative material to Crushed Granite (CG) in production of lightweight concrete in an area where there is scarcity of CG. The research recommended that DS concrete should not be exposed to sulphates having concentration close to 5% or more.

Keywords: aggregate, concrete, characteristic, date seed, durability

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IMPACT OF TOTAL QUALITY MANAGEMENT (TQM) ON NIGERIAN CONSTRUCTION FIRMS

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Construction processes are characterized by a number of elements which differentiate it from other known businesses like manufacturing and process industry. These differences implied that quality control and assurance procedures applied in manufacturing industry cannot be readily applied in construction where there are higher degrees of uniqueness in each and every project/product. Hence, this paper assessed the effects of Total Quality Management principles adopted by Nigerian construction firms on their production processes. The population considered was indigenous contracting organizations that have the capacity for implementing Total Quality Management principles. Non-probabilistic sampling method was used to select the contracting organizations. The management of the selected organizations was interviewed through a semi-structured questionnaire to obtain information on the effects of Total Quality Management principles on project quality criteria. Data collected were analyzed through the use of content analysis and inferential statistics. The results show that there is no prevalence of Total Quality Management principles among indigenous construction firms in Nigeria; despite the high correlation between the implementation of Total Quality Management principles and organizational performance. The study recommended that it is high time for customers of construction products begin to demand for certain level of quality and the Standard Organisation of Nigeria (SON) begin to enforce quality requirements in the production processes of construction products

Keywords: construction industry, construction process, total quality management, quality principle.

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RELEVANCE OF HERNANDO DE SOTO'S PRINCIPLE OF LAND TITLING TO LAGOS METROPOLIS

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Hernando De Soto's book, "The mystery of Capital" attributed the failure of capitalism in the third world to lack of titles on properties held by the poor. The Land use Act meant to create relief did not ease the procedure of obtaining relevant land documents. Lagos State situation appears to be more precarious as the authority issuing Certificate of occupancy bears no responsibility for guaranteeing good title under the land use Act. These situations have prompted interest in the research work: i) identifying the benefits accruable to land formalization ii) determining the effects of Government policies on land transactions and iii) establishing the role played by Financial institutions. The population sample covers stakeholders who expressed opinion on the subject. Field trips were made. Secondary data obtained from various materials and presented using frequency tables. The outcome revealed that affected stakeholders are resolute to revive their capital from the "dead" by obtaining necessary titles.

Keywords: certificate of occupancy, dead capital, government policy, land use Act, title

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RATIONAL DESIGN OF CONCRETE MIXES USING UNCRUSHED AGGREGATES

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This paper presents the study carried out on naturally deposited gravel for use in the production of concrete mixes. Physical properties of the coarse aggregates was carried out and was found to satisfy specification requirements to produce normal grades of 20, 25 and 30 concrete with continuous grading, single size grading, natural deposit grading, gap grading(continuous) and gap grading (single size). Also, maximum aggregates of 10mm, 20mm and 40mm with low slump of 10 – 30mm and medium slump of 30 – 60mm were considered. The properties of the mixes both in the plastic and hardened states have been found to vary depending on the coarse aggregates grading used. Based on these results, the starting estimates for the compressive strength and approximate free-water cement requirements to give various levels of workability for uncrushed aggregates presented in the DOE design manual have been found to be invalid. The appropriate charts, tables and standard deviations for the revised relationship have been re-presented, which can be used directly in designing concrete mixes using the gravel as coarse aggregates.

Keywords: mix design, uncrushed aggregates, grading, specified strength

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CAUSES OF FINANCIAL LOSS TO CONTRACTORS IN THE UGANDA CONSTRUCTION INDUSTRY

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Contractors in the construction industry suffer loss to the extent that the majority of them do not survive over a number of years. The losses incurred are of various nature, frequency and severity. However, the industry suffers from lack of information on the causes of financial loss. The objective of this research was to identify and analyze the sources of financial losses experienced by local contractors during the execution of construction contracts. The factors were mainly identified through a literature search and rated by contractors using a Likert scale. The mean rating of the factors, their importance index and the correlation between frequency and severity were determined. It was found out that the most frequent, severe and important factors were corruption, inflation and high interest rates of borrowing. It was further found out that there is a strong correlation with a coefficient of 0.862 on the frequency and severity of the factors. The major recommendations are that clients should pay the contractors as stipulated in the conditions to avoid loss or else be penalized and that government should try to the extent possible curb corruption and inflation. The findings are important to contractors and consultants, policy makers and researchers in the construction industry.

Keywords: contractor, financial loss, Uganda

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MINIMIZATION OF HEAT GAINS IN BUILDINGS: THE CASE OF DOMESTIC BUILDINGS IN CAPE COAST METROPOLIS – GHANA

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Minimization of heat gains in buildings is a matter of great concern to designers and engineers. This heat gain in buildings leads to room's discomfort and to reduce this, will call for the use of fans and air conditioners which rely on expensive artificially generated electrical energy to operate them. This research therefore aims at ascertaining appropriate construction designs and techniques that could be adopted to minimize excessive heat gains in buildings. Random sampling technique was used for selecting hundred (100) domestic buildings in each of the three densely populated suburbs considered within the Cape Coast Metropolis in Ghana. In total, three hundred (300) buildings were used as a sample for this study. Structured interview and observation were used as the main research methods to obtain the necessary data for the study objectives. The results shows that appropriate construction designed methods and techniques were not adopted for the construction of almost all the buildings investigated. It was also realized that majority of the occupants (96%) used electric fans, and air conditioners to reduce the amount of heat gains in their rooms. The study suggested that, shading techniques such as screens to walls, fixed sun breakers and attached canopies must be encouraged in the design and construction of buildings. The study also suggested that all buildings, yet to be constructed, should be positioned with their longest walls facings north and south in order to reduce intense morning and evening sun entering into the building with more window openings accommodated in both sides of the longest walls to allow for cross-ventilation.

Keywords: Cape Coast, Ghana, heat gain, heat minimization

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STRENGTH PERFORMANCE OF LATERIZED CONCRETE AT ELEVATED TEMPERATURES

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The study presents the results of an experimental program to investigate the strength performance of Laterized concrete at elevated temperature. Four concrete mixes incorporating 0, 10, 20 and 30% laterite as a replacement by weight of sand was prepared. A concrete mix ratio of 1:2:4(Cement: laterite/sand: granite) with water/cement ratio of 0.65 was used for the study. The laterite content in the fine aggregate was varied from 0 – 30% at 10% interval. Specimens cured for 7, 14, 21 and 28days were subjected to uniaxial compressive loading tests at room and elevated temperatures of 200, 400 and 600°C. Results showed that for the varying percentage replacement of sand with laterite, compressive strength of laterized concrete decreases; and with increase in temperature, the strength decreases. It was also observed that an air-cooled lateritic concrete specimen has higher residual strength values than water- cooled specimens. A maximum compressive strength value of 24.10N/mm² was obtained for the mix with 30% laterite – 70% sand at 400°C which indicates the strength of laterized concrete that is sufficient for use at elevated temperature not exceeding 400°C.

Keywords: compressive strength, elevated temperature, laterite, residual strength

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EFFECT OF PACKING DENSITIES OF AGGREGATES ON THE WORKABILITY AND COMPRESSIVE STRENGTH OF CONCRETE

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The packing densities of selected aggregates and their various combinations were determined in the laboratory and compared. The coarse aggregates included granite and gravel while the fine aggregates were granite dust, plaster sand and river sand. The aggregate combinations consisted of granite plus granite dust, granite plus plaster sand, granite plus river sand, gravel plus granite dust, gravel plus plaster sand, and gravel plus river sand. Concrete was produced using each of the above aggregate combinations, cast, cured and tested for compressive strength at maturity ages of 7, 14, 21 and 28 days. The results revealed that the gravel plus river sand aggregate combination had the highest packing densities both in the loose and the compacted states. The same combination also produced the most workable concrete at the same water-to-cement ratio and fixed paste volume, and also the strongest concrete at a fixed slump value. The results further indicate that for all the aggregate combinations considered, the greater the packing density, the more workable the concrete and the higher the compressive strength.

Keywords: packing density, compressive strength, workability, aggregate

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A NEED TO RE-DEFINE THE STATUS OF PROFESSIONAL VALUATION: THE NIGERIAN PERSPECTIVE

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While virtually all professions in the built environment are somewhat founded on eclectic academic base, that of valuation is perhaps, most critical. Though professional valuation has been widely taken to be a subset of real estate practice, the scope of valuation transcends the real estate discipline. Rather, it is believed to be both multi-disciplinary and inter-disciplinary so much so that it exhibits a porous nature that leaves sufficient room for infiltration and abuse in practice. This paper examined the debate on the status of valuation as an academic discipline and in particular, the challenges confronting the curriculum definition for valuation in Nigeria as well as the various attempts by allied professionals at wresting core valuation services from the professional 'estate surveyor and valuer'. It employed a combination of questionnaire survey of stakeholders' perception as analysed on a 3–point relative importance scale on one part and a perspective discourse from the author's experiences in theory and practice on the other. Findings include, inter alia, that real estate has a wide coverage of services with valuation constituting a relatively unpopular aspect, that there is stiff competition by allied professions with real estate practitioners on valuation and that the subsisting scope of the real estate curriculum is inadequate for full professional valuation. It was therefore concluded that professional valuation should be separated from real estate both at the academic and practice levels.

Keywords: body of knowledge, inter-discipline, multi-discipline, professionalism , valuation

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EVALUATION OF PUBLIC PRIVATE PARTNERSHIP (PPP) AS ALTERNATIVE PROCUREMENT ROUTE FOR INFRASTRUCTURE DEVELOPMENT: CASE OF NIGERIA MEGA CITY

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An agglomeration of people in the urban centres world over has led to the rapid expansion of city borders into neighbouring suburbs, resulting in the formation of Megacities. This trend has created chronic shortage of infrastructure to cope with the needs of the burgeoning urban population. Successive governments of countries with megacities have directed much effort toward the provision of these much needed infrastructure but little has been achieved due largely to the shortage of fund required to meet the huge capital outlay. It is now common for government at various levels to call on private investors, both local and foreign, to come to their aid in form of partnership between the public sector and the private sector for the provision of infrastructure through Public Private Partnership (PPP). Lagos, Nigeria has the characteristics of a megacity. In this paper, documentary evidence has been gathered to assess the investment needs of Lagos as a mega city. Subsequently, the suitability and acceptability of PPPs within the purview of Lagos State government in particular and Nigeria at large was assessed. The social, legal, economic, environmental, political and technological (SLEEPT) approach has been adopted incorporating the views of stakeholders within Lagos. Documentary evidence points to a huge deficit between the investment need and current capacity of Lagos State government to fund the investment. Emerging from the SLEEPT is the favourableness environment for private participation in infrastructure provision both by the Federal government and Lagos State government. It was discovered that the social, legal and political landscape within Lagos mega city is set for the adoption of PPP and that the state is yet to measure up to the required needs in terms of technology. Altogether, PPP represents a good long term investment for private investors and have the potential to deliver much needed infrastructure in a short timeframe thus improving the quality of life of the people.

Keywords: construction investment market, mega city, public private partnership, construction investment

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SUSTAINED BEAUTIFICATION OF NIGERIAN CITIES THROUGH LANDSCAPING: THE CASE OF AKURE

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Developing countries worldwide are characterised with high rate of urbanisation which occurs as a result of several opportunities of wealth creations in cities. This rapid growth has affected land use planning and poor environmental quality; where inadequate planning for planting and city beautification is marked. This is particularly true in the case of Nigeria where the urban sprawl or rapid growth has resulted in many cities ecosystems being replaced by diverse development due to the misuse of space; with the natural areas constantly being destroyed by man's activities of building, refuse dumps, squatter settlements and little being done about beautification through landscaping. Of recent, many cities in Nigeria, are struggling to live up to the challenges of beautification globally, and are calling for the reconstruction and redevelopment of the disorders which emanated as a result of urbanization. This paper examines recent landscape planning in Nigerian cities and further discussed the ongoing construction and beautification in Akure, the Ondo State capital, Nigeria. Unstructured face to face interview and observation methods of data collection was used to gather information from those in authority, on the prospect of sustaining the on going beautification. The paper concludes with suggestions on how beautification through landscaping can be sustained.

Keywords: beautification, landscaping, Nigeria, sustainability

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SUCCESS FACTORS FOR IMPLEMENTATION OF PRIVATE PUBLIC PARTNERSHIPS IN THE CONSTRUCTION INDUSTRY IN UGANDA

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Developing countries like Uganda are in dire need of infrastructure development and some countries are venturing into Private Public Partnerships (PPPs). In Uganda for example, the ministry in charge of finance has been trying to find ways of implementing projects funded using PPP arrangements. PPPs are risk sharing investments in the provision of public goods and services, seen by governments as a means to launch investment programs, which would not have been possible within the available public-sector budget, within reasonable time. However, there is no in-depth analysis of the critical factors that are likely to affect the success of PPP projects in developing countries. The objective of the present paper is to address the aforementioned gap and contribute to the knowledge base of success factors for PPP projects in developing countries using Uganda as a base for data collection. Success factors were identified from the literature and validated using interviews on the three major stakeholders in the construction industry i.e. the contractors representing the private sector, the financial institutions and government departments largely charged with construction of facilities. Using questionnaire surveys, the various factors were rated. The factors were then ranked using the Coefficient of Variation on importance of the factors for each of the parties involved. Competitive procurement process, well organized private sector, availability of competent personnel on PPP project implementation, and good governance are the most important cross cutting factors identified.

Keywords: private public partnerships, success factor, Uganda

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ASSESSMENT AND MANAGEMENT OF STORMWATER DRAINAGE FACILITIES IN RESIDENTIAL AREAS OF ENUGU CITY

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The objectives of this paper are to assess the quality of artificial drainage facilities in residential premises of Enugu city and profer appropriate strategies for managing them. An appraisal technique, which employs a checklist of seven simple classifications of specified qualities, is utilized to achieve the aim. In this approach percentage penalty points (Pp) are assigned to drainage facilities having observable defects. A total of 366 drains in 20 residential areas of the city are appraised. The poorest condition of drainage system is observed in Ogui Urban area with the highest penalty points of 88% followed by Abakpa with 87.5% penalty. Only three layouts (Ekulu, G.R.A, and Independence Layout) have less than 25% penalty points rated as good condition of drainage. None of the residential areas in the city has excellent drainage facilities as none scored less than 10% penalty. A more integrative legislation on urban land use planning and management to protect the drainage facilities against dysfunctional uses or abuse and a comprehensive urban drainage system network coupled with proper maintenance (inspection, regular schedule of cleaning blocked drains and repair) are strongly recommended to prevent the hydrological consequences of unregulated storm water drainage construction in the residential layouts of Enugu city.

Keywords: appraisal technique, drainage facility, inspection, maintenance, stormwater

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AN ASSESSMENT OF HOUSING SANITATION AND WASTE MANAGEMENT PRACTICES IN THE RESIDENTIAL CORE AREAS OF OSOGBO, OSUN STATE NIGERIA

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The paper examines the situation of housing sanitation and waste management practices in the residential core areas of Osogbo city, with a view of improving housing supply and sanitation to meet the millennium development goal on water and sanitation. It investigates the core areas of Osogbo which consists of Oja-Oba, Ita Olookan and part of Ayetoro. Variables investigated in the study includes house type, source of water supply, sanitary services in building, drainage conditions and refuse disposal methods. Primary data collected for the study through questionnaire was analysed with statistical tools. The paper also provides recommendations to improving housing and sanitation.

Keywords: housing, sanitation service, water supply and waste management

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BENEFIT OF CONDUCTING ENERGY CALCULATIONS IN THE BUILT ENVIRONMENT OF NIGERIA

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This paper aims to highlight the benefit of conducting energy calculations on electricity consumption in the built environment of Nigeria. The study is quantitative, through a quasi-experiment on mix mode office buildings in Abuja, Nigeria. Primary consumption data was recorded during a previous fieldwork survey into 15 office buildings investigating electricity consumption. A comparison is made between simple analytical and dynamic building energy calculations; and the benefit is shown of conducting said calculations in a timely fashion within the life-cycle of a building to predict possible energy savings. Analyses of the effect of dynamic building energy calculations were conducted using sophisticated graphic user interface (GUI) software Design builder and simulation engine Energyplus on a base-case building in Abuja, Nigeria. Results show that performing building energy calculations at design or occupied stages of any building is beneficial to energy efficiency and conservation; energy savings of 22-67% of typical practice with little or no increase in capital cost is possible. Dynamic and integrated building energy calculation software yield even more powerful conclusions than simple calculations and are able to compare different energy conservation methods faster and cheaper than building physical models or field testing.

