

**WEST AFRICA BUILT
ENVIRONMENT RESEARCH
(WABER) CONFERENCE**

July 27-28, 2010

Accra, Ghana

**Keynotes, programme and abstracts of
the Waber 2010 conference**

Editors

Dr Samuel Laryea
Dr Roine Leiringer
Professor Will Hughes

Proceedings of the West Africa Built Environment Research (WABER) Conference
Accra, Ghana, 27-28 July 2010

Editors

Dr Samuel Laryea
Dr Roine Leiringer
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First published 2010

ISBN 978-0-9566060-0-6

Published by
West Africa Built Environment Research (WABER) Conference
C/o School of Construction Management and Engineering
University of Reading
PO Box 219
Reading, UK
RG6 6AW

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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

Welcome to this West Africa Built Environment Research (WABER) conference taking place here in Ghana. Thank you for coming and welcome to Accra. The main aims of the WABER conference are: to help young researchers and early-career scholars in West Africa to develop their research work and skills through constructive face-to-face interaction with experienced academics; to provide a platform for networking and collaborative work among senior built environment academics in West Africa; and to serve as a vehicle for developing the field of construction management and economics in Africa.

Waber 2009

The WABER event in 2009 was held at the British Council in Accra, Ghana on 2-3 June. The event was a resounding success. It attracted participation from 32 researchers, from 12 different institutions, who presented their work to an audience of approximately 100 people. Each presenter received immediate and constructive feedback from an international panel. The event was opened by Professor K.K. Adarkwa, Vice Chancellor of KNUST, Kumasi, Ghana, with several senior academics and researchers from universities, polytechnics, and other institutions in Ghana and Nigeria in attendance. There was also a significant level of attendance by senior construction practitioners in Ghana. Thank you to the School of Construction Management and Engineering, University of Reading, UK for funding the inaugural event in 2009. We are also grateful to all of you who helped to make the event a success and to those of you who have joined us here today to build upon the success and legacy of WABER 2009.

Waber 2010

This year, we have 60+ peer-reviewed papers and presentations on topics relating to Building services and maintenance, Construction costs, Construction design and technology, Construction education, Construction finance, Construction procurement, Contract administration, Contract management, Contractor development, Decision support systems, Dispute resolution, Economic development, Energy efficiency, Environment and sustainability, Health and safety, Human resources, Information technology, Marketing, Materials science, Organisation strategy and business performance, Productivity, Project management, Quantity surveying, Real estate and planning, Solar energy systems, Supply chain management and Urban development. We hope that these papers will generate interest among delegates and stimulate discussion here and beyond the conference into the wider community of academia and industry.

The delegates at this conference come from 10 different countries. This provides a rich international and multicultural blend and a perfect platform for networking and developing collaborations. This year we are blessed to have three high profile keynote speakers in the persons of Professor George Ofori (National University of Singapore), Dr Roine Leiringer (University of Reading, UK) and Professor Will Hughes (University of Reading, UK). We are also thankful to Dr Chris Harty (University of Reading, UK) who is facilitating the Research Skills Workshop on '*Writing a scientific article*'. Thank you to Dr Sena Agyepong of our conference organising team for her capable management of local organising arrangements. And above all, thank you to all of you for coming to this conference. Enjoy and have a safe journey back home.

Dr Samuel Laryea
School of Construction Management and Engineering
University of Reading, July 2010

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In addition to members of the scientific committee, the following people helped to review abstracts and papers and we would like to acknowledge their contribution and thank them.

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Dr Emmanuel Adu Essah, University of Reading, UK
Solar Energy Systems and Technologies, Ventilation and Moisture Transfer in Buildings

Professor Anny Nathaniel Aniekwu, University of Benin, Nigeria
Economics and Industry

PROGRAMME

TUESDAY 27 JULY 2010

08:30-09:00 REGISTRATION

OPENING SESSION (Main auditorium)

- 09:00-09:10 Welcome address by *Mr. Moses Anibaba* (Director of British Council in Ghana): *The role of the British Council in Africa*
- 09:10-09:15 Introductory remarks by *Professor Will Hughes* (Head of School of Construction Management and Engineering, University of Reading, UK)
- 09:15-09:25 Address by *Dr Edward Omane Boamah* (Deputy Minister of State, Environment, Science and Technology): *The role of Built Environment academics in Environment, Science and Technology advancement*
- 09:25-09:35 Chairman's remarks by *Professor Kwasi Adarkwa* (Vice Chancellor of Kwame Nkrumah University of Science and Technology, Kumasi, Ghana)
- 09:35-09:45 Official WABER 2010 Group Photograph

KEYNOTE ADDRESS (Main auditorium)

- 10:00-10:30 Built environment education, research and practice: Integrating diverse interests to make an impact
Professor Will Hughes (Editor-in-chief, *Construction Management and Economics* / School of Construction Management and Engineering, University of Reading, UK)
- 10:30-11:00 Refreshments and networking break

PRESENTATION SESSIONS (11:00-13:10)

STREAM 1 (Main auditorium)

Chairperson Professor Raymond Nkado (University of the Witwatersrand, Johannesburg, South Africa)

- 11:00-11:10 Construction cash flow prediction model in Ghana: A case study of the district assembly common funded project – Joseph Buerterey *et al.*
- 11:10-11:20 Risk and uncertainties in construction clients' cash flow forecast – M.O. Babalola and G.K. Ojo
- 11:20-11:30 Discussion
- 11:30-11:40 Evaluating the characteristics of whole life-cycle cost data in the Nigerian construction industry – A M Ibrahim, K Bala, Y M Ibrahim, A D Ibrahim
- 11:40-11:50 Construction cost data management by quantity surveying firms in Nigeria – Johnson Olunmi Atinuke
- 11:50-12:00 Discussion

Chairperson Dr Mrs. Bola Babalola (Obafemi Awolowo University, Nigeria)

- 12:10-12:20 An artificial neural network model for predicting construction cost of institutional building projects in Nigeria – Baba Shehu Waziri
- 12:20-12:30 Multi-criteria decision-making model for contractor's selection in construction projects in Nigeria – Oluwaseyi Modupe Ajayi
- 12:30-12:40 Discussion
- 12:40-12:50 Introduction of build-operate-transfer (BOT) model into main stream funding of infrastructural projects in Ghana – Kwaku Owusu
- 12:50-13:00 Appraisal of factors that influence the implementation of BOT infrastructure projects in Nigeria – Alhassan Dahiru and S. A. Bustani
- 13:00-13:10 Discussion
- 13:10-14:30 Lunch and networking break

PRESENTATION SESSIONS (11:00-13:10)

STREAM 2 (Seminar room)

Chairperson Dr Paul Alagidede (University of Stirling, Scotland, UK)

- 11:00-11:10 The macroeconomic review of building and construction sector in Nigeria: pre 1980-2006 – Folasade Omoyemi Alabi
11:10-11:20 An assessment of the effectiveness and equitability of access to federal mortgage bank of Nigeria's finances for housing (1992 - 2008) – Musa Nuhu Madawaki
11:20-11:30 Discussion
11:30-11:40 A hedonic regression analysis of urban infrastructure in commercial property values in Lagos – Funlola Famuyiwa
11:40-11:50 Analysing quantitative data using factor analysis: reflections from an empirical study – D. K. Ahadzie, D.G. Proverbs and N.A. Ankrah
11:50-12:00 Discussion

Chairperson Dr Moshood Olawale Fadeyi (British University in Dubai, UAE)

- 12:10-12:20 The applicability of the Harvard and Warwick models in the development of human resource management policies of large construction companies in Ghana – Sena Agyepong, Frank Fugar and Martin Tuuli
12:20-12:30 Characteristics of migrant labour in Wasimi, Irewole Local Government Area, Osun State, South-western Nigeria – M. B. Gasu and S.O. Fadare
12:30-12:40 Discussion
12:40-12:50 Land and housing values and their effect on housing delivery in Sekondi-Takoradi metropolis, Ghana – P. P. Yalley, J. F. Cobbinah and P. K. Kwaw
12:50-13:00 The influence of facilities on rental values and vacancy rates in high rise office rented properties in Kaduna, Nigeria – David Ayock Ishaya and Daniel Ishaya Dabo
13:00-13:10 Discussion
13:10-14:30 Lunch and networking break

KEYNOTE ADDRESS (Main auditorium)

- 14:30-15:00 Built environment research and the Millennium Development Goals
Professor George Ofori (School of Design and Environment, National University of Singapore, Singapore)
15:00-15:30 Refreshments and networking break