Keywords: building energy calculation, computer simulations, electricity consumption, energy conservation, Nigeria

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EFFECT OF CLIMATE CHANGE ON CONSTRUCTION PROJECT PLANNING IN NIGERIA

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Climate change affects the ecosystems as it creates desertification and serious flooding, and thus, increases the risks associated with embarking on construction project planning. The study assessed the effects of climate change at the first three stages of "the project management cycle" otherwise regarded as project conception planning, project design planning and construction planning. A structured questionnaire was used to obtain responses from eighty-eight (88) construction practitioners representing 73% response rate. Mean and repeated measure ANOVA test was used to establish the average scores and to explore significance differences among variables respectively. Frequent rainfall and extreme air temperatures delaying site preparation activities is the most significant effect of climate change on project conception planning, followed by high insurance costs on projects within flood prone areas. Severe weather events, which influence the selection and specification of construction materials, were considered as the greatest impact on project design planning. Too much rain which interfere with construction schedule and mixing of concrete causing newly laid concrete to be destroyed and, high wind which poses danger to life/limbs at the construction sites on building requiring the use of scaffold were ranked very significant effects of climate change on project construction planning. Extreme weather events which influence the structure of site organization plan, and extremely low temperature interference with construction work were outranked in project conception planning and construction planning respectively. The study has provided construction professionals and project managers with useful information and considerations on the effects of climate change on construction project planning.

Keywords: climate change, construction practitioner, Nigeria, project planning

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ESTIMATING COST CONTINGENCY FOR CONSTRUCTION PROJECTS: THE CHALLENGE OF SYSTEMIC AND PROJECT SPECIFIC RISK

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The challenge of poor scope definition resulting in scope creep is recognized as the major driver for construction project and cost overruns (AACE, 2009). All construction projects are associated with both systemic uncertainty and project specific uncertainty. The epistemic ambiguity in risk estimation could be considered as an opportunity or threat, a gain or loss, positive or negative; while project specific risk are in relation to project cost which makes its estimation untoward. Out of 204 questionnaires distributed to built environment professionals to determine the impact of systemic and project specific risk factors on the estimation of cost contingency, 118 was retrieved representing 57.8%. Data analysis using FMEA as a qualitative risk tool and univariate statistical analysis as a quantitative risk tool revealed that systemic risk accounted for approximately 64% of the cost drivers related of the construction cost uncertainty whilst projects specific risk accounted for 36% of the risk impact. Scope changes, incomplete scope definition, design status and changes in specification were revealed as high-impact systemic risk which has a high propensity of cost overrun effect on cost contingency. The impact of systemic risks can be managed through a design management effort by confirming the certainty of owner related issues during project definition and planning stage through historical based models relying on organizational process asset. The research revealed that the effect of project specific risk including natural and force majeure conditions and economic indicators are beyond the prediction and stochasticity effort of the project team. Project specific risk can be managed only through collaborative communicative effort of the project team with simulation to enable the right construction technologies to be selected and risk impact to be curtailed.

Keywords: contingency, epistemic uncertainty, risk, systemic risk, uncertainty.

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Buerter, J.I.T., Abeere-Inga, E. and Kumi, T.A. (2012) Estimating cost contingency for construction projects: The challenge of systemic and project specific risk *In: Laryea, S., Agyepong, S.A., Leiringer, R. and Hughes, W. (Eds) Procs 4th West Africa Built Environment Research (WABER) Conference, 24-26 July 2012, Abuja, Nigeria, 413-426.*

ASSESSMENT OF THE RENTAL VALUES OF RESIDENTIAL PROPERTIES IN URBAN SLUMS: THE CASE OF OSOGBO, OSUN STATE NIGERIA

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The aim of this study is to assess the rental values of residential properties in urban slums, using Oja-Oba, Osogbo as a case study. Residential property is one of the basic human needs. Hence, real estate investors are consistently faced with decision of the types of property and the place to invest in. The study adopted the survey research design to collect data from the field. The population for the study consisted of 1,375 households in Oja-Oba Osogbo and 15 practicing Estate Surveyors. Two different sets of questionnaires (165 for tenants and 15 for Estate Surveyors) were administered on household heads and principal Estate Surveyors of the randomly sampled population; however, only 149 and 13 questionnaires respectively, were retrieved and used for analysis. The data obtained was analyzed using both descriptive and inferential statistics. The Pearson Product Moment Correlation Coefficient for rental values and slum indicators was $r = 0.709$, $p = 0.000$ (2-tailed) indicating a strong positive correlation. The regression analysis carried out shows $R = 0.814$ indicating a high positive correlation between all the variables. The ANOVA indicated that the overall model is statistically significant [$F(5,143) = 56.335$, $p = 0.000 < 0.05$]. The study revealed that rental values of residential properties in urban slums are low due to the impact of slum indicators on such properties. It was recommended among others, that all stakeholders expedite eradication of poverty through job creation for the urban slum dwellers as well as involvement in urban slum upgrading to enhance the latent property values in the study area.

Keywords: estate surveyor and valuer, rental value, residential property, tenant, urban slum

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EVALUATION OF THE POZZOLANIC ACTIVITY OF KAJURU PUMICE TUFF AS SUSTAINABLE CEMENTITIOUS MATERIALS FOR CEMENT BLENDING

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This paper focused on a report of an evaluation of the pozzolanic activity of pumice deposits obtained from Kajuru as potential Sustainable Supplementary Cementitious Materials for Construction. The study investigated the chemical characteristics of the pumice tuffs and the compressive strengths of concrete containing the pumice materials in % addition. The Oxides analysis was carried out by means of Energy Dispersive X-Ray Fluorescence method. The compressive strengths and the Strength Activity Index of the concrete containing the pumice tuffs materials were evaluated. The results of the chemical analysis indicated that the sum oxides of Silica, Alumina and Iron were 80.87%. The evaluations of the compressive strengths of concrete cubes containing 5% of the pumice tuffs materials at 28 days curing showed an increased of compressive strength from 23.5 N/mm² (cubes with Ordinary Portland Cement only to 30.3 N/mm². This result indicated that concrete containing 5% pumice increased the compressive strengths of the concrete to about 29%. It is thus, concluded that the Kajuru Pumice Tuff are potential sustainable SCMs for Cement Blending.

Keywords: Kajuru, pumice, mineral additive

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ASSESSMENT OF PUBLIC-PRIVATE-PARTNERSHIP REGULATORY FRAMEWORK FOR INFRASTRUCTURE DEVELOPMENT IN NIGERIA

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Public-Private-Partnership (PPP) regulatory systems is a major concern in infrastructure industries especially in Nigeria where the use of PPP project delivery system has become imperative where often the government does not have adequate finances to bridge the critical infrastructure gap and improve investment. Therefore an Infrastructure Concession Regulatory Commission (ICRC) was established to regulate PPP infrastructure arrangement in the country. This paper examines some of the key components of the legislation and policy of the ICRC by analyzing its strengths and weaknesses in relation to: willingness to invest; contract design; and prevention regulatory failure. The aim is to review the regulation of PPP arrangement with a view to encourage and support sustainable long term economic and legal commitments in PPP contract transaction. Therefore a survey was critically conducted on the main sections of the legislation and policy governed PPP through which Data were collected, codified and consolidated and analyzed using effective infrastructure regulation matrix. The paper concludes that: creation for the return on investment, managing risks perceived by the private sector, reducing political uncertainty, getting incentives right, and affordability problem were among the most important factors on PPP good practice arrangement. These findings established a backbone of better understanding of the PPP governance system in Nigeria.

Keyword: infrastructure regulatory system, infrastructure regulatory system, Nigeria, procurement, public-private-partnership

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AN EVALUATION OF THE CONCRETE PRODUCTION IN TYPICAL CONSTRUCTION SITES IN NIGERIA

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One of the major problems encountered in the construction of buildings, is the use of defective material which cause the perennial problems of structural failure in the construction industry in Nigeria leading to loss of lives and properties. This is a report on an assessment of concrete production in typical construction sites in Nigeria. It was achieved by a careful study of contract documents with special reference to mix design/specification. Concrete sample was then produced using information obtained from the document (control sample). Renal samples of actual concrete used were collected randomly cast, cured (sample specimen) and subjected to compressive strength after 7, 14, 21, 28 curing days. Checklist was prepared on the right method of concrete production and used to assess how concrete was produced. Result of the study shows that non adherence to the correct steps of concrete production such as the use of wrong water/cement ratio and use of crude method of batching were identified as the common problem in concrete production. It was also found that the average strength of concrete produced on two sites did not attain the minimum strength required at 28 days by the BS 1881, (1983b) part 116, while the concrete produced on another site has a strength of 20.01N/mm² at 28 days which is close to the specification of BS 1881 and the controlled sample average strength of concrete at 28 days was 23.79N/mm² which is within the range specified by the BS 1881 part 116 (1983b).Based on the results obtained, the compressive strength of concrete collected from sites was less than the control specimen by 14% hence it was recommended that 14% should be added to the estimated design strength, as a factor of safety to take care of the problems of the handling of the concrete materials and other construction inaccuracies. Government and professional bodies should make concerted effort in enforcing National Building Code.

Keywords: evaluation, compressive, concrete, strength, quality

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QUANTITY AND QUALITY ASSESSMENT OF ARTIFICIAL LIGHTING SYSTEM OF BUILDINGS IN NIGERIA

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Quantity and quality of lit environment has been defined as parameters that determine a good and sufficient interior lighting system that can avoid glare completely. In an attempt to avoid glaring effect of artificial lighting system, British Zonal (BZ) system classify luminaries into 10 standard light distribution classes BZ numbers 1 – 10. In this work, three (3) interior lighting catalogues were assessed for describing the conformity with the BZ system classification. While, analytical method for measuring and accessing glare index was used for measuring the compliance of some selected lighting design to minimum requirement. The study shows that, all the products conform to the percentage of light output distribution of five (5) standards of luminaries. In addition, all products have relevant photometric data in their catalogues with BZ classes or polar curves of each luminary. However, the specified limiting glare values were found to be adequate. The values lies between 0.2-9.5 in the respective spaces while 10.48 and 10.65 were for the summation of two interior spaces studied and were also adequate.

Keywords: artificial lighting, glare index, illuminance, luminaire, polar curve

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THE PREFERENCE OF GHANAIAN CONTRACTORS IN PROVIDING OCCUPATIONAL HEALTH AND SAFETY ITEMS; AN EXPLORATORY STUDY

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Most of the building construction site accidents in Ghana have been attributed to the fact that building contractors do not provide the required health and safety items on construction sites. This paper is aimed at establishing the preference of building contractors to the provision of welfare facilities and safety equipments, so that their understanding of the situation could be embodied in a framework for improving health and safety management in Ghana. Structured questionnaires were used to elicit the relevant data from building contractors on their preference for occupational health and safety items on building construction sites in Kumasi, the second biggest city in Ghana. The items were grouped under two major thematic areas, namely welfare facilities and safety items. The building contractors were asked to indicate their preference on 5- point rating scale. The findings reveal that, the building contractors' preference for welfare facilities were in the order of first-aid equipment (1st), safe drinking water (2nd), sanitary facilities (3rd), accommodation to change and store clothing (4th) and means of heating food (5th). On the theme of safety items the following emerged, helmet (1st), training in safety (2nd), appointment of safety officers on site (3th), safety glasses, goggles, and face shields (4th) and safety boots (5th). One sample statistics supported the findings, suggesting that the findings could have wider relevance in Ghana. The findings have implications in as much as it can be embodied in supporting contractors' safety management strategies, and also policy direction in future safety guidelines for improving health and safety practices on Ghanaian construction sites.

Keywords: building contractors, construction industry, Ghana, occupational health, safety

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THE REACH AND LIMITS OF ARCHITECTURAL THEORY IN PRACTICE: INTERPRETATIONS FROM A NIGERIAN PERSPECTIVE

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Theory is an important part of our daily lives. From a framework of the scientific method, the idea of theory as an organized body of concepts and principles which offer logical explanations about relationships and phenomena is one that is generally accepted. In this respect, the utility of theory in advancing both the understanding of phenomena as well as of knowledge is significant. From a framework where architecture is considered as a distinctive discipline, being both an art and a science, a range of perspectives to the orientation of theory in architecture exist. The aim of this paper is to examine the context and limits of theory in architecture generally, and go further to explore relationships between the practical application of theory in design, in academic research and in architectural practice specifically. Three theories that have significantly influenced architecture from the mid – twentieth century and the early part of the twenty-first century are highlighted in this paper. A discussion of how they influenced design decisions, constraints and opportunities surrounding them is also provided. Following these discussions is an example of the application of these theories in an empirical study conducted in already occupied residential developments in Nigeria.

Keywords: architecture, architectural theory, design

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USING INDOOR CLIMATIC MEASUREMENTS FOR OCCUPANCY MONITORING

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The operation of systems for indoor climatic control remains a challenging task for facilities managers, energy managers, and the building industry in general. This is compounded by increasing building control complexities, emergent sensing technologies, and increasing pressure on commissioning. Industry can benefit from a better description of the relationships between indoor climatic variables including occupancy, which is vital for the development of building control algorithms for improved energy efficiency and comfort. This paper presents an investigation of the relationship between indoor climatic variables such as temperature, volatile organic compound (VOCs), carbon dioxide (CO₂) and occupancy in a naturally ventilated non-domestic building (office kitchen area) using portable non-invasive sensors, with occupancy level validation carried out using an infra-red people counter. Results suggest that case temperature monitoring of electrical appliances is also a cost effective way to establish usage patterns, from which occupancy can be inferred. Experimental findings also show that VOC measurements can produce better indications of occupancy than CO₂ levels, while also measuring other air contaminants which may affect indoor air quality, but this depends heavily on the type of workspace under test.

Keywords: carbon dioxide, demand controlled, indoor air quality, occupancy, ventilation

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URBAN OPEN SPACES; LUXURY OR NECESSITY

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In the urban context, the various land uses are mapped out following laid down rules and regulations, which go a long way in enhancing of the environment. The issue of open spaces need to be defined properly and everybody should be aware of the inherent benefits of open spaces to everything living and non living alike. Their effects are far reaching physically, socially, psychologically, politically, economically, ecologically and other wise Ojo (1978) and with the current rate of urbanization, modernization and increasing rate of literacy, there is enhanced demand for outdoor spaces and facilities. In some developed countries, there are organized call for the preservation and conservation of open spaces and creation of new ones where possible. The likes of Fredrick Olmsted championed the movement in New York central park design in 1879. Our Nigerian attitude towards the value of land where we believe in maximum use made of any piece of land seems to heighten the problems of urban open spaces. In many sub division plans, provisions for open spaces; parks, playground, buffer etc are abused because the executing body neglect implementation (development) of the spaces as provided, with tike these spaces become disused, overgrown with bushes and uncared for areas. These become high crime where lives and properties are longer safe. This research seeks to show how important open spaces are to the populace. This is done by establishing a relationship between open spaces and public health, open spaces and economic stability, open spaces and environmental quality and so on. In doing this, it will help broaden our understanding of the usefulness of open spaces in terms of satisfying people's outdoor, recreational needs and stimulating liveable environment amidst pressing needs on limited resources. It also enhances and protects resources base and mitigates urban heat island and climate changes generally. It will make the work of the planners easier because, with enlightened society, the why's of policy maker will e4asily be answered by laying hand on available useful data on areas of need and thus enhance policies on open spaces development generally.

Keywords: climate change, luxury, necessity, urban, open space.

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A CASE FOR THE CONSTRUCTION OF GREEN BUILDINGS IN LESOTHO: A PILOT STUDY

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The concept of green building (GB) arose from the need to propagate sustainable construction (development) practices in the built environment. The goal is to ensure the creation of sustainable buildings that contribute to the restoration rather than the destruction of the environment. As a result, new standards, rules and regulations have been developed to take forward the GB approach. For developing countries such as Lesotho, the concept brings to the fore new challenges in terms of finance, education and training, health and safety (H&S), among others. In this context, the overall objective of the paper is centred on the investigation of GB challenges in terms of sustainable construction and energy efficiency in buildings in Lesotho. Self-administered questionnaires were distributed among the owners and occupants of five building types in the district of Maseru. Selected findings include: there is a lack of knowledge and understanding of GB approach; much is not being done to create enough awareness related to GB; and most importantly, very little education and training is provided in this regard. In effect, the concept of GB is yet to take a solid foothold in Lesotho, and it can be argued that continuous education and training that is underpinned by appropriate funding of research and development (R&D) and the actual construction process provides a platform for improvement.

Keywords: energy efficiency, green building, Lesotho, questionnaire, sustainable construction.