PRESENTATION SESSIONS (15:30-17:40)

STREAM 1 (Main auditorium)

Chairperson Professor G.W.K. Intsiful (KNUST, Kumasi, Ghana)

- 15:30-15:40 Sustainable construction education: assessing the adequacy of built-environment professional's training – S Ameh, A Dania, I Zubairu and S Bustani
15:40-15:50 The role of construction education in sustainable waste material management in the construction industry – Nongiba A. Kheni
15:50-16:00 Discussion
16:00-16:10 Evoking the green-shift in the building industry for sustainable development in Nigeria – Dodo Yakubu Aminu *et al.*
16:10-16:20 The role of organizational learning in achieving sustainable construction project delivery – Alex Opoku and Chris Fortune
16:20-16:30 Discussion

Chairperson Dr Esi Ansah (Ashesi University, Ghana)

- 16:40-16:50 Safety on Ghanaian construction sites: The role of the employer and the employee – B. B. Akomah, A. Nimo-Boakye, F. D. K. Fugar
16:50-17:00 How and to what extent do construction project features contribute to accident causation? – P. Manu, N Ankrah, D Proverbs, S Suresh and D Ahadzie
17:00-17:10 Discussion
17:10-17:20 Sustainability of solar home systems for a domestic power supply in Nigeria – Dalhatu Abdulsalam, I. Imbamali and I.K. Zubairu
17:20-17:30 Building integration photovoltaic module with reference to Ghana: using triple-junction amorphous silicon – Emmanuel Adu Essah
17:30-17:40 Discussion

STREAM 2 (Seminar room)

Chairperson Dr Martin M. Tuuli (Loughborough University, UK)

- 15:30-15:40 Problem of ready-mix concrete production in the construction industry in Nigeria and its cost implication – Dauda Dahiru
15:40-15:50 The continuous use of asbestos in Ghana despite its hazards (case study area: Sekondi-Takoradi) – P. P. Yalley and C. N. Ndede
15:50-16:00 Discussion
16:00-16:10 Impervious building (coating) materials' workability in South-West Nigeria: a case of Akure, Ondo State – Clement Oluwole Folorunso
16:10-16:20 Investigations into the pozzolanic activities of volcanic deposits from the Jos plateau; interim report on chemical characteristics – D. W. Dadu *et al.*
16:20-16:30 Discussion

Chairperson Rev. Dr Frank Fugar (KNUST, Kumasi, Ghana)

- 16:40-16:50 Effects of flooding on the built environment in Akure, Nigeria – Gabriel Fadairo and Sikiru Abiodun Ganiyu
16:50-17:00 Disaster preparedness of high rise buildings in Lagos metropolitan area: evaluating the risk, vulnerability and response strategies – I H Mshelgaru and O. Olowoyeye
17:00-17:10 Discussion
17:10-17:20 An assessment of the causes of foundation failure in residential buildings – Aliyu Suleiman Shika and Nkeleme Emmanuel Ifeanyi
17:20-17:30 Appraisal of the public private partnership in residential housing delivery for low income group in the north central geo-political zone, Nigeria – Suleiman Bolaji
17:30-17:40 Discussion
17:40 Close

WEDNESDAY 28 JULY 2010

RESEARCH SKILLS WORKSHOP

- 09:00-10:30 Writing a scientific article – Dr Chris Harty (School of Construction Management and Engineering, University of Reading, UK)
10:30-11:00 Refreshments and networking break

PRESENTATION SESSIONS (11:00-13:10)

STREAM 1 (Main auditorium)

Chairperson **Dr Emmanuel Achueni (University of Jos, Nigeria)**

- 11:00-11:10 Construction project delivery in Ghana: The performance of the traditional procurement method – Collins Ameyaw and S Oteng-Seifah
11:10-11:20 Towards improving procurement of built infrastructure in Nigeria – Kulomri Jipato Adogbo, Ahmed Doko Ibrahim and Yahaya Makarfi Ibrahim
11:20-11:30 Discussion
11:30-11:40 The lean project delivery system (LPDS) – Zoya E. Kpamma and Theophilus Adjei-Kumi
11:40-11:50 Value management: How adoptable is it in the Nigerian construction industry? – Baba A. Kolo and Ahmed D. Ibrahim
11:50-12:00 Discussion

Chairperson **Professor Kabir Bala (Ahmadu Bello University, Nigeria)**

- 12:10-12:20 How do clients influence innovations in construction professional services firms? – John Kissi, Robert Payne, Sam Luke, Andrew Dainty and Anita Liu
12:20-12:30 An exploratory study of the contextual meaning and consequences of empowerment in project teams – Martin M. Tuuli
12:30-12:40 Discussion
12:40-12:50 The effects of management on productivity: A comparative study of indigenous and foreign firms in the Nigerian construction industry – A. N. Aniekwu and H.O. Audu
12:50-13:00 Challenges and opportunities facing contractors in Ghana – Samuel Laryea
13:00-13:10 Discussion
13:10-14:30 Lunch and networking break

STREAM 2 (Seminar room)

Chairperson **Professor Anny Nathaniel Aniekwu (University of Benin, Nigeria)**

- 11:00-11:10 Adaptable and flexible design solutions for improved functional quality of public apartment buildings in Ghana – Agyefi-Mensah, S., *et al.*
11:10-11:20 Environmentally responsible interior design (ERID) solutions for air-conditioned office space in Dubai – M O Fadeyi and R Taha
11:20-11:30 Discussion
11:30-11:40 A factorial study of accessibility requirements of paraplegics mobility in a built up environment – Ashiedu, Festus and Igboanugo, Anthony Clement
11:40-11:50 An investigation into the use of unapproved drawings in the construction industry in Ghana – Nanyi Kobina Orgen
11:50-12:00 Discussion

Chairperson **Dr Emmanuel A. Essah (University of Reading, UK)**

- 12:10-12:20 An evaluation of physical transformation of residential buildings in government estates in south western, Nigeria – Victor Olufemi Adegbehingbe
12:20-12:30 Emphasizing the need for estate surveyors and valuers' capacity building in housing development in mega city – Kemiki Olurotimi
12:30-12:40 Discussion
12:40-12:50 People's attitude toward property tax payment in Minna – Ayoola Adeyosoye Babatunde
12:50-13:00 Analysis of households' travel behaviour in Lagos metropolis – Wale Alade
13:00-13:10 Discussion
13:10-14:30 Lunch and networking break

KEYNOTE ADDRESS

- 14:30-15:00 Handmaidens and ivory towers: The role and responsibility of construction management researchers as agents of change
Dr Roine Leiringer (School of Construction Management and Engineering, University of Reading, UK)
- 15:00-15:30 Refreshments and networking break

PRESENTATION SESSIONS (15:30-17:45)

STREAM 1 (Main auditorium)

Chairperson **Dr Sena Agyepong (KNUST, Kumasi, Ghana)**

- 15:30-15:40 Cost escalation of major infrastructure projects: A case study of Soccer City Stadium in Johannesburg – Raymond Nkado
- 15:40-15:50 The evolution of indigenous contractors in Ghana – Samuel Laryea and Sarfo Mensah
- 15:50-16:00 Discussion
- 16:00-16:10 An assessment of the effect of community participation on sub-urban development in Akure – Akin, Oluwatoyin .T. and Oyetunji, Abiodun K.
- 16:10-16:20 Assessment of governmental intervention towards tourism development of Idanre hills, Ondo state, Nigeria – A. J. Afolami and A. A. Taiwo
- 16:20-16:30 Discussion

Chairperson **Dr Nongiba A. Kheni (Tamale Polytechnic, Ghana)**

- 16:40-16:50 Management of water distribution infrastructure with GIS in the Niger delta region of Nigeria – H. A. P Audu and G. C. Ovuworie
- 16:50-17:00 Resident's perception of the central sewage system in the federal capital city, Abuja-Nigeria – Andrew Stanley *et al.*
- 17:00-17:10 The effect of restructuring the Central Business District (CBD) on urban housing and poverty in Lagos, Nigeria – Paul Obi
- 17:10-17:25 Discussion
- 17:25-17:45 Presentation of certificates and close

STREAM 2 (Seminar room)