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EFFORTS IN RURAL DEVELOPMENT BY AFRICAN GOVERNMENTS; FOCUS ON NIGERIA'S NIGER DELTA

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The Niger Delta is a predominately rural settlement with small and scattered hamlets comprising of 80 percent of the population living in largely rural communities within dispersed and linear village settlements remaining underdeveloped and unplanned, despite the various attempts made by the federal government of Nigeria such as the establishment of OMPADEC and later the NDDC which has actually moderated the crisis, but remain inadequate and ineffective, epitomized by increasing environmental degradation, excruciating poverty and inadequate infrastructural development resulting in formation of various agitation groups demanding control of their resources. This study examines the impact of NDDC projects on the lives of the rural people by identifying the rural development projects carried out, their distribution; impact; the level of community participation and their sustainability. It was found out that such projects do not make significant impact in terms of development as they are not evenly spread and lacks sustainability through the use of Mann-Whitney U Test. Amongst the recommendation includes that the NDDC should avail itself with the prevailing peace in the region sequel to the amnesty programme offered by the Federal Government of Nigeria to justify the purpose why the commission was established.

Keywords: Niger delta, project, sustainable development; rural development

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DETERMINANTS OF VACANCY RATE IN SHOPPING CENTRES IN AKURE, NIGERIA

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This paper examined the factors that cause vacancy in shopping centres in Akure. A total number of thirty five (35) shopping centres in Akure were sampled and questionnaire were administered on the tenants of the selected centres, while seventeen (17) Estate Surveyors and Valuers in Akure were also selected in order to determine the factors that influence the choice of a tenant to stay or leave a centre. The data collected were analysed using Weighted Mean Score and Multiple Regression Analysis. The result showed that factors such as location, volume of sales, customers' patronage, and visibility of the centre are responsible for the choice of retail space in a particular centre. The result further showed demand and supply factors to be the major determinants of vacancy rate in a shopping centre. Vacancy rate is directly related to supply of shopping centre's spaces and inversely related to the demand for shopping spaces. It is therefore recommended that property developers should seek the services of Estate Surveyors and Valuers to advise them on the best location for shopping centres' development which will in turn command high demand.

Keywords: Akure, determinants, market imbalance, shopping centre, vacancy rate

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ASSESSMENT OF BID EVALUATION STRATEGIES FOR CONSTRUCTION PROJECTS IN LAGOS STATE, NIGERIA

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The selection of an appropriate contractor to execute a construction project is a tricky and hard procedure thereby making bid evaluation one of the major challenges that face clients and consultants in the construction sector. The study centres on the assessment of bid evaluation strategies for construction projects in Lagos State. Primary data were collected through the administration of questionnaire to practicing construction professionals who have been involved in the evaluation of bids submitted by contractors for construction works in Lagos state which were analyzed using the Statistical Package for Social Sciences (SPSS). Mean Item Score was used for ranking the identified bid evaluation strategies and the level of importance attached to bid evaluation strategies for different construction projects. Chi-square test statistics was used to determine the significance of the level of importance attached to bid evaluation strategies. The study revealed that the lowest bidder system and past performance and performance metrics are the most widely used bid evaluation strategies in Lagos state while a high level of importance is attached to the lowest bidder system and past performance and performance metrics respectively. It is recommended that new and improved techniques of bid evaluation strategies should be incorporated in the system for construction projects in Lagos State.

Keywords: bid, evaluation, strategy, Nigeria

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CONTRIBUTING FACTORS OF DELAY IN THE NIGERIAN CONSTRUCTION INDUSTRY: A COMPARATIVE ANALYSIS WITH OTHER SELECTED COUNTRIES

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Most construction projects are completed according to clients' specification, but rarely within planned completion period. This study attempted to identify the causes delay in the Nigerian construction industry. The objectives of the study are to: (1) identify and rank the most important causes of delay as perceived by various groups of construction industry participants, (2) test the strength of agreement between the rankings of any two groups of construction industry participants on importance of individual causes, (3) compare the Nigeria situation with some selected countries. In all 105 structured interviews were conducted and the result were used for the study. From the study delayed payment, poor site management and supervision, and inadequate resources respectively were ranked as the most important delay causes. Comparing the result with literature in other countries showed that the most important causes of construction delay in Nigeria are also true for other countries of the world. The study recommended that clients should ensure adequate and available sources of finance before commencement of projects so that honouring of interim certificates could be done as at when due. Contracting organisations should pay more premiums to providing relevant training programmes or short-time courses in reputable organisations for their technical and managerial personnel.

Keywords: delays, time, project

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THE KITCHEN IN DOMESTIC SPACE: A COMPARATIVE STUDY OF KITCHENS COOKING AND CULINARY PRACTICE IN ILE-IFE, NIGERIA

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This paper presents results of an empirical study carried out on domestic spaces in Ile-Ife, Nigeria as part of a PhD study at the University College London (Ekundayo*, 2007). It is a common strategy in ethnographic research to replicate studies that have been successfully carried out in one area, in another geographical context. Applying this cumulative approach, the bi-polar framework that had originally been proposed by architectural theorist, Roderick Lawrence (1988, 1983) in a cross-cultural comparative study of sixty houses in Adelaide, Australia with another sixty houses in Cherry Hinton, Cambridgeshire, England, was adopted to this study of domestic space in Ile-Ife, Nigeria (Ekundayo, 2007). This consisted of an intra-cultural comparative study of seventy-five households from three distinct areas of Ile-Ife that cut across the socio-economic strata, and with particular emphasis on the kitchen facilities, cooking and culinary practice. However, it soon emerged that the framework proposed in the Lawrence study could not be adopted in the Ile-Ife sample. In order to obtain any significant data for analysis, a new system of analysis had to be developed from first principles taking into account, context-specific and culturally relevant variables. The aim is threefold: a/ to develop tools for cross-cultural comparative study. b/ to represent the place of activity, objects and food in the home. c/ to define the mechanism by which compatibility and incompatibility of activities in spatial proximity is determined. The study found firstly that space labels did not determine space use; secondly, that the boundaries of culinary practice were dispersed beyond the boundaries of the space that was actually labeled as a kitchen; and thirdly that it was the sensory awareness of other domestic activities in discernible proximity that significantly determined the compatibility and incompatibility of domestic activities in space.

Keywords: boundary, culinary practice, domestic space, food, kitchen

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MASS HOUSING IN NIGERIA, CUSTOMIZE THE BRIEF: PROVIDE A DESIRED HOUSE

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The nature of the housing designs in mass housing schemes in Nigeria is a function of how architects were trained to handle mass housing designs while in school. It is common practice to find that the houses in majority of the mass housing schemes in Nigeria are similar and that the houses are never house owner specific. It is often assumed by architects working on mass housing schemes that the process of making the houses specific is cumbersome, so many architects take the simple alternative of providing a single or few options of design and repeat them all around the site. The nature of the construction method of these mass housing schemes allows for the design briefs of the individual house to be different. This paper seeks to show how design brief in mass housing in Nigeria can be customized. This is done through the development of a customization brief model with aid of a network of computers. It is expected that if the model is applied into mass housing practice in Nigeria, desired house/homes by prospective house owners in mass housing schemes would be met.

Keywords: architect, customization, house owner, mass housing, model

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THE USE OF LATERITE-CEMENT-ENHANCED BRICKS IN THE PROVISION OF PUBLIC INFRASTRUCTURE: A CASE STUDY OF OSUN STATE UNIVERSITY BUKATERIA COMPLEX, OSOGBO, OSUN STATE, NIGERIA

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The study examined the use of laterite-cement-enhanced bricks in the provision of low cost students' infrastructural facilities in Osun State University, Osogbo with a view to creating an environment that is aesthetically pleasing for working, living and recreation. Primary data made use of semi-structured interviews and focused group discussions on the key participants in the project while secondary data was gotten from publications. Results show that the use of laterite-cement-enhanced bricks was able to cut down the cost of construction by between 20% and 30%. Therefore the use of laterite-cement-enhanced-bricks has the potentials that could propel the construction of low cost housing which could go a long way to promote economic growth, reduce poverty and inequality, and ensure an orderly environment which could aid planning and decision making process and the attainment of the Millennium Development Goals (MDGs).

Keywords: laterite-enhanced-brick, public infrastructure, low cost housing, poverty

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GREENING ACCRA: THE USE OF LANDSCAPE ARCHITECTURE TO ENHANCE THE CITY'S ENVIRONMENT

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The city of Accra, after 55 years of Ghana's independence has an urban landscape characterized by an increasing number of freestanding signature buildings devoid of consideration for the design of the spaces in between them. If this situation continues unchecked, it could cause local businesses to flee the district and make foreign investors to look elsewhere no matter how frantically the country is marketed. The economic centre of the central business district is characterized by excessive heat, inadequate parking, unavailability of seating, unacceptable competition for circulation space between pedestrians, vehicles and hawkers, etc. Landscape architecture, a discipline that seeks to mitigate the effect of man's development on nature, is a tool that can be used to enhance the image of the city, improve upon the comfort levels for the residents, and cleanliness of the environment, while beautifying it. This paper addresses the role of landscape architecture in a city's development within the context of the physical environment of Accra's CBD, focusing on its parks, open spaces and circulation routes. Sustainable and easy-to-implement proposals, which aim at alleviating the urban landscape problems of Accra, have been made to serve as a contribution of ideas to help decision-makers create a Sub-Saharan African garden city which is clean and green.

Keywords: Accra, beautification, environmental improvement, greenery, urban

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MITIGATING CONSTRUCTION PROJECT RISK USING BUILDING INFORMATION MODELLING (BIM)

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One of the major constrains facing the construction industry is multiple stakeholders as well as numerous stages related to a construction process. Disintegration remains a barrier to smooth flow of information among stakeholders which may consequently lead to a poor communication and staggered information handling. The break in flow of information may eventually leads to growth in mistrust and poor relationships between actors involved in the construction projects and this may trigger an internal risk. On the other hand, development in information and communication has resulted to innovations aimed at reengineering construction process from conceptual phase to operation and maintenance. One of such innovations is the building information modelling popularly known as BIM. BIM is a new approach to integrated project delivery in which, a single comprehensive repository of the facilities data from conceptual to operation and maintenance is generated and coordinated concurrently. It is considered as a novel revolutionary achievement in the construction industry that will enhance effective communication and subsequently improves productivity in construction project delivery. Therefore, the objectives of this paper are to review the concept of Building information modelling (BIM) and demonstrate how BIM can reduce internal risk in construction delivery process.

Keywords: building information, modelling, project risk

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PUBLIC-PRIVATE PARTNERSHIPS (PPPS) IN HOUSING PROVISION IN OGUN STATE, NIGERIA: OPPORTUNITIES AND CHALLENGES

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There is a consensus among housing experts and policy makers that there are not enough resources for government alone to address growing urban housing challenges in many developing countries. Consequently, a paradigm shift from government provision to partnerships between the public and private sectors is advocated. The study examined the prospects and challenges of Public-Private Partnerships (PPPs) in housing provision in Ogun State Southwest Nigeria. Data were derived from the review of official records and interview enquires. Findings show that Public-Private Partnership in housing in the study area is based on the joint venture approach between government agencies and corporate commercial private property developers. So far, attention has been on the provision of housing for high-income earners, while the challenges of insufficient numbers of housing units and housing affordability among low-income earners have not been addressed. The key challenges militating against Public-Private Partnership in housing are inadequate supply of land by government and housing finance as well as the exclusion of low-income people from the PPPs. Given the huge housing supply deficit in Ogun State, it is argued that the future success of PPP is contingent upon addressing these challenges and the involvement of organizations that represent low-income people in the institutional framework of the PPPs.

Keywords: Ogun state, public-private-partnership, public housing, urban area

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FOUNDATION FOR A DECISION SUPPORT FRAMEWORK FOR OPTIMAL SEQUENCING OF EMISSIONS SAVINGS REFURBISHMENT OPTIONS IN NON-DOMESTIC BUILDINGS

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The need for a concerted effort towards reducing greenhouse gas emissions to mitigate the pernicious effect of climate change continues to mount. Non-domestic buildings account for 17% of the greenhouse gas emissions in the UK and currently, they emit an estimated 100 million tonnes (Mt) of carbon dioxide per year. Therefore, the reduction of GHG emissions from the products and processes involved in the lifecycle of non-domestic buildings are of utmost importance in meeting national and global emissions reduction targets. Today, measures for reducing GHG emissions that are most appropriate for retrofitting non-domestic buildings, including renewable energy generation technologies, energy efficiency measures and inducements to change behaviour are widely available. With such a variety of available measures, the challenge for the decision makers is to consider energy, environmental and financial factors and apply the measures so as to reduce overall emissions in the most cost-effective way, while taking into account any interactions. Attaining such a goal will require a robust decision-making methodology with which optimal choices can be made regarding the prioritisation of emissions-saving refurbishment options. This paper, gives an overview of relevant literature in this field, a proposed decision-making framework and some thoughts on how measures of financial costs and both embodied and operational emissions can be combined into a robust way. This will allow ranking and sequencing of retrofit options to reduce emissions in non-domestic buildings in a cost-effective manner.

Keywords: emission, energy conservation, non-domestic buildings

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IMPROVING LABOUR PRODUCTIVITY IN MASONRY WORK IN NIGERIA: THE APPLICATION OF LEAN MANAGEMENT TECHNIQUES

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The performance of local contracting firms is very important to any nation's economic growth. This performance is hitched on the firms' construction efficiency which can be improved by increasing productivity. Therefore this paper examines the analysis of labour output for masonry work in the construction of six bungalow buildings in Abuja metropolis. The objective was to determine the level of labour productivity of contractors handling the construction of bungalow buildings and to identify gaps in levels of productivity and reasons for the differentials. The computation of the performance indexes that is Project Waste index (PWI), Performance ratio and disruption Index (DI), it was learnt that about 50% of the projects studied were poorly managed. The projects had low productivity rating. The other 50% performed well. The PWI values computed for the project studied ranged from 0.0106 to 0.1940. It was observed that three of the projects had PWI values lower than 0.1 which is an indication of good performance and three had values greater than 0.1. Three of the projects had Performance ratio (PR) value of 1.1389, 1.1689 and 1.9662 which showed poor performance. It was observed that low outputs were accomplished with high labour inputs. Other factors found out by direct observation for the non performing projects were distance of materials from work stations, system of daily payment method without adequate supervision and shortages of materials on site. It was recommended that the site managers of each of the non performing projects should learn reasons for gaps and make necessary adjustments in order to improve performance by raising labour productivity. It was also recommended that the lean benchmarking task should not be once for all exercise among the firms investigated but should be a continuous practice until the best practice height is attained.

Keywords: indigenous firms, labour, management, performance, productivity, project

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AN ANALYSIS OF CONTRACTORS' APPROACHES TO RISK MANAGEMENT PRACTICES IN LAGOS STATE, NIGERIA

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Emphases have not been placed on risks during construction in Nigeria and such risks when not properly managed have contributed to unsuccessful project. This research aimed at analyzing contractors approaches to risk management practices in Nigeria. Questionnaire survey was used to elicit information from 60 contractors firms in Lagos state. 39 questionnaires were returned representing response rate of 65%. Three hypotheses were tested using Analysis of Variance (ANOVA). The result of the study revealed that there are no differences in risk management approaches employed by contractors firms in Nigeria. The paper also identified lack of knowledge on risk management as the major problem in risk management practice. Providing training and seminar on risk management will increase the awareness level of risk management in Nigeria

Keywords: contractor, Nigeria, questionnaire, risk management, Lagos State

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BRIDGING THE CULTURAL GAP BETWEEN TRADITIONAL AND MODERN BUILDING DESIGNS

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This paper examines the relationship that exists between traditional and modern building designs in some selected towns in the South-western part of Nigeria. The author expounds that there is a gradual neglect of traditional architecture for architectural styles that are not sympathetic to the local climate. Studying the architecture of palaces and buildings, various current trends and challenges are identified. Precisely, these include: an abysmal neglect of local building materials; planning and zoning that are not traditionally-based and a gradual loss of symbolism and concepts in the form of palace buildings. Although traditional designs are given up for modern designs, and most palaces and buildings are now a shadow of their former past, the author remains optimistic and points out that, in an attempt to curtail the side effects of this cultural gap and create a sustainable human environment, taking the values and heritage of such environment as starting points can be helpful in achieving modern cultural patterns and forms that evolve from the society's own cultural past. This is simply making traditional architecture as the starting point of creative designs in planning, and also evolving in materials such as steel, concrete, glass, aluminium and so on, a functional modern architecture that is developed from an indigenous architecture. To achieve this, the study recommends that the best of local building materials should be synthesized with that of modern materials with adequate consideration of the local climate; planning and zoning of spaces should be traditionally-based; and the use of symbolism and concepts in the forms of palace buildings should be embraced.

Keywords: building design, culture, modern architecture, palace, traditional architecture.

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EFFECT OF USED OIL ON THE STRENGTH AND COMPRESSIBILITY BEHAVIOUR OF LATERITIC SOIL

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Appreciable quantities of used motor oil spills are common at and around mechanic workshops. Laboratory testing program was carried out to determine the effect of used motor oil contamination on the strength and compressibility properties of lateritic soils. Contaminated specimens were prepared by mixing the soil with used motor oil by weight of dry soil in order to evaluate the usefulness or otherwise of oil contaminated soils in engineering construction. The results indicated a decrease in the unconfined compressive strength (UCS), coefficient of consolidation, c_v and coefficient of volume compressibility, m_v , up to 6% oil content. The UCS of the specimens containing, 0, 2, 4, and 6 % oil content were 154, 185, 180, 151 and 103 kN/m^2 , while the coefficient of consolidation, c_v and coefficient of volume compressibility, m_v , decreased to 373, 75, 27 and 12 m^2/year and 157×10^{-6} , 334×10^{-5} , 305×10^{-5} and $540 \times 10^{-6} \text{ m}^2/\text{MN}$, respectively at 0, 2, 4 and 6 % oil content. The results of laboratory tests show that properties of the soil were immensely impaired on contamination with oil.

Keywords: coefficient of consolidation, compressibility, lateritic soil

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OUTSOURCING OF FACILITIES MANAGEMENT SERVICES IN NIGERIA'S PUBLIC UNIVERSITIES

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Outsourcing has become one of the most researched areas in management studies due to its rising profile as a management strategy for improving service delivery. It is a strategy that is gaining popularity among public institutions particularly Nigeria's universities as a way of improving value for money in providing public services. This research presents an outcome of the review of literature on the concepts of outsourcing and facilities management as part of a larger on-going research aimed at developing a framework for outsourcing facilities management services in Nigeria's public universities. Findings reveal that the outsourcing decision factors identified from past studies have largely been investigated under sectors other than facilities management. Besides, indications from past studies reveal that there is paucity of research on best practice outsourcing decision support tools as well as appropriate methodologies for identifying and managing outsourcing risks. Additionally, Europe, North America and recently South East Asia have retained the focus of outsourcing studies with little or no attention paid to the developing economies such as Nigeria. The paper concludes with a summary of the knowledge gaps and an overview of the on-going research on the framework for outsourcing facilities management services.

Keywords: Nigeria, outsource, risk, service delivery, public university

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A COMPARATIVE STUDY OF MAINTENANCE MANAGEMENT OF TERTIARY INSTITUTIONS IN SOUTH AFRICA AND NIGERIA

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In evaluating and comparing the performances of South Africa and Nigerian tertiary institutions on maintenance of their physical assets, secondary data on s. Africa and 78% valid response to questionnaire survey on Nigeria were analysed using ranked means and paired samples t-test. Nigeria's benchmarks and performances in 2010 are higher than s. Africa's 2009 on inspection, budgeting, training and technology while s. Africa proved superior on 15 out of the 25 criteria. Paired-samples t-test gave a statistically significant decrease between b.m. and performances of Nigerian institutions on all the 25 criteria. For example, Nigeria's b.m. on inspection had mean of 4.73, standard deviation of 0.477 while the performance gave mean of 3.18 and standard deviation of 1.065 with $df = 79$, $t = 12.59$ and $p < 0.0005$. The eta squared statistics also indicated a large effect size on the difference in means between benchmark and performance, of range between 0.2681 and 0.6674 on all the 25 criteria. As every tertiary institution, in Nigeria, is facing budget cuts, performance evaluation should be a regular exercise for identifying weaknesses, improving use of current portfolio of physical assets, and by implication reduce the pressure of the budgetary cuts through benchmarking of management processes in executing maintenance works. Nigerian tertiary institutions need to address areas in which wide gaps exist, between benchmarks and performance, like life cycle costing (ICC), computerised maintenance management system (CMMS), top management awareness, feedback and, research through initiation and implementation of appropriate strategies,

Keywords: benchmark, maintenance management, performance, physical asset, tertiary institution

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TOWARDS UNDERSTANDING CLIENT QUALITY REQUIREMENTS ON PUBLIC BUILDING PROJECTS

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Although well-defined client quality requirements facilitate the production of a good project design brief and minimize rework, project participants should adequately understand these requirements. In the absence of sufficiently understanding them, there are added challenges of inadequate translation of these requirements into product and process characteristics, a transmuting client and an imprecise procedure of determining integrity of building product and construction process exist. A case study comprising both exploratory and descriptive research performed a document analysis of a donor funded project in Uganda to conceptualize the clients' quality requirements. The findings highlight the impact of inadequately communicated and insufficiently prepared and translated client quality requirements. Furthermore, compliance to quality requirements is shown to be primarily limited to onsite inspections and the testing and approval of selected building materials. The paper, comprising the descriptive research, discusses the use of quality function deployment in understanding clients' quality requirements on public building projects. This is valuable to those involved in public infrastructure development, especially in countries where the public authority is not only involved in the pre-construction stage, but in the operation and maintenance of the facilities. It is also particularly useful to clients who comprise development partners that provide aid or grants to developing countries such as Uganda.

Keywords: quality function, quality requirement, reworks

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WAYLEAVES AND SPIDER'S WEB DEVELOPMENT PATTERNS IN OIL AND GAS PIPELINE NETWORKS - SELECTED CASES FROM NIGERIA

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Urban development and re-development processes occur within a complex scenario of locational or economic advantages and constraints which together combine to shape the overall pattern of the physical development and ultimately land value patterns. In oil and gas producing areas, production activities are facilitated by pipeline infrastructure traversing several kilometres and criss-crossing several communities and towns along its path from source through processing to consumption outlets or export terminals. The oil industry generally enjoys wayleaves under various enactments that enable them restrict third party access over such pipelines rights of way but from an urban development perspective, there are potential planning and development challenges arising from pipeline wayleaves which should be taken into consideration in urban design or upgrade. In Nigeria, the launch of the 50-year Greater Port Harcourt City development master plan in 2008, presents an opportunity to review historic development patterns shaped by pipelines wayleaves alongside the potential challenges this will have on the implementation of the new master plan. The study reveals that peri-urban lands severed by pipeline wayleaves exhibit a development pattern similar in shape to a spider's web with isolated pockets of land bounded on all sides by pipelines. It recommends the adaptation of this 'spider's web' phenomenon as a development model that can manage the land use requirements of the Master Plan, in harmony with existing land use pattern and thereby unlock land value potentials.

Keywords: gas, land values, oil, real estate, spider's web

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AN ASSESSMENT OF THE PROCUREMENT STRATEGIES FOR THE PROVISION OF POTABLE WATER TO LOW-INCOME URBAN AREAS IN NIGERIA

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The provision of water infrastructure is essential to the attainment of the Millennium Development Goals (MDGs), as all the goals are linked directly or indirectly to it. With the majority of the beneficiaries of the MDGs residing in the low income communities, it is essential that these communities are served with the necessary potable water infrastructure. An effective procurement strategy not only ensures the attainment of the time, cost and quality goals but also those social, economic, environmental and political goals. For the provision of potable water to low income urban areas (LIUAs) in Nigeria it was discovered that a single procurement strategy was being used. Therefore an assessment of the traditional procurement strategy available in Nigeria for the provision of potable water infrastructure was conducted. Literature was reviewed to form the basis for the interviews. The client and contractors were interviewed to ascertain the effectiveness of the process. Findings suggested that the effectiveness of the strategy was limited by political interference and uncertainty, unsustainable practices, inadequate institutional and financial capabilities as well as lack of clear and coherent holistic procurement strategy. Therefore a procurement strategy needed to be developed. This new strategy should be designed to be sustainable, holistic, clear, coherent, immune to political upheavals and involve all the stakeholders in order to offset these inefficiencies and to effectively procure water infrastructure to low income urban areas in Nigeria.

Keywords: low income, Nigeria, procurement strategies, potable water, urban areas

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DETERMINING CRITICAL PROJECT SUCCESS CRITERIA FOR PUBLIC HOUSING BUILDING PROJECTS (PHBPS) DELIVERY IN GHANA

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Public Housing supply remains one of the least given attention in Ghana over the past three decades. Successive Public Housing Building Projects (PHBPs) attempts have been unsuccessful due to a number of reasons. The lack of success on PHBPs is also due to the lack of clearly defined success criteria which guides the housing projects from inception to closure. The crux of the adoption and application of project management and project success criteria is to deliver projects successfully, attain enhanced output, develop framework to help track key project result and for enabling the appropriate allocation of resources. This research seeks to determine and establish what constitute critical project success criteria for PHBPs in Ghana. Questionnaire survey was used to elicit what is perceived as critical success criteria from respondents who have considerable experience and have been involved in PHBPs. Data analysis involving mean scores and t-test were conducted on the responses on 13-identified criteria to reveal and discuss its characteristics. The 'cost of individual house' and 'extensive use of local materials' were perceived as the most critical project success criteria and thus were ranked 1st and 2nd whilst 'risk containment' emerged as the least critical criteria. These findings could form the basis of a framework and formulating policies which will enable project managers (PM) involved in PHBPs to channel appropriate efforts and behaviours towards ensuring the attainment success in PHBPs delivery.

Keywords: criteria, Ghana, housing delivery, project management

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BUILT ENVIRONMENT RESEARCH IN WEST AFRICA: CURRENT TRENDS AND FUTURE DIRECTIONS

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The countries in West Africa (WA) are pushing for socio-economic development. The construction sector has an important part to play in helping to realise these aspirations. This necessitates an increased emphasis on research in the built environment, as a key contributor to developing capacity, knowledge and technologies for the sector. The West Africa Built Environment Research (WABER) conference was initiated in 2008. The objective was to: help young built environment researchers in West Africa (WA) to develop their research work and skills through constructive face-to-face interaction with their peers and experienced international academics; supply a platform for interaction among more senior academics and an outlet for disseminating their research work; and to serve as a vehicle for developing the built environment field in Africa. Three conferences have so far been organised, 2009 - 2011, bringing together ~300 academics, researchers and practitioners from the WA region. This paper draws on content analysis of the 189 papers in the proceedings of three conferences: 2009 (25); 2010 (57) and 2011 (107). These papers provide a window into current research priorities and trends and, thus, offer an opportunity to understand the kinds of research work undertaken by built environment researchers in West Africa. The aim is to illuminate the main research themes and methods that are currently pursued and the limitations thereof. The findings lay bare some of the many challenges that are faced by academics in WA and provide suggestions for alternative directions for future research and development work with indications of a potential research agenda.

Keywords: built environment, research, WABER conference, West Africa

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POVERTY AND ENVIRONMENTAL CONDITIONS IN INFORMAL SETTLEMENTS OF LAGOS MEGACITY: A TIME-LINE STUDY OF AJEGUNLE COMMUNITY (1998 – 2008)

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This paper investigates the growth of an informal settlement in the Lagos Metropolis over a period of ten years. Major issues considered include key socio-economic attributes as well as the quality of housing facilities and basic infrastructure in order to determine the level of poverty reduction and general environmental improvement. The research adopted systematic random sampling of 390 household heads in Ajegunle in 1998, 2002 and 2008 respectively. Issues examined include housing and environmental conditions; socio economic characteristics such as age, gender, income and survival strategies. The responses over the three periods were collated in order to develop a trend pattern. The trends observed were then analysed in order to determine their implication on urban planning and regeneration in the study area. Data was analysed alongside the specific targets outlined in the MDGs 1 and 7. Major results from the study revealed that poverty level of the respondents had grown worse over the study period. Average monthly incomes were significantly lower than the national minimum wage for each of the study periods. The Nigerian government is merely paying lip-service to issues of slum improvement and poverty alleviation. The contentious issue of security of tenure was quite evident and reflected in an unwillingness to improve environmental conditions by the respondents. A high rate of emigration was also noticed as more people are emigrating from Ajegunle whereby those who have been resident in the community since 1980 reduced to only 53% as at 2008. Housing tenure ship is mainly tenancy with 93% living in rented apartments in 1998. This figure fell to 60% in 2002 and rose considerably to 83% in 2008 thereby corroborating literature study of the prevalence of absentee landlords in most squatter settlements. The paper concludes by suggesting pragmatic measures towards meeting the specific targets of the Millennium Development Goals in the study area and also aid the evolution of a more sustainable Lagos. These include the adoption of pro-poor planning and local economic development as strategies for urban planning and regeneration.

Keywords: environmental condition, millennium development goal, poverty, slum

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AN INVESTIGATIVE STUDY OF THE EFFECT OF DESIGN DECISIONS ON THE COST OF BUILDINGS

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The cost of buildings is influenced by a variety of design variables. Prospective building clients seldomly have empirical cost data on the impact of design variables. Using rates obtained from synthesized bills of quantities, priced by professional Quantity Surveying firms in Port Harcourt metropolis (situate in Niger Delta region of Nigeria), the research analyses the impact of two plans shapes (rectangular and square of equal sizes) and their cost implications. The statistical tool of percentile was used to analyze the data obtained from the BOQs and designs from the two shapes. The research findings establish as follows: (i) That differences exist between the initial total costs of the square and rectangular shaped buildings, recording a 12.56 percent differential, (ii) The square shaped building is higher than the rectangular one, so also are the elemental costs, which established percentage differentials that ranged between 0.53 to 17.79%. It recommends that the effect of design variables (specifically plan shape) and others, on the cost of designs should be well appraised at the early stages. The Quantity Surveyors as a cost analyst should be engaged at the conceptual stages of design, using the tools of cost analyses, and iterations to arrive at optimal design shapes.

Keywords: design, cost, variable, project, ratio

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COST-CHECK PROCEDURE FOR VERIFYING THE APPROPRIATENESS OF LOANS FOR HOUSING IN NIGERIA

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This study developed four mechanisms for authenticating the appropriateness of mortgage granted to eligible persons by Federal Mortgage Bank of Nigeria (FMBN). The mechanisms were developed sequel to need for faster and reliable methods for loans determination as against doing so from first principles. Data were sourced via Questionnaires administered through stratified purposive sampling on Estate Developers, Valuers, mortgagors and officials of FMBN in the States that were selected and studied. The only hypothesis of the study assumed no significant relationship between FMBN's effective loans to particular income's Housing and the number of persons that accessed the loans in the income group. Data was analysed by ANOVA. The results revealed rejection of null hypothesis and acceptance of the alternate for all income groups. Thus, loans disbursed to low, middle, and high incomes Housing by the FMBN during the period between 1992 and 2010 were reasonable in the circumstance. Iteratively, the loans disbursed (1992 - 2010) were verified using the four mechanisms and at least, one mechanism was found to replicate the effective loans disbursed by the bank in each of the States studied. Thus, each of the mechanisms was found best fitted for use in specific States for loans determination or check for loans appropriateness to particular income's Housing in Nigeria.

Keywords: authentication, effective loans, mechanisms, replicate

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A HOLISTIC UNDERSTANDING OF THE CONCEPT AND MEASUREMENT OF PRODUCTIVITY IN THE CONSTRUCTION INDUSTRY: A NEW ZEALAND PERSPECTIVE

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The concept of productivity is not clearly understood in the construction industry. The inconsistency in its interpretations is behind the apparent lack of a generally acceptable approach to its measurement. The popular macro-economic view of productivity focuses solely on efficiency of resource utilization, which involves the input-output measurement schema; this is not helpful as a tool for performance measurement in the construction industry. This study contributes to filling the gap in the understanding and measurement of productivity by exploring a concept and measurement approach that resonates well with the industry aspirations and project focus. The full report presents the preliminary findings of a work-in-progress with two aims: the establishment of a holistic definition of productivity as a strategic and economic performance indicator; and the development of a framework for its measurement and use in benchmarking performance in project delivery. Following a two-stage qualitative data-gathering approach, personal interviews were used to obtain feedback from contractors and building owners of 16 recently completed medium to large sized industrial/ retail projects in Auckland. Content analysis and the multi-attribute method were used in the data analysis. Results show that, productivity at the project level comprises two limbs: resource efficiency (measured as the ratio of the value of the completed project to the total resource inputs), and goal effectiveness (measured as the extent to which the set project objectives were achieved, namely, budget, schedule and quality performance, as well as client satisfaction level). Practical application of the developed framework was successfully demonstrated in the case studies; it supports a recommendation for its use by project teams and other stakeholders for measuring and benchmarking productivity performance at the project level. The methodology could also be replicated for measuring productivity at the task, firm and industry levels.

Keywords: labour productivity, multi-factor productivity, New Zealand, performance measurement, productivity measurement

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KNOWLEDGE AND SKILLS REQUIRED FOR CONTRACTORS' HIGH PRODUCTIVITY AND PERFORMANCE IN CONSTRUCTION PROJECT DELIVERY: AN EXPLORATORY STUDY OF THE UP-SKILLING NEEDS OF THE NEW ZEALAND CONTRACTORS

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Lack of requisite knowledge and skills amongst industry operators had been identified as part of the key contributors to the continuous decline in the productivity and performance of the New Zealand construction industry. This paper presents the preliminary findings of an exploratory study aimed at establishing the key knowledge and skills for high productivity and performance of contractors in construction project delivery. Through personal interviews, feedback was received from contractors, construction project management consultants and clients. Content analysis and multi-attribute methods were used to analyse the empirical data. Results indicated three broad categories of knowledge and skills which support high productivity and performance of contractors in construction project delivery: technical, managerial and generic knowledge and skills. In total 20 out of the 24 identified skills and knowledge underlying the three broad categories were found to have moderate to high impact on contractors' productivity and performance. The levels of the contractors' strengths in the identified skills and knowledge areas were also analysed. Using a 3x3 Impact-Strength dimensional mapping, 7 skills and knowledge areas were found to be critical due to their high impact on productivity and performance and the contractors' weaknesses in them; these are: project management and leadership; risk management; financial management, accounting and cash flow management; strategic and change management; IT, computer literacy and BIM; and numeracy and problem-solving. The identified critical skills and knowledge are therefore recommended as the basis for a contractor education and training programme aimed at improving contractors' productivity and performance in the New Zealand construction industry.