Chairperson **Dr Peter Yalley (Takoradi Polytechnic, Ghana)**

- 15:30-15:40 Structural stability in Nigeria and worsening environmental disorder: the way forward – Anthony N. Ede
- 15:40-15:50 The spatial dynamics of cement manufacturing and marketing in Nigeria – Kemiki Olurotimi
- 15:50-16:00 Discussion
- 16:00-16:10 An assessment of core skills and competencies of quantity surveyors in Nigeria – Joshua O. Dada
- 16:10-16:20 The disproportional representation of black and minority ethnic peoples' (BMEs) employability in construction: a review of literature – Paul Missa and Vian Ahmed
- 16:20-16:30 Discussion

Chairperson **Dr K.T. Odusami (University of Lagos, Nigeria)**

- 16:40-16:50 Pre-construction information implementation in Ghana using UK's CDM 2007 model – John Dadzie and David Coles
- 16:50-17:00 Factors affecting the choice of dispute resolution techniques in the Nigerian construction industry – Mustapha AbdulRazaq *et al.*
- 17:00-17:10 An assessment of liquidated and ascertained damages in contract delivery – Wasiu Bello
- 17:10-17:25 Discussion
- 17:25-17:45 Presentation of certificates and close (Main auditorium)

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SECTION 1: KEYNOTES

BUILT ENVIRONMENT EDUCATION, RESEARCH AND PRACTICE: INTEGRATING DIVERSE INTERESTS TO MAKE AN IMPACT

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The role of the academic in the built environment seems generally to be not well understood or articulated. While this problem is not unique to our field, there are plenty of examples in a wide range of academic disciplines where the academic role has been fully articulated. But built environment academics have tended not to look beyond their own literature and their own vocational context in trying to give meaning to their academic work. The purpose of this keynote presentation is to explore the context of academic work generally and the connections between education, research and practice in the built environment, specifically. By drawing on ideas from the sociology of the professions, the role of universities, and the fundamentals of social science research, a case is made that helps to explain the kind of problems that routinely obstruct academic progress in our field. This discussion reveals that while there are likely to be great weaknesses in much of what is published and taught in the built environment, it is not too great a stretch to provide a more robust understanding and a good basis for developing our field in a way that would enable us collectively to make a major contribution to theory-building, theory-testing and to make a good stab at tackling some of the problems facing society at large. There is no reason to disregard the fundamental academic disciplines that underpin our knowledge of the built environment. If we contextualise our work in these more fundamental disciplines, there is every reason to think that we can have a much greater impact that we have experienced to date.

Keywords: education, practice, research, university, vocation.

INTRODUCTION

The purpose of this keynote presentation is first, to examine how built environment education and research inform each other. Second, it is about how they both inform and are informed by practice. Third, it is about the extent to which these things together can inform not only built environment research and practice, but wider academic disciplines and, perhaps, society as a whole. Built environment is anything that is not the natural environment, and therefore encompasses buildings and infrastructure, in their design, management, operation and disposal.

RECONCILING THE IRRECONCILABLE

To a certain extent, the topic I have chosen involves a fool's errand in attempting to reconcile the irreconcilable. First, it may be stating the obvious to assert that built environment education is about education, but too often it is seen by many people as being about training

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Hughes, W.P. (2010) Built environment education, research and practice: Integrating diverse interests to make an impact *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 1-8.*

for a vocation. There is a key distinction between education and training. Second, research is often carried out by people who do not teach, as well as by people who are not sufficiently experienced at research to come up with findings that are interesting and useful. Third, practitioners, like many people in society generally, often fail to appreciate the role of the university in society, and therefore get frustrated when their expectations are not met. So, across these three special interests in the built environment, there are hugely mis-matched expectations that lead to a great deal of dissatisfaction and mis-guided effort.

These issues are even more difficult to deal with when they are seen in a wider, societal context. We argue among ourselves about how industry might better support our research, how teaching might meet the needs of industry, why our research does not increase the productivity and efficiency of built environment firms, and so on. While we are arguing about how each can better support the other, no one appears to be thinking about how all of us, collectively, might contribute to society. What is happening in the wider world? What is the context that we seek to relate to in order to make our work more meaningful? There have been several changes in recent years regarding the role of professionals of all kinds, particularly in relation to a general decline in trust. This is important, because academics are professionals, and our particular breed of academics is trying to prepare students for a profession. What does it mean to be a professional? What does society expect from professionals that it would not expect from other kinds of people? And if professionalism is in decline, what should we make of the kind of managerialist and so-called “best practice” ethic that appears to be replacing it? These questions hinge around the role of judgement in decision-making and the relationship between experts and non-experts, generally. In other words, I can see a problem here and I am asking myself my favourite question when it comes to defining a problem – what is the general class of problem of which this is a specific example? And through this question, I hope to comment on what our discipline might be able to share with others, both now and in the future.