Keywords: construction contracting, construction productivity and performance, New Zealand, project delivery

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SUSTAINABLE PROCUREMENT: THE CHALLENGES OF PRACTICE IN THE GHANAIAN CONSTRUCTION INDUSTRY

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The practice of procurement in Ghana seems to have neglected sustainability considerations. The purpose of this paper is to ascertain the extent to which public procurement practice in Ghanaian construction industry incorporates sustainability and the challenges that faces the practice of Sustainable Procurement (SP). First, procurement practitioners were interviewed to find out their understanding of SP in light of the environmental, economical and social goals of SP, and to also identify challenges that face the practice of SP in Ghana. Second, RII analysis was performed to measure the significance of challenges identified through the interview and from literature. It was found out that, by perception, SP is adequately addressed by the Procurement Law operating in Ghana; Act 663 (2003). However, among practitioners interviewed, there exists low level of awareness and understanding of the environmental, economic and social concerns of SP. Lack of understanding of the SP concept was determined as a major challenge that faces its practice in Ghana.

Keywords: Challenges, Ghana Public Procurement, Sustainable Procurement, Sustainable Procurement Practices

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APPLICABILITY OF BROMILOW'S TIME – COST MODEL ON BUILDING PROJECTS IN GHANA

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Construction time has been mentioned by most researchers as one of the key factors used in the determination of a successful project. Construction time is influenced by several factors out which cost also stands out prominent. Based on this, a time-cost model, known as Bromilow's time-cost model, has been developed for the determination of project success in cost terms in Korea. This paper assesses the applicability of the Bromilow's time cost Model on building projects in Ghana. Historical cost data on 62 completed building projects carried out within the period 2000 - 2007 were therefore assessed for achievement of the aim of the study. The data were obtained through a questionnaire survey in three regions of Ghana. The data was analyzed using multiple regression analysis with the aid of SPSS 17. The analyses revealed that the original Bromilow's model is generally not applicable to building projects in Ghana. This suggests that further research needs to be done to develop a model applicable in the Ghanaian construction industry.

Keywords: Bromilow's Time-Cost (BTC) Model, building projects, Ghana, Construction Time

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LESSONS LEARNT IN THE MAINTENANCE OF PUBLIC SCHOOLS' INFRASTRUCTURE IN THE GAUTENG PROVINCE, SOUTH AFRICA

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This study presents findings on the reasons why public schools infrastructure is in a dilapidated state, various factors which contribute to the dilapidation and establishes ways in which the state of old and new infrastructure can be improved in an attempt to preserve and maintain a good state of public schools infrastructure. A detailed literature review of both South Africa and international literature was compiled on public schools infrastructure. A questionnaire was designed to collect data from 9 schools in the East Rand. The field survey comprised of 3 Department of Education Officials, 9 school principals, 9 school teachers and 9 school governing body members. There are several factors that lead to the state of dilapidation of public schools. Public schools infrastructure suffer from dilapidation mainly due to neglect, inadequate maintenance, vandalism, lack of community involvement, lack of clear national standards on public schools' infrastructure, insufficient funds, lack of accountability at district and school levels for example. The study is restricted to the East Rand, Gauteng Province. The selection of East Rand as a case study has been mainly influenced by accessibility to the researcher, its high rate of overcrowding in schools and high rate of public school's infrastructure backlog. The results of the research will be taken as representative of the entire country. The study provides a detailed comprehension on the various factors which contribute to the dilapidated state of public schools' infrastructure, the main causes of dilapidation, challenges that schools face in keeping their infrastructure in a good condition and ways in which the dilapidated state of public schools infrastructure can be improved. The study provides an understanding of the various factors so as to enhance maintenance of existing public schools and the capability of the government to build new schools or extend the existing schools to meet the demand.

Keywords: infrastructure, maintenance, public schools

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AN EVALUATION OF DISASTER SAFETY PERFORMANCE OF THE HIGH-RISE-BUILDINGS IN ABUJA

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Disasters could occur anywhere and at any time but certain types of disasters are more likely to be more severe in some structures than others; especially those located in highly populated areas. This study aims at evaluating the safety performance of the high-rise-buildings in the Federal Capital Territory Abuja, Nigeria. The states of what the buildings can provide during disaster were reviewed and the aspects of disasters preparedness, information management, disaster facilities and rescue strategies were investigated. Questionnaire was administered to the owners of the buildings, estate managers and disaster managers who manage the building and interviews were also conducted with tenants and rescue organizations to supplement the information obtained. The result revealed 70% level of safety but the tenants were 25% not confident in the disaster management strategies adopted. Since the sources of the disaster risk were mostly man made and environmental, good governance and enhanced coordination can eliminate the risk and improve the safety status of the buildings.

Keywords: disaster-management, high-rise-building, information-management, safety-performance

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SECOND HAND SMOKE (SHS) EXPOSURE IN PUBLIC PLACES, ANY LESSON TO LEARN FROM OTHER NATIONS?

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Over the last decade, efforts have been made on the need to improve the air quality in public places due to the amount of evidence gathered on the possible health impact associated with the exposure of airborne pollutants in public places which second hand smoke is considered as part of the major contributor of these pollutants in the environment. It is now a known fact, that human beings globally spend between 55-90% of their time in enclosed environments hence been exposed to pollutants present in the building, part of the strategy is need to bring to an end the publics' exposure to Second Hand Smoke (SHS) in buildings. A set of questionnaire centred on second hand smoke issues was administered to 137 person's residence in Abuja, the Federal Capital Territory of Nigeria. The result showed 64.2% of the respondents smoke, and 35% from this group of smokers acknowledge to smoking within enclosed buildings including and their cars. Since there is no safe exposure level for tobacco smoke, part of the recommendation focused on the need to eliminate this practice from the public places in other to protect the health of persons living or working there. Although the participants' awareness level around second hand smoke was found to be high, also considered is the urgent need to draw the attention of experts within the built environment especially in tropical climate like Abuja, on finding ways to safeguard the lives of users of public places starting from the design, construction and operation stage of these facilities used by the general public almost on daily basis.

Keywords: exposure, indoor environment, public health, second hand smoke

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AN ASSESSMENT OF THE IMPACT OF INSURANCE IN MANAGING RESIDENTIAL AND COMMERCIAL RISK

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The recent development in Nigeria where most cities are becoming increasingly urbanized which was orchestrated by man's demand for a place of abode and the drive to increase ones wealth. The development has given rise to a lot of residential and commercial building dotting most of our urban cities. However, it is pertinent not to shy away from the risks associated with this development in order to maintain an effective urban security. The aim of the study is to understudy the level of contribution made by insurance companies in maintaining urban security. This study is postulating that insurance companies help to reduce risk exposure of residents of residential and commercial area. The study adopts a descriptive approach and with the help of statistical tool to analyze important variables. The study recommended that individuals, corporate bodies and government should embrace insurance culture as a way of lifestyle to maintain an effective urban security.

Keywords: assessment, commercial area, impact, insurance companies, managing, residential area, risk.

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INVESTIGATION OF A FINANCIAL MODEL FOR SMALL, MEDIUM AND MICRO-ENTERPRISES CONTRACTORS IN SOUTH AFRICA

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The financing needs of contractors, especially emerging contractors, need to be explored. In the case of the Small, Medium and Micro-Enterprises (SMMEs') within the contracting sector, a type of "finance-PLUS" arrangement, which sees the lender, or an intermediary, offer additional support services to emerging enterprises, would be worth exploring. This study follows a focused approach towards the investigation of a financial model for small, medium sized contractors in South Africa. Interviews were conducted and questioners were sent out to different constructors who have been successful in the business for more than five years and also contractors who are currently straggling and trying to survive and grow. The findings of the study point to the fact that conventional financing mechanisms do not allow for cost-effective provision of finance to large numbers of entrepreneurs seeking small quantities of finance. Effects of poverty and lack of assets mean that many people do not have the collateral needed to access finance. The study also found that although there are different initiatives that are in place to assist small and medium size contractors the typical problems and challenges still exist. The importance of systematic, regular and objective monitoring and evaluation of progress with the overall strategy and its different components is beyond dispute. Government must support and encourage lively public debate about the goals, means and effectiveness of small-enterprise support in South Africa, against the background of South Africa's urgent ever-changing, socio-economic challenges. It is trusted that such an open mind will also strengthen public understanding that government is but one "party" in the needs of small and medium scale contractors. Further research is therefore suggested as a means of establishing the specific relationships and correlated variables presented by the funding institutions and the entrepreneur. Conclusions will be drawn from the analysis and recommendations will be made for further study and curriculum revision, if necessary. All types of businesses need capital before and after they start operating as well as for expansion purpose.

Keywords: agency, financial model, micro-enterprise, South Africa

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A COMPARATIVE STUDY OF THE POTENTIAL PROPERTIES OF NIGERIAN RICE HUSK ASH (RHA) BLENDED CEMENT CONCRETE

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Among agricultural wastes, Rice Husk Ash (RHA) has the greatest potential as a substitute to Ordinary Portland Cement (OPC) in concrete production. However, in Nigeria little research work exists on the performance of RHA sourced from different locations within the country. This paper compared the properties of RHA blended cement concretes sourced from Kebbi State (RHA-K), Plateau State (RHA-P), and Lagos State (RHA-L). Concrete cubes and beams were prepared and crushed for compressive strength using mix design targeted strength of C-25 with water/cement ratio of 0.6. Partial replacement levels of 0% (control), 10%, 15%, 20%, 25% and 30% with hydration periods of 7, 14, 28, and 90 days were adopted. Results indicate that at 28 days curing and 25% replacement, RHA-P gives better compressive strength (29.6N/mm^2) followed by RHA-K (27.8N/mm^2) and lastly RHA-L (26.2N/mm^2). The same trend of differences in flexural strength was equally recorded. It was further found that compressive and flexural strength increase with increase in percentage replacement level of RHA up to 25%, but decreases drastically at 30%. It was concluded that the source of RHA influences the performance of the RHA blended cement concrete. It was therefore recommended that RHA-P is more suitable at 25% optimum replacement when compared to RHA-K and RHA-L.

Keywords: compressive strength, flexural strength, potential properties, rice husk, rice husk ash.

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ACHIEVING THERMAL COMFORT IN RESIDENTIAL BUILDINGS USING EXPANDED POLYSTYRENE (EPS): A STUDY OF CITEC BUILDINGS IN ABUJA

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Humans and indeed architects have been in the business of finding ways of creating buildings with conducive internal and external environments as a way of adapting to the climate and ensuring occupants' well-being and productivity (thermal comfort). The focus is on Nigeria and its tropical climate which is characterized by hot-humid conditions, hot-dry conditions (harmattan) and intense rainfall, alongside the challenges of providing for indoor thermal comfort passively and reducing energy use in buildings. In a bid to downplay the negative effect of its climate, research has been made worldwide to develop materials that are environmentally friendly yet conservative in energy and sustainable for the local people. Expanded Polystyrene (EPS), one of such material, is a polymer of polystyrene that is employed in building systems. This research studies existing prototypes at CITEC Estates to evaluate the condition of the internal environment created within structures constructed with Expanded Polystyrene (EPS), assess how EPS has been able to achieve thermal comfort passively in residential buildings and its suitability to the local climate. Findings from the field survey support the argument that for the Nigerian climate, EPS will help to better moderate our climate thermally.

Keywords: expanded polystyrene, laterite, residential buildings, sandcrete and thermal comfort

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AN APPRAISAL OF THE PROVISION OF URBAN INFRASTRUCTURAL FACILITIES AS A MEANS OF REALISING LATENT RESIDENTIAL PROPERTY VALUES IN AKURE, NIGERIA

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The study aimed at investigating the effect of infrastructural upgrading on residential property values in Oke-Aro/Eyinke in Akure with a view to enhancing the sustainability of residential property and rental values. This neighbourhood was compared to Isolo/Araromi where infrastructural upgrading exercise was not done. The sampling frame of the houses in the neighbourhoods (Oke-Aro/Eyinke and Isolo/Araromi) was 425 and 412. However, Kothari formula was used to arrive at a sample size of 289 in Oke-Aro/Eyinke and 280 in Isolo/Araromi for the study. Questionnaires were administered to occupants of residential properties in the neighbourhoods to elicit information. Out of the five hundred and sixty nine questionnaires administered on occupants in the neighbourhoods only four hundred and fifty six were duly filled and returned for analysis. The information collected was analysed using the descriptive statistics and Multiple Regression Analysis. The result reveals that when infrastructural facilities was put in place rental values in Oke-Aro/Eyinke experience a sharp increase between the periods of 2007-2009, thereby bringing out the hidden values of the properties these was attributed to the upgrading of urban infrastructures and Isolo/Araromi is still experiencing a steady increase in rental value. The study therefore, recommends that the state government should enlighten the people on the importance and management of these infrastructural facilities, this is needful so as to sustain every improvement put in place also, essential infrastructures should be provided in Isolo/Araromi so as to bring out its hidden values, maintenance culture is very important to avoid the deterioration of facilities put in place and achievement of the expected end result.

Keywords: infrastructure, property value, residential and urban

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CLIENT INFLUENCE ON VALUATION PROCESS: MEANS, MOTIVE AND IMPACT

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The inherent subjectivity of the valuation process makes it susceptible to client influence. The study investigates client influence on valuation in Nigeria with a view to determining its impact, ascertaining the means clients employ to influence valuers and the motives for valuers to yield to pressure. The study employed questionnaire survey on Likert response format to collect data from a sample of valuers across the country. Mean and frequency were employed to analyse the data. The results indicate that client influence has negative impact on valuation practice. Clients employ several means to bias valuation. However, their approach is more of rewards/plea and information than threat/coercion. Client influence on valuation process has become an important issue in the valuation profession. Economic pressures occasioned by the tight valuation market and environmental influence demonstrated in the high level of corruption and indiscipline in the Nigerian society provide the incentives for valuers to succumb to pressure. Whatever the motive, however, client influence is detrimental to the valuation profession. It undermines the professional ethics and code of conduct especially valuer's independence and the obligation for objectivity and unbiased reporting. Valuers, the professional association and valuation regulatory body should therefore take appropriate steps to tackle the problem.

Keywords: biased, client influence, client pressure, impact, means, motive, valuation outcome, valuation process

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BIOPHILIC DESIGN: A SUSTAINABLE RESPONSE TO CLIMATE CHANGE – THE ECONOMICAL ECOLOGICAL SOLUTION OF A MODERN DAY ECOCITY - THE CASE STUDY OF ECOPARK, HANOI, VIETNAM

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Presently the world is facing many global environmental risks, such as climate change, drought, severe storm systems, earthquakes, forest fires, rainforest depletion and pollution. These disasters have strongly affected many people around the world. In addition, many nations are bearing the added weight of a global economic crisis. Nigeria together with many West African nations is among the many countries of the world that have been heavily affected by both economic uncertainty and environmental concerns. In understanding the sustainable solution of the modern day ecocity; ECOPARK, Hanoi, Vietnam, hereby presented and the challenges which lie ahead, Nigeria and all West African cities, including all cities of the world, will have the responsibility of developing a living environment that is safe and sustainable, as they will face significant changes in the future. ECOPARK, ecological township in Vietnam is no exception and is being highlighted in this research as an example of sustainable biophilic development with a definitive plan to create an ideal sustainable community where we can bring true value to the lives of our residents and the global community as a sorely needed sustainable response to climate change.

Keywords: ecocity, sustainable development, biophilic design, climate change, ecological

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ENERGY OVERVIEW OF BOTSWANA: GENERATION AND CONSUMPTION

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Botswana has a basic need to explore its energy concept, this being its energy sources, generation and percentage of the population with access to electricity. At present, Botswana generates electricity from coal, which supplies about 29% (on average) of the country's demand. The other 71% is imported mainly from South Africa (Eskom). Consequently, the dependence of Botswana on imports poses threats to the security of its energy supply. As a result, there is the need to understand the bases for a possible generation expansion that would substantiate existing documentation. In view of this need, this study investigates the existing energy sources as well as energy consumption and production levels in Botswana. The study would be further developed by making projections of the energy demand up until the year 2020. The key techniques that were used include; literature review, questionnaire survey and an empirical study. The results presented indicated that, current dependable operation capacity (i.e. 100MW) should be increased to 2,595 MW or more assuming 85% plant efficiency. This would then be able to meet the growing demand for energy use. In addition, the installed capacity would be able to support commercial and mining activities for the growth of the economy.

Keywords: Botswana, energy, electricity generation, electricity production, electricity consumption

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WASTE TO WEALTH: A STUDY OF LATERITE BRICKS PRODUCED USING BLENDED INCINERATED CORN-COB ASH CEMENT

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In recent past good attempts have been made for the successful utilization of various agricultural and industrial waste to save environmental pollution. Currently Nigeria has taken a major initiative on developing its infrastructures such as express highways, power projects, industrial structures and mass housing schemes etc., to meet the requirements of globalization, in the construction of buildings and other structures. River sand and Ordinary Portland cement (OPC) which is one of the major constituents used in the production of conventional block has become very expensive, while river sand is becoming scarce due to depletion of river bed. As a result, the suitability of stabilizing laterite brick with Corn cob ash (CCA) an agricultural waste was sought. The Physical, mechanical and durability properties of bricks produced using laterite stabilized with corn cob ash incorporating OPC cement as admixture were investigated. This paper reports the experimental study which investigated the influence of CCA stabilization of 0%, 2%, 4%, 6%, 8% and 10% at 1%, 2%, 3% cement admixture. The experimental results showed that the compressive strength property increases with age at curing. Stabilization up to 6% was found to enhance the strength.

Keywords: blended cement, compressive strength, incinerated corn-cob, laterite bricks

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URBAN HOUSING DELIVERY: EXPANDED POLYSTYRENE PANELS INITIATIVE IN ABUJA, NIGERIA

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In recent times, Abuja, the Federal capital city of Nigeria has witnessed an extensive use of innovative building materials including Expanded Polystyrene (EPS) in housing delivery. This is in the quest to develop alternative local building materials to the conventional sandcrete blocks, which is of increasing high cost and import dependent. This paper therefore, reports a comparative study on the use of EPS materials over the sandcrete blocks in masonry works in FCT, Abuja. Data for the research were obtained through interview schedules and observations from five (5) selected case studies of housing projects built with EPS panels in Abuja and compared with other housing projects constructed with sandcrete blocks with the aim of ascertaining the comparative advantages of EPS panels over the conventional walling materials. Over one hundred and twenty (120) building professionals (Architects, Engineers, Builders and Quantity Surveyors) involved in the construction of these projects were interviewed. Analyses of the findings indicate that EPS buildings demonstrate high thermal insulation capacity, light weight, faster time, higher strength, greater structural stability and cost effectiveness. The paper concludes that EPS panels are better alternatives to the conventional sandcrete blocks and should be used in place of the former in housing delivery in Nigeria.

Keywords: Abuja, building materials, expanded polystyrene, urban housing

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TRENDS IN RESIDENTIAL LAND VALUES IN AKURE, NIGERIA

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The study examines the trends of residential land values in Akure - a medium sized city in south - western part of Nigeria. The main thrust is to identify how land values have changed over a time frame of 5 years (1996-2010) and the kind of trends land values follow in this city. To achieve this, the city was stratified into three residential neighbourhoods. The various practicing estate surveying and valuation firms in Akure were contacted to get information on land values in these residential neighbourhoods within the city. Statistical averages and time series analysis were used in the analysis and presentation of the data. The result showed that land values experienced an upward increase in different areas and at different times but the increase is more pronounced in the low density residential neighbourhood. The study recommends deliberate and innovative approaches which will solve land affordability problems and its attendant rising values. The findings of this paper will be useful for an understanding of the property market in Nigerian cities and other parts of the developing country. The result of which will also be beneficial for investors and policy-makers in their decision-making processes.

Keywords: land value, trend, land use, urban land

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ASSESSING PROJECT GOVERNANCE STRUCTURES IN CONSTRUCTION PROCUREMENT: THE SEARCH FOR A UNIFIED THEORY

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An attempt at conceptualizing project governance has been made. Rather than commence with existing definitions of project governance, the work draws on literature in project management, public governance as well as corporate governance to construct from the basics what project governance is. The path leads to uncovering what we call the “5whs” of project governance—a set of questions that delimit the scope of project governance as a construct within the construction procurement and supply chain management literature. We posit that an assessment of project governance frameworks in use calls for a unified theoretical framework. The intention for the wider research work is the unification of seven distinct theories - agency theory, transaction cost economic theory, social network theory, the theory of coordination, the transformation-flow-value theory of production, the stakeholder management theory, and the language /action perspective theory - into a synthetic theoretical platform for evaluating extant project governance frameworks in public sector construction procurement. This paper however discusses public sector construction procurement within principal-agent theory as a frame of reference, identifying four agent types and three distinct project governance challenges. We conclude with the research goals of the wider doctoral research and our plan to deploy a unified theoretical perspective to discourse upon the questions embodied by the “5whs” project governance construct.

Keywords: adverse selection, construction procurement, collusion, project governance

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GEOSPATIAL ANALYSIS OF LANDSLIDE VULNERABILITY IN KUJE AND ENVIRONS, ABUJA NIGERIA

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Natural and human activities such as flooding, improper building patterns, poor drainages and general land use are taking negative toll on Kuje and environs. Landslide phenomenon includes a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flows, which occurs over a given terrain. This study aims at analyzing areas vulnerable to landslide in Kuje area of Abuja Nigeria using geospatial techniques. The datasets used include Shuttle Radar Topography Mission (SRTM) and Advance Space borne Thermal Emission and Reflection Radiometer (ASTER) data, topographic map, GPS coordinates acquired during field work, digital photographs, high resolution imagery, geological and soil maps. A total of 3834 grid data points (3-dimensional) were generated from SRTM and ASTER data for the terrain visualization and analysis. The digital terrain models and maps created for terrain analysis include, surface model, profile and cross sections, land use and maps of areas prone to landslide/slope failure. The results of the study show traces of landslides and slope failures in the southern and eastern axes of the study area caused by a combination of factors such as deep surface sand mining (along roads, streams, drainages and building sites), flooding, erosion and incomplete construction activities. From the field measurements, the magnitude of land slide/slope failures along critical features such as streams, roads and drainages is in the range of 3.5m to 4.4m in height/depth. The long term inherent danger in these phenomena is ground subsidence and structural deformation in the study area.

Keywords: geospatial analysis, landslide, land use, slope failure, topography

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INFLUENCE OF CURING REGIME ON COMPRESSIVE STRENGTH DEVELOPMENT OF HIGH STRENGTH CONCRETE

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Compressive strength of high strength concrete (HSC) cubes cured in water and uncured by storing in ambient air were determined at 3, 7, 14 and 28 days. The compressive strength of HSC cubes continuously cured in water for limited durations and then subsequently removed and cured in air were also established at the same age of 28days to determine the effect of limited wet curing duration on compressive strength. The results show that at 28 days, compressive strength of uncured cubes was 6.81% less than water cured cubes. The results also show that the maximum compressive strength at 28days was recorded for cubes continuously cured in water for a limited period of only 4days.

Keywords: compressive strength, concrete, curing

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MORTGAGE INVESTMENT IN OSUN STATE: AN EVALUATION OF THE ROLE OF ESTATE SURVEYORS AND VALUERS

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The determination of value of land and landed properties for all purposes is by virtue of decree No 24 of 1975 the responsibility of an Estate Surveyor and Valuer. Concern has risen over the incursion of non Estate Valuers in Mortgage Valuations and it is perceived that banks are beginning to doubt the Estate Valuer's opinion. This paper investigates Mortgage investment with respect to the Estate Valuers' work. A survey research method was adopted for the study. Two different sets of well structured questionnaires were served on 25 practicing Estate Valuers and loan officers in the 22 commercial Banks (respectively) in Osogbo and Ile-Ife of Osun state. The data collected were analyzed using frequencies, charts, mean score, likert rating scale and regression analysis. Findings revealed among other things that majority of the Estate Valuers (47.07%) often adopt cost method in valuation for mortgage purposes. The general consensus was that the Estate Valuers' figure provides adequate cover for the amount of loan advanced. The regression analysis results indicated a high positive correlation of 0.935 between the variables. Of the four predictors used, only the second predictor (Valuer's do not carry out enough investigation/inspection) significantly predicts Valuer's work. The study recommends that Estate Valuers should ensure adequate inspection and proper reporting of properties. The Nigerian Institution of Estate Surveyors and Valuers is urged to organize a mandatory educational enlightenment programmes aimed at keeping Estate Valuers abreast with the global trends in valuation practices to enable them satisfy their clients' expectations.

Keywords: estate surveyor, investment , landed property, mortgage, valuation

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AN APPRAISAL OF INDIGENOUS LIMITED LIABILITY CONSTRUCTION COMPANY IN SOUTH-WESTERN NIGERIA

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Viability of any construction industry determines the level and frequency of its involvement in the construction activities and consequently its survival. Survival of the ILLCC is mostly threatened by the existence and performance of the foreign companies. However, the competitive environment still gives room for the willing ILLCC to strive for excellence. Therefore this paper assessed the determinants of the viability of ILLCC in South-western Nigeria so as to predict their survival in the highly competitive construction environment. Archival data on 54 annual financial status of projects executed by 19 contractors purposively selected in the study area were used for this study. The data included construction and overhead cost, their fixed assets, gross earning and profit between 2008 and 2010. These were subjected to analyses of regression and correlation to determine the relationship between profit and gross earning and also between profit and fixed asset. The result indicated that the sum spent on fixed asset was low and average profit of ILLCC in South-western Nigeria was low although higher than UK margin. The profit was positively and significantly influenced by gross earning and fixed asset except in 2008. ILLCC contractors in Nigeria should concentrate more on the financial factors with great effect on their profit for growth and sustenance in the competitive building environment.

Keywords: indigenous, limited liability company, Nigeria, South-western

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EFFECT OF CALCINATION ON OXIDES COMPOSITION OF DUTSIN DUSHOWA VOLCANIC ASH OF JOS PLATEAU

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This study investigates effect of calcination on oxide composition of Volcanic Ash (VA) sample obtained from Dutsin Dushowa, Kerang in Mangu Local Government Area of Plateau State, Nigeria. VA sample was collected as a lump, pounded, grounded, sieved with a 75 μm sieve and calcinated in a furnace at five temperatures levels (i.e. 500, 600, 700, 800 and 1000 °C) before packaging for Chemical Analysis in Sagamu works Department of West African Portland Cement Company (WAPCO) via an X-ray fluorescent Analysis using a Total Cement Analyser model ARL 9900 XP with control being Pulverized VA sample in the natural state. The result reflects that Silicon Dioxide (SiO_2) content and total Silicon Dioxide, Iron Oxide, and Aluminium Oxide ($\text{SiO}_2+\text{Fe}_2\text{O}_3+\text{Al}_2\text{O}_3$) content improved at a decreasing rate as the temperature of calcination increases. Values varied from 41.13% (at natural state) through 42.41% (at 500 °C) to 43.36% (at 1000 °C) for SiO_2 and from 70.99 % (at natural state) through 73.13% (at 500 °C) to 74.65% (1000 °C) for $\text{SiO}_2+\text{Fe}_2\text{O}_3+\text{Al}_2\text{O}_3$. All the samples were noted to satisfy the requirements of ASTM C618:2008 and IS 3812:1981 on basis of oxide composition.

Keywords: calcination, chemical analysis, oxide composition, pozzolan, volcanic ash

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THE LIFECYCLE ASSESSMENT OF INTERLOCKING BLOCKS AND BRICKS

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This study is based on the Assessment of lifecycle of interlocking blocks and or bricks. The provision of alternative economical materials for wall construction has a significant impact on cost of construction. The study of the economical effectiveness of materials could not be concluded, if the lifecycle of the materials are not considered. This study was able to compare the maintenance required throughout the functional life of interlocking blocks or bricks and information are obtained from users (occupiers, owners and developers) in Lagos and Ogun State, Nigeria. Due to the nature of the material this research is being made on, there are few houses that are built using the material. Therefore few users, occupiers and producers are available to reach for their opinion about the interlocking blocks and bricks. This is why out of thirty (30) questionnaires distributed, twenty (20) that is 67% were completed and returned. Using the result obtained through administration of questionnaire and personal observation on summated rating scale. All the respondents who are majorly occupant and / or owner of buildings built with it responses revealed that it is more economical to build with interlocking blocks or bricks than non-interlocking types as it requires little or no maintenance throughout their functional life. The uniqueness, innovation, aesthetic, speeds of construction among others are factors that determine the preference for its use. The major constraint in its use is the fact that there are few people who can deliver good workmanship for its use in construction. The study was concluded by recommending more awareness of the use of interlocking blocks and bricks as the comparison with non-interlocking blocks and bricks reveal its merits. Area for further research was suggested on the potential value of using the material in order to discover why it is more preferred in other parts of the world.

Keywords: interlocking block, interlocking brick, lifecycle

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WATER HYACINTH (*EICHHORNIA CRASSIPES*) LEAVES EXTRACT AS CORROSION INHIBITOR FOR AISI 1030 STEEL IN SEA WATER

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The study of corrosion inhibition of AISI 1030 steel in a chloride environment with water hyacinth extract as inhibitor was carried out. Corrosion is the engineer's greatest enemy as water hyacinths are also weeds which grow on the surfaces of water bodies posing dangerous threats to aquatic lives and water transportation. Since both corrosion and water hyacinth are threat to the environment this research sought to use one environmental menace (water hyacinth leaves extract) as an inhibitor to curb corrosion; another environmental menace. The extract from this water weed was obtained and analyzed for chemical composition. Samples of AISI 1030 steel were subjected to sea – water environment with the inhibitor at varied concentrations for an exposure period of forty – five days. Corrosion was examined using weight loss and electrode potentials techniques. The result showed that as the concentration of the inhibitor increases, the severity of corrosion reduces on the AISI 1030 steel. The cation content of the extract is predicted contributing to the reduced corrosion rates of the samples as the exposure period increases. It was observed that the steel sample inhibited with 20 ml of 20 g of the inhibitor gave the highest inhibition efficiency of 89.63 % in the forty – five days exposure period. Water hyacinth leaves extract effectively inhibit corrosion of AISI 1030 steel in marine environment.

Keywords: electrode potential, chloride environment, corrosion inhibition, water hyacinth

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MANAGING CONFLICTS RELATING TO PROPERTY MANAGEMENT: THE ROLE OF ESTATE SURVEYORS

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Conflict resolution is an expanding field of professional practice around the world and the need to promote healthy landlord-tenant relationship is on the increase. While some conflicts are inevitable many disputes relating to property management are quite preventable especially where the property manager exhibits high level of professionalism. The success attained in handling disputes determines the ease with which the objective of investment in landed properties would be achieved. This study examines the various conflict points in the management of rental properties with particular focus on Lokoja residential property market in Kogi State, Nigeria. Primary data on which its findings are based were sourced from property owners/landlords and tenants in the study area. Stratified random sampling was used in selecting respondent tenants from five neighborhoods and a total of 300 questionnaires were administered on them out of which 235(78.3%) were returned and good for analysis. Structured interview was conducted on 23 purposively selected respondent landlords. The data were analyzed using the descriptive statistics. Findings indicate that issues relating to rent revision are the major source of dispute common among both landlord and tenants in the study area and that this has singularly discredited many property managers in the public perspective. It was recommended among others that property managers should employ good communication, adhere to the profession ethics and remain objective in decision making.

Keywords: conflict management, estate surveyor, Lokoja, property manager

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MITIGATING INFORMAL ECONOMIC SECTORS' PROLIFERATION THROUGH MICROCREDIT SCHEME FOR SMALL AND MEDIUM SCALE ENTREPRENEURS IN METROPOLITAN LAGOS

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The aim of this paper is to examine impacts of informal economic sector, in order to integrate it into the urban economy of Lagos Metropolis. The proliferation of informal economic sector results into environmental degradation because it is usually present in public open spaces, meant for other purposes. The study relies on primary and secondary data. The survey was carried out using systematic random sampling technique to ensure a fair representation of the population on each selected roads. A total of 9 roads were selected for study in the Eti-osa, Lagos Island and Surulere Local Government Areas. A sample size of 463 was selected using 10% of every informal sector on all roads in the study area except Nnamdi Azikwe and Igboere road, 0.5% and 2.5% were selected respectively. Hence, 463 questionnaires were administered to respondents in the study area. Data was analyzed with regression analysis statistical technique, the estimated relationship between informal sector activities, encroachment and traffic flow was found to be significant also the alternative hypothesis acceptable. Findings show the relationship between road encroachment, traffic congestion and informal economic sector in the study area. The paper concludes that inadequate road setbacks, weak regulatory mechanism and inadequacies of Government agencies are the basic factors responsible for environmental degradation in Metropolitan Lagos. However, the informal economic sector also contributes to poverty and social vices' alleviation through its employment generation ability. Hence, the need for its integration into the urban system. This integration can be made possible through access to micro-credit for Small and Medium scale Entrepreneurs (SMEs) and re-design of circulatory system; to achieve an enabling environment for living and working within the urban system of Metropolitan Lagos.

Keywords: entrepreneur, informal economic sector, micro-credit scheme, urban area

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ASSESSMENT OF THE IMPACT OF TRANSPORTATION FACILITIES ON THE PATRONAGE OF TOURISM SITES IN ONDO STATE

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All over the world, empirical studies have proven that adequate or inadequate provision of transportation facilities affects the level of patronage of tourism sites. The study is aimed at evaluating the modes, availability and condition of the transportation facilities, i.e. roads leading to the selected tourism sites in Ondo state. Data will be collected from direct observation and in depth interviews of the patrons at the tourism sites with reference to their perception of the transportation facilities leading to the tourist sites. The sample frame for the study is the patrons to the eight (8) identified tourist sites out of which the sample size was drawn. The sample size for the study was determined through a systematic random selection of 1 out of every 2 patrons of the tourist sites, representing fifty percent (50%) of the sample frame. The data collected were analysed using descriptive and inferential statistics. Findings showed that most of the tourists are unsatisfied with the state of the transportation facilities and this is represented by 52.9% of the respondents. Also from the Likert Scale table used, it was discovered that factors like width of road (-0.14), maintenance of road (-0.24), safety along the route (-0.05) and availability of parking space (-0.23) showed negative deviations, while only traffic regulation and control (0.54) and ease to tourist site (0.14) showed positive deviations when the patrons were sampled. It can therefore be concluded that there is the need for total rehabilitation of all the routes leading to most of the tourism sites in Ondo state. This can be achieved through coordinated efforts of the public (government) and private sector. In addition, there is the need to involve the private sector in the provision of necessary transportation facilities in all the identified tourism sites towards a sustainable built environment.

Keywords: built environment, transportation facilities, tourism, patronage

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CORRELATES OF JOB SATISFACTION AMONGST QUANTITY SURVEYORS IN CONSULTING FIRMS IN LAGOS, NIGERIA

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Job satisfaction is the sense of well-being, good feeling and positive mental state that emerge in an incumbent worker when his obtained reward consequent upon his performance is congruent with his equitable reward. Extant literature in other sectors of the economy points to the fact that factors such as poor working conditions, below competitive salaries, a lack of promotional opportunities are some of the factors contributing to employee dissatisfaction. The aim of this study is to ascertain the levels of job satisfaction amongst quantity surveyors in consulting firms in Lagos, Nigeria. Biographical and job descriptive index questionnaires (JDI) were administered to gather the data. The JDI measures job satisfaction on five facets, namely, pay, promotions, supervision, co-workers and the work itself. A total of 100 questionnaires were collected and used for the study. The survey covered quantity surveyors in consulting firms in Lagos and the respondents were selected using stratified random sampling technique. Data collected were analysed using mean item score, spearman rank correlation, correlation matrix, linear regression analysis where appropriate. Findings of the study revealed that the respondents were satisfied with the relationship with co-workers, nature of work and the supervision they receive. Major sources of dissatisfaction are promotion and salaries of the respondents. This finding is a bold step and necessary benchmark for resolving major sources of dissatisfaction among quantity surveyors in consulting firms. The roles of other contextual factors on job satisfaction need to be contemplated for future research.

Keywords: consulting firms, correlates, Job satisfaction, Nigeria, Quantity Surveyor

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AN INTEGRATED SUPPLY CHAIN RELATIONSHIP MANAGEMENT THEORETICAL FRAMEWORK FOR IMPROVING ENGINEERING AND DESIGN SERVICE DELIVERY (EDSD) TO BUILDING CONTRACTORS IN GHANA

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The processes of managing projects have seen a lot of development and transformation in structure, systems and strategies to overcome non collaborative working and adversarial relationship in construction industry. However, these developments and transformation efforts have not been able to change much the behavioural business attitudes of Engineering and Design Service Delivery (EDSD) practitioners and contractors to improve EDSD activities. The objective of this paper is to develop a framework, which is Theory of Action oriented, guided by diagrammatic illustration from Multi-Grounded theory. Through a review of relevant literature, EDSD practitioners' discussions and explanations offered by the Theory of Action definitions, terms and procedures for the literature content of relationship improvement levels in the framework, five maturity stages/periods such as: adversarial, transitional, short-term, medium-term and long-term have been identified for EDSD improvement. Further, it has been found out that by facilitation, workshops, seminars, for a and meetings can be used to achieve joint goals, capacity and capability of contractors/EDSD practitioners to adopt the critical relationship improvement factors for business relationship improvement and continuous improvement. As an integral part for the free flow of feedbacks, traditional non adversarial and innovative information for the improvement of EDSD to Building contractors, much attention has been given to business relationship improvement in the theoretical framework specifically.

Key words: engineering and design, Ghana, supply chain

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OPTIMISING SOIL-CEMENT-ASH STABILISATION MIX FOR MAXIMUM COMPRESSIVE STRENGTH: A CASE STUDY OF THE TROPICAL CLAY SUB-BASE MATERIAL STABILISED WITH CEMENT-LOCUS BEAN WASTE ASH

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The results of a laboratory study on the influence of standard Proctor (SP) and West African Standard (WAS) compactive efforts on the compaction and strength characteristics of tropical black clay treated with a maximum 8% cement / 8% locust bean waste ash (LBWA) blend by dry weight of soil is presented. Test results show that the compaction and strength properties of the treated soil generally increased with higher additive contents and peak values were recorded at 6% cement / 6% LBWA content for the compactive efforts considered. Based on durability criterion, an optimal 6% cement / 6% LBWA is recommended for treatment of black cotton soil compacted using WAS energy for use as sub-base material in road construction.

Keywords: clay, compressive strength, sub-base material

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AN EXAMINATION OF THE NIGERIAN SUSTAINABLE URBAN DEVELOPMENT STRATEGIES AND GOVERNANCE

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Despite the actions of past Nigerian administrations to contain the problems of urbanization through the promulgation of major land development and urban management laws establishing special regulatory institutions, the cities are still besieged by many of those challenges. With the intent to examine the duties and responsibilities of the various tiers of government in achieving a sustainable urban built environment, the tools for urban governance were explored. Thus, existing legislations on urban development were analyzed against the principles of sustainable development. Drawing from a critical review of the 1999 Constitution of Federal Republic of Nigeria and the Nigerian Urban and Regional Planning Law; the study revealed that, though, the statutes provide viable structures for tackling the challenges of municipalities, the fundamental rules for making decisions run parallel to the universal principles of sustainable development and good urban governance. It also showed that the over-bearing centric and techno-bureaucratic approaches impede the capacity of the grassroots urban governance structures to respond to issues of urban development. Therefore, it is recommended that for effective grassroots urban governance in Nigeria, the universal strategies of popular participation, and a decentralized self-correcting administrative system are adopted.

Key words: grassroots urban management, popular participation, sustainable development, urban development strategies, urban governance

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CHARACTERIZATION OF SUGAR CANE BAGASSE ASH AND ORDINARY PORTLAND CEMENT BLENDS IN CONCRETE

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This study investigates the strength performance of concrete using partial blends of Ordinary Portland Cement (OPC) and Sugar Cane Bagasse Ash (SCBA). SCBA was obtained by burning Sugar Cane Bagasse (SCB) at between 600-700°C. Atomic Absorption Spectrometry (AAS) conducted confirmed SCBA to be good pozzolana since the sum of SiO₂, Al₂O₃ and Fe₂O₃ is 74.44%, thus, meeting the requirement of 70% minimum recommended by ASTM C618 (1992). For strength test, mix ratio of 1:2:4 was used and OPC was partially replace with 0 (control), 5, 10, 15, 20, 25, 30, 35 and 40% SCBA by weight of OPC in the concrete. Compressive strength values of crushed hardened concrete were obtained at the ages of 7, 14, 21 and 28 days. The result shows that the performance of concrete having up to 10% SCBA replacement met the BS8110 (1997) but up to 35% SCBA could be adapted for use in mass concrete.

Keywords: compressive strength, concrete, ordinary portland cement, pozzolana, sugar cane bagasse ash

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THE MOBILIZATION OF FORMAL HOUSING FINANCE BY CO-OPERATIVE SOCIETIES: PROSPECTS, CHALLENGES AND STRATEGIES

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The challenge of housing finance provision in developing countries remains the need to reconcile three (partially conflicting) objectives: affordability for the households, viability for the financial institutions and resource mobilization for the expansion of the sector and the national economy. Within this, the particular policy challenge facing governments is how to target formal housing finance to the predominantly informally employed people. This paper is a response to that challenge. In the paper, the factors that impede the mobilization of housing finance through the co-operative society structure are examined. The objective is to ascertain how the formal structure of co-operative societies (whose members operate in the informal sector) could be utilized in the sourcing of housing finance from the formal housing finance market. The paper is based on a study of co-operatives registered in Lagos, Nigeria. Formal housing finance providers were also interviewed. Findings revealed that although there is a medium to high potential for the formal sector to provide funds to the co-operatives; lack of appropriate and enabling institutional framework is a crucial challenge. The paper recommends a comprehensive institutional framework that would link the co-operatives and the formal housing finance sector.

Keywords: co-operatives, housing finance, housing, low-income

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CONSTRAINTS TO LAND ACCESSIBILITY BY URBAN RESIDENTS IN AKURE, NIGERIA

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Secure access to land is a key factor for household asset formation and wealth creation while also contributing significantly to national economic development and poverty reduction in an inestimable measure. However, in spite of the several reforms at ensuring equitable and secure access to land in Nigeria, the urban residents are still being plighted with the menace of inaccessibility to land. This paper therefore analyzes the various constraints incidental to this ugly development. Akure, the Capital of Ondo State was selected as the case study area. Questionnaires were randomly administered on Two hundred (200) land owners resident in the city out of which One hundred and eighty-six (186) were retrieved and found suitable for analysis. Data were analyzed using factor analysis. The result of the analysis revealed among other things that “Costly land title registration process”, “Ineffective government policy”, “Lack of finance and title processing documents”, “Lengthy period of title registration” and “Corrupt practices among land officers” are major constraints to land accessibility in the study area. The study recommends a stress-free, simplified and cheaper land title registration process.

Keywords: accessibility, constraints, factor analysis, land, urban residents

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INVESTIGATING OPTIMUM CONDITIONS FOR PUBLIC-PRIVATE PARTNERSHIP IN HEALTH, EDUCATION AND HOUSING SECTORS IN NIGERIA

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Although many PPP (Public-Private Partnership) projects in the developed countries are regarded as successful and the drivers of success have become subject of extensive investigation, little is known about the relative importance of these success factors in developing countries such as Nigeria. This is particularly noteworthy given that previous studies indicated incongruence between the cross-cultural features of PPPs which suggested inapplicability of the UK Private Finance Initiative (PFI) model in other countries. Therefore, it is essential that adequate attention is given to identification, understanding and management of the specific drivers at national and sectoral levels. This research investigates the optimum conditions for PPPs to thrive in various infrastructure sectors in Nigeria. The study focused on the health, education and housing sectors. Questionnaire survey was adopted to elicit information from PPPs practitioners within the Nigerian construction industry. The identified conditions, through extensive literature review, were rated on five point likert scale and the responses were analysed using Relative Importance Indices and Mean Score Values. The results revealed that acceleration of project development is the most attractive factors for adopting PPPs in health and housing sectors while that of education sector was benefit to local economic development. Prolong delays due to political debate/interest was ranked as the most negative factor for adopting PPP in education and health sectors with high risk of relying on private sector as the most negative factor for housing sector. The research concluded that a 'one-size-fit-all' approach is inappropriate for success of PPPs and recommends further sector specific studies that will ensure sustainable growth of PPPs in Nigeria.

Keywords: driving force, infrastructure, optimum condition, public-private partnership, sector

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ROLE OF BENEFICIARIES IN THE DELIVERY OF LOW-INCOME HOUSING IN SOUTH AFRICA: A LITERATURE REVIEW

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Adequate housing is recognised as part of the right to an adequate standard of living and that it must meet the following minimum conditions: security of tenure; availability of services, materials, facilities and infrastructure; affordability; habitability; accessibility; location; and cultural adequacy. This study examines previous literature on beneficiary participation during the development of adequate housing. Many Governments around the world in their attempt to deliver adequate housing and related infrastructure overlook the importance of the contribution of beneficiaries in the delivery process. This study is mainly a literature review of existing published and unpublished research on the role and participation of beneficiaries in the delivery of low-income housing in South Africa. Preliminary findings suggest that where communities are in control their homes are better and cheaper than those built through government programmes and large corporations. The participation of beneficiaries could enhance the delivery of adequate housing by government and thereby reduce the dependency of beneficiaries on the state. The study also makes recommendations for the effective participation of beneficiaries in housing delivery programmes in South Africa.

Key words: adequate housing, beneficiary, participation, low-income

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EVALUATING THE ADEQUACY OF INSTALLED VENTILATION SYSTEMS IN HIGH RISE BUILDINGS IN NAIROBI, KENYA

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Sustainable passive ventilation has been promoted as the way forward in ventilation systems in Sub-Saharan Africa. Whether this is real or factual will be determined by this investigation on how well installed ventilation systems meet the comfort needs of office building occupants. The study gave an indication of the priorities that were attached to climatic suitability of ventilation designs in high rise office buildings. The study investigates the use of both mechanical and natural ventilation systems in some high rise office buildings. It provides information on one hand, on the level of adoption of ventilation systems in office buildings located in the Central Business District (CBD) in Nairobi, Kenya, and on the other hand, the adequacy of the installed ventilation systems as perceived by the building occupants. 34 tenants of high rise buildings located in the CBD area were purposively sampled and were the units of the study analysis. Analysis of their responses was presented using simple descriptive and interpretative techniques. The study finds that installed ventilation systems were inadequate and rarely meet tenants' needs in high rise buildings. Occupants require greater flexibility in ventilation design and desire ventilation systems that could incorporate some measure of individual control of air circulation to enhance their general comfort.

Keywords: CBD, Kenya, Nairobi, ventilation system

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STAGE BUILDING INSPECTION: A POSSIBLE SOLUTION TO BUILDING FAILURES IN NIGERIA

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Building quality failures have become rampant in Nigeria, with the worst cases resulting in collapse of buildings and loss of lives. Several studies have attributed quality failures to a myriad of factors some of which are traceable to insufficient/lack of quality inspection during construction. Stage inspections are a common feature of most developed countries, which ensure that building works comply with consent documents issued by approving authorities. The more the checks and inspection on building performance, the more probable the final build will meet the required quality standards. Thus the primary objective of this paper is to suggest stage inspection during construction by approving authorities, as a feasible solution to building failures in Nigeria. Literature review methodology is used to discuss building inspection regimes operable in different developed countries. This is with a view for the Nigerian building construction industry to consider stage inspection as a mandatory process during building production. It is hoped that the findings of this paper will benefit property owners, building occupants and the overall construction industry through improved quality achievement levels. Stage inspections may guarantee peace of mind and confidence that buildings will eventually attain desired levels of performance because the culture of building it right first time would have been imbibed.

Keywords: building failure, construction industry, stage building, Nigeria

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THE USE OF RISK REGISTERS BY PROJECT MANAGERS

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The construction industry is widely recognised as being inherent with risk and uncertainty. This necessitates the need for effective project risk management to achieve the project objectives of time, cost and quality. A popular tool employed in projects to aid in the management of risk is a risk register. This tool documents the project risks and is often employed by the Project Manager (PM) to manage the associated risks on a project. This research aims to ascertain how widely risk registers are used by Project Managers as part of their risk management practices. To achieve this aim entailed interviewing ten PMs, to discuss their use of the risk register as a risk management tool. The results from these interviews indicated the prevalent use of this document and recognised its effectiveness in the management of project risks. The findings identified the front end and feasibility phases of a project as crucial stages for using risk registers, noting it as a vital ingredient in the risk response planning of the decision making process. Moreover, the composition of the risk register was also understood, with an insight into how PMs produce and develop this tool also ascertained. In conclusion, this research signifies the extensive use of the risk register by PMs. A majority of PMs were of the view that risk registers constitute an essential component of their project risk management practices. This suggests a need for further research on the extent to which risk registers actually help PMs to control the risks in a construction project, particularly residual risks, and how this can be improved to minimize deviations from expected outcomes.

Keywords: interview, project manager, risk management, risk register, UK

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SUSTAINABLE SCHOOLS: WHOSE RESPONSIBILITY?

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The need for sustainable built environment has for sometimes been frequently orchestrated, and would continue to be, not only for ease of management and control, but for more decent, healthy and functional environments. It is disheartening however to note that our schools the training grounds for future leaders, scientists and innovators of tomorrow are to this date the most neglected areas of our built environments. The fact still remains that, to be able to perform at the peak of their efficiency and be prepared to face the challenges of the 21st century, an enabling learning environment has to be created, managed and sustained for the pupils. This culture of sustainability, if entrenched right from the school level will become part of us and can easily be translated into every other facet of our life. The paper, through a theoretical and practical approach, and the review of existing literature and discussions with stakeholders, examines the problems of sustainability of school environments and suggests strategies for action.

Keywords: built environment, responsibility, sustainable schools

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THE IMPLICATIONS OF USER REDESIGNS OF PUBLIC HOUSING ON THE ARCHITECTURAL DESIGN PROCESS

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The initial product of the architectural design process is a building ready for occupation. This product is subsequently occupied and further changes are made to the initial design by the user. This redesign is part of the evolution of the building and therefore part of the design process. This implies that the design process continues even after occupation. Two public housing schemes, Barnawa and Malali Low Cost housing estates in Kaduna, Nigeria were studied and it was found out that after tenure changed from rental to ownership, the new owners made changes to suite their taste. Changes were physically observed and recorded through pictures and measured drawings, questionnaires were employed to trace reasons for and process of user redesigns and implications were derived. It was found out that an average of 70% of owners in both estates made changes to their houses without consulting the architect. The process of user redesign was found to be deficient leading to the conclusion that architects need to tighten their control of the post-occupation design process and not leave it to the untrained user.

Keywords: changes, design process, public housing, redesign, user

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THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) ON CONSTRUCTION SITES IN NIGERIA

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Personal Protective Equipment plays a prominent role in ensuring overall health and safety on construction sites. Different surveys indicate that PPE is often not worn by workers on construction sites in Nigeria, which undermines their general health and safety and leads to different types of injuries. This study focuses on studying the factors that determine the use of PPE on construction sites in Nigeria, including its availability, maintenance, user-friendliness and training in the use of PPE. The study revealed that the vast majority of workers understand the need for PPE and want to be protected against accident, injury and illness. However there is a need to address the issues of comfort with respect to PPE to ensure it does not interfere with worker's productivity and takes into account specific work environment. Supervision, checking and properly maintaining and replacement of PPE would also go a long way in improving the practices of PPE use on construction sites in Nigeria. Policies and regulations with respect to PPE need to be developed and implemented.

Keywords: construction, Nigeria, personal protective equipment (PPE), safety

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AGROCHEMICALS PRESENCE IN WATER SOURCES AND THEIR EFFECTS ON HUMAN HEALTH AND THE ENVIRONMENT: CASE OF ZARIA DAM RESERVOIR AND ENVIRONS

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The study assessed the presence of agrochemical's concentration in the Zaria dam reservoir and ground water sources in the environs. The indicators assessed and their concentrations for surface and ground water sources are as follows: chlorides, 0.600-0.900 and 1.5830-3.1000 mg/l, nitrates, 0.0130-0.019 and 0.0160-0.0340 mg/l; bicarbonates, 0.4440-1.8890 and 0.6000-2.7330 mg/l; total phosphates, 0.1730-3.0770 and 0.0810-1.8850 mg/l, sulphates, 0.6170-3.5870 and 0.3300-2.6570 mg/l; and pH, 6.400-7.500 and 6.1500-7.7000 respectively. Several research works have linked the causes of cancer and other related ailments among other causes to the ingestion of agrochemicals into human systems by direct consumption of polluted water or their residues in crops and vegetables. Agrochemical utilization increased progressively since the post SAP era especially in Nigeria because of Trade Liberation Policy on agriculture related goods. In consequence, land cultivation might have increased with resultant agrochemical demand. Cancer and related ailment's record for a period of seven years (2005-2011) showed increasing trend per annum for female patients but decreasing trend for male and total patients. The predicted male, female and total patients were -181, 182 and -87 respectively for the year 2015, the year targeted as the MDGs year of health for all. To reduce environmental degradation and agrochemical health related ailments, environmentally friendly agrochemical should be encouraged.

Keywords: agrochemical, cancer, health, water source.

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COMPETING MODELS OF HOW MOTIVATION, OPPORTUNITY AND ABILITY DRIVE PERFORMANCE BEHAVIOURS

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The motivation–opportunity–ability (MOA) framework is well established in organizational behaviour and specifies complementarity among motivation, opportunity, and ability in driving behaviour. Despite decades of research, the precise inter-relationship among the MOA variables and how they interact to influence performance behaviours still remain largely unclear. Three competing models, a multiplicative, linear and constraining-factor model (CFM), reflecting different levels of complementarity and interaction among motivation, opportunity and ability, and their impact on performance behaviours are specified. These models offer fresh perspectives on interaction effects in organizational behaviour and on how to drive performance in organizations. To test the specified competing models, a quantitative methodology appears appropriate. This will require operationalizing the MOA as well as the performance behaviour variables and measuring them through quantitative questionnaire surveys. Subsequent empirical test of the competing models will confirm whether the constraining-factor model (CFM) is a superior model that provides a better explanation of the variance in performance behaviours than the traditional multiplicative and linear models.

Keywords: ability to perform, constraining-factor model (CFM), motivation to perform, opportunity to perform, performance behaviour.

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EFFECT OF CLIENT PRESSURE ON MARKET VALUATION OF RESIDENTIAL PROPERTIES IN MINNA, NIGERIA

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Market valuation is required for several purposes, including the sale of real properties. In the residential property market in Minna, most property valuers are under pressure from clients (property owners) to sell their properties at asking prices determined by them, the valuers' valuation opinion notwithstanding. This study examines the effect of this pressure on the market valuation of residential properties in Minna, Nigeria. Data for the study were collected from real estate firms operating in Minna and analysed using multiple regression analysis. The primary objective of the study is to examine whether client pressure has significant influence on market valuation of residential properties in the city, using property owners' asking price as proxy for the source of pressure. Results of data analysis showed that clients' asking price which is a source of pressure in the determination of market values of residential properties by valuers in the city produced a negative regression coefficient (-0.05899) at $p > 0.05$ when used in predicting the sale prices of the properties. This implies that although property valuers in Minna experience some form of pressure from clients, such pressure has no significant effect on the market valuation of residential properties in the city.

Keywords: client pressure; market valuation; residential property; valuer.

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A HOLISTIC SURVEY OF RISK MANAGEMENT IN BUILDING CONSTRUCTION PROJECT

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The Construction industry is a key activity in any country. It controls the Nations Gross Fixed Capital Formation (GFCF) and accounts for more than 65% of total capital investment; therefore, it contributes substantially to Gross Domestic Product (GDP) of any nation. It is a vast industry employing millions of workers and offers unlimited opportunities. Construction, on the other hand, is a risky industry with uncertainties due to many external and internal factors that influence the construction process. The management of risks is a central issue in the planning and management of any venture. Up to date, managing risk in construction projects has been recognized as a very important process in order to achieve the projective objectives of time, cost, quality, safety and environmental sustainability. The aim of this paper is to have a survey of risks in the construction process. The paper identified forty-four (44) risk factors critical in construction business. It also identified four (4) most important risk categories as perceived by construction professionals, which include: Awarding design to unqualified designers; defective or incorrect design; occurrence of accident because of poor safety measure and inaccurate quantities.

Keywords: construction project, risk, risk management

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MODELLING THE PERFORMANCE OF TRADITIONAL CONTRACT PROJECTS IN NIGERIA: AN ARTIFICIAL NEURAL NETWORK APPROACH

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Construction projects are time consuming undertakings which are considered to be successful if delivered on time, to an appropriate budget and to a quality desired by the owner. Previous studies have shown that several factors influence the success of traditional contract projects. Due to these multiple factors, project managers have difficulties in predicting the performance of their projects at the early stage. Through the review of extant literature, a total of forty six factors affecting project performance were identified. Field study was conducted and the analysis of the result revealed nine significant factors affecting the performance of traditional contract projects in Nigeria with a very high degree namely: complexity of project design, adequacy of contractor's resources, client's emphasis on quick completion, precise budget estimate, planning effort, contractor's performance record, clients experience with similar project, percentage of repetitive elements and project control mechanism. The respondents of the survey included professionals from offices of building owners, contactors and consultants who are involved in traditional contract project execution in Nigeria. These important factors were used as input variables to develop a model for predicting the time performance of building construction projects. Artificial Neural Network was employed using the back propagation algorithm to develop the model. The model enables parties to a contract to predict and ensure that their project performance is within the time constraints. Hence effective project planning, controlling and monitoring should be established to enhance project performance to minimise the problems of construction delay and cost overrun.

Keywords: artificial neural network, Nigeria, project performance, prediction

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FACTORS AFFECTING QUALITY OF LOW INCOME HOUSES IN A SOUTH AFRICAN PROVINCE

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The research investigates the factors affecting quality in the construction of low income houses in a South African province. A review of related literature and an empirical study formed that basis of the primary data. A survey was initially conducted among owners of low income houses and then, interviews were conducted among designers, contractors and building inspectors. The respondents were chosen due to their perceived involvement in the low income housing sector. The findings indicate that time constraints placed on the project team by clients could be significantly affecting the quality of built low income houses. It equally appears that clients should be aware that financial and time constraints impact quality to a large extent, and then take necessary steps that can improve the quality of built low income houses.

Keywords: low income housing, quality, South Africa

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ACHIEVING A SALUBRIOUS RESIDENTIAL ENVIRONMENT THROUGH RESIDENTS PARTICIPATION IN NASARAWA, NIGERIA

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Habitable residential environment guarantees occupiers satisfaction, which is achieved through efforts of the government and occupiers. This study aims at examining the participation of residents' in the achievement of a salubrious residential environment in three neighbourhoods (Tammah, Oversea and Angwan Biri) of Nasarawa, Nigeria. Systematic random sampling technique was used in the collection of data for this study, of which, the first residence was randomly selected and every fifth residence was subsequently selected in the three neighbourhoods. On the whole, a total of three hundred questionnaires were distributed out of which two hundred and twenty (220) were returned for analysis. The study reveals that residents in the three neighbourhoods were nonchalant in enhancing the habitability and quality of their environment. The regular monthly environmental sanitation has virtually gone into extinction as government officials who normally enforce environment laws that compel residents to clean up, landscape, remove dirt of blocked drainages from their environment among others are not doing so. On the other hand, residents' seems to be ready to achieve a salubrious residential environment if provided with waste bins, frequent visit of environmental officials with waste evacuation vans to remove waste from their premises and pay other people to clean up their surroundings. The study therefore, recommends that awareness campaign by authorities of the environmental protection and health agencies in Nasarawa town should be reinvigorated, waste van should be procured or repaired and residents who want to pay to have others clean up their environment should be encouraged. On the whole, attitudinal change by both the authorities and residents towards the residential environment in Nasarawa is needed.

Keywords: Nasarawa, residential environment, resident participation, salubrious, waste

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INTERPLAY OF ISLAMIC ETHICS AND ARCHITECTURE IN AN AFRICAN CITY: FOCUS ON SOME SELECTED LOCAL GOVERNMENT AREAS IN KANO

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Ethics plays a substantial role in building residences in Africa. Realities on the ground seem to indicate that they infuse into our social and built environments. The modern world appears to undergo a unique predicament where the social and the built environments are detached from one another. Residences are gradually becoming no more than an expression of someone's artistic style rather than the functions they are expected to serve. Besides being a sleeping place most residences today, particularly in the urban areas, hardly serve any other purpose as they are mostly values-free. In a traditional African setting, where social values are largely intertwined with the built environment, this trend may not augur well. This paper examines the Islamic ethics and the extent to which they are incorporated into the built environment in some areas of Kano city. Four local government areas within the metropolis were taken as case study. The paper first looks at the pre-Islamic house structure in Kano in comparison with the post-Islamic one with a view to determining the degree to which these ethics are made manifest on residential structures. The paper combined between elicited information, context analysis, interviews and survey. The paper discovered that Islam impacted on the lives of the Kano people, including its traditional earthen architecture. It is also found out that residences share common configurations such as entrance halls, passage rooms, inner open courtyards, etc, which are linked to Islamic morals. Some of the outstanding ethics integrated into the Kano built environment and reflected on residential structures includes audio-visual privacy, gender separation, respect for strangers, etc. The paper concludes that there is a strong relationship between Islamic ethics and architecture in Kano which is manifest on the residential structure. This is a pointer to the fact that architecture can be moulded to suit cultural and religious needs which strengthens the relationship between people and their built environment.

Keywords: architecture, African city, ethics, Kano, Islam

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HOUSING DELIVERY VIA HOUSING COOPERATIVES AS A TOOL TOWARDS ACHIEVING NATIONAL DEVELOPMENT; AN EMPIRICAL STUDY

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Housing problems in Nigeria are dimensional in nature such as the inaccessibility to decent, safe, and affordable housing which are consequences of the ineffectiveness of housing provision sectors to meet the housing needs of the populace which results to a negative impact on the contributions expected of the workforce, thus a draw-back in the national development goals. These problems are commonly found in most developing countries in spite of a number of initiatives taken, still leaving a large number of their populace living in deplorable housing condition without any ability of owning their own houses. This paper, thus, in general, attempts to see the efforts made by different African Housing initiatives and in particular, efforts made by the Housing Cooperatives looking into the Federal Polytechnic, Bida and Nuhu Bamalli Polytechnic as case studies. Conclusively, the cooperative phenomena is proposed as an urgent step needed to be backed by the authorities that be, to bring about the much needed transformation in the Nigerian housing sector, also advising the government to back this phenomena with necessary political will and commitment, using cooperatives especially in higher institutions of learning.

Keywords: cooperatives, housing delivery; National development

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THE EFFECTS OF GHANA'S OIL DISCOVERY ON LAND AND HOUSE PRICES ON COMMUNITIES NEAREST TO THE OIL FIELD IN GHANA (CASE STUDY: KUMASI AND SEKONDI-TAKORADI) - YALLEY, P. P. AND OFORI-DARKO, J

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The announcement of the oil discovery in the Tano Basin in the Western Region of Ghana immediately brought an astronomical increase in the cost of houses and land in Sekondi-Takoradi metropolis. A study was conducted to investigate the land and housing prices in two cities with almost the same housing and land prices before the oil discovery in Ghana in 2007, namely; Sekondi-Takoradi, representing the communities close to the oil field and Kumasi representing communities far from the oil field. Questionnaire was designed and administered to collect data from Estate Agents, landlords, tenants and land owners in both metropolises. In addition personnel from Land Commissions and Land Valuation Board some tenants and landlords in both metropolises were interviewed. It emerged from the studies that between 2007 and 2011 the average increase in land prices were 567 % and 267% respectively in Sekondi-Takoradi and Kumasi Metropolises. Within the same period the percentages increased in land prices in the two Metropolises were 200% and 100% in Sekondi-Takoradi and Kumasi respectively. The results support the conclusion that the discovery of oil has brought an upward review of prices of all items, goods and services being provided in the Sekondi-Takoradi Metropolis. Landlords are charging exorbitant prices on their houses which in most cases resulting in ejection of tenants. The sudden upsurge of the land and house demand and prices in the Sekondi-Takoradi has awakened the interest of a lot of claimants to lands in the metropolis, which has resulted in fierce dispute among the contending parties as well as the investors.

Keywords: houses, land, Kumasi, Sekondi-Takoradi, oil

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AN EXAMINATION OF THE PROPERTIES OF LITERATE AND CLAY AS CONSTRUCTION MATERIALS FOR SUSTAINABLE BUILDINGS IN KANO AND KADUNA METROPOLIS, NIGERIA

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Utilization of clay and laterite as building materials has become a source of concern to all due to its effect on the social, economic and environment to the society. Rising population in developing nations like Nigeria has led to the demand and effective utilization of these gifted materials in constructions of housing, roads, dams, air fields, and others. This paper is aimed at examining the properties of laterite earth and clay for sustainable buildings. The literature findings are expected to benefit practitioners in the construction industry, stake holders and local users; towards effective utilization of these available raw building materials in construction industry. It will also encourage the need for further research on these two important materials in the construction industry.

Key words: clay, laterite, materials, sustainable buildings, utilization

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STAKEHOLDER PERCEPTION OF RISKS AND RISK FACTORS IN INFRASTRUCTURAL PROJECTS: THE CASE OF THE NIGER DELTA

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Although some progress has been made, the heavy engineering sector in Nigeria today continues to be fractured in their structure and approach to construction. It is a sector that has already achieved changes in key aspects of its delivery, but still requires continuous transformation to achieve greater efficiency. Lack of flexibility to accommodate change in project delivery methods have complicated the extent to which contractors can manage and mitigate risks in infrastructure projects. From the reviewed literature, contemporary developments have suggested a holistic perception of risks which integrates threats and opportunities. Using a qualitative method, this paper examined contractor's perceptions of project risks and ascertained if their opinions are aligned with the holistic perspective of project risk that incorporates a link between threats and opportunities. The primary objectives of the paper was to: (i) examine perceptions of project risk among contractors of infrastructure projects in the Niger Delta (ii) to investigate the extent to which their views are aligned with contemporary developments in the heavy engineering sector (iii) to propose the way forward.

Keywords: infrastructure, Niger delta, project management, risk management, stakeholder

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