WHAT IS BUILT ENVIRONMENT EDUCATION FOR?

Clearly, the primary purpose of built environment education is the preparation of people for a vocation in the built environment. Should the universities be more concerned with the pursuit of knowledge for its own sake? Have we lost touch with our traditions by directing so much of our effort to the service of the vocations? I suspect not. Traditionally, universities have focused on preparation for vocations – for example, by the sixth century in Europe, education only existed where the church maintained it. As Patterson (1997: 31-32) points out in her history of the University since Ancient Greece:

The church regarded education not as a good in itself, but as a means of training the clergy in the sacred writings and in the performance of their religious duties. Education was therefore restricted within the boundaries of the church's interests and doctrines.

It is interesting how closely this resonates with a perception that the professions seek to restrict the boundaries of vocational education in the universities, even though most professional institutions, these days, would not seek to have this kind of influence or control. In addition to this view, I would also offer another view, this time from Edward Shils – *Universities have a distinctive task. It is the methodical discovery and the teaching of truths about serious and important things* (Shils 1997: 3).

HOW SHOULD RESEARCH BE DESIGNED AND CARRIED OUT?

Research is the basic process of discovering new things that are interesting and useful. In the built environment, despite the increasing range of books about built environment research

methods, research is still research! There is not a special branch of research methodologies that are exclusive to the built environment. There are many ways of carrying out research, and many of us get terribly confused about what constitutes research. Clearly, it is important to make sure that what we do in the name of research has some meaning and some kind of impact. Two questions about any particular research project flow from this. First, is this the right research method? Second, is the research done well? Apart from the obvious problems of inappropriate methods, one problem that I frequently encounter is poorly designed research. For example, students frequently distribute their survey questionnaires through email lists. Typically, these lists consist of academics from many countries, but usually, the survey questions are based on a set of assumptions that reveal a complete lack of understanding.

One recent survey was an interesting case in point, from an American doctoral student interested in how construction employers deal with the risks associated with terrorism when their professional employees work on overseas projects in trouble spots. His first question, to an international list of construction academics, was: "Have you ever worked on a construction project outside of the United States?" It is clear from the context of this question that he identifies overseas as being outside the United States. But, clearly, if I had never worked overseas, I would have to answer yes to this question, since I only worked on projects at home, in UK. So, having answered yes to this question, because I have worked on projects outside the United States, the next screen asked a whole load of questions with drop-down options that make little sense to me, but clearly make a great deal of sense to the researcher. I particularly wondered about the question "Have you worked in any country which was affected by terrorism?" I guess that the UK has been affected by terrorism – but is this really what the researcher is looking for, given that his next question asks if my family travelled with my while I worked abroad? This was very confusing. Until this point I was answering questions about working on sites in the UK, a country that has been affected by terrorism. But when asked a question about taking my family with me while I worked abroad, I had to think about when my family came with me when I travelled as an academic to countries that were not affected by terrorism. In other words, all of the questions about my working abroad elicited answers that were nothing to do with what the student was investigating. So I aborted it my responses half way through. Given what I know about survey questionnaires, I was struck by a series of questions about this research: How do you write up a survey when you have not defined a sampling frame? What would you state about the population, the sample and the return rate? This student has no idea who the survey went to, how many people even looked at it, or anything meaningful. There is nothing to be learned from this exercise, and what really worries me is that one day the work might turn up in a conference or as a paper submitted to a journal.

I think it is important that before sending surveys out to mailing lists, students and researchers should be encouraged to think about the traditional steps in designing surveys. I wonder what we are teaching our students that leads them to make so many errors in the design of a simple survey. One thought that frequently occurs to me is that these construction researchers simply do not realize that they are carrying out social science research. Many people imagine that because they are researching in the construction sector, they are carrying out something other than social science. There are so many good books on this topic, such as Oppenheim (1992), Fink (1995), Converse and Presser (1986), Moser and Kalton (2001), to name but a few, that I sometimes wonder whether research students are being directed to this extensive literature on how to carry out research. Again, I question whether the absence of the word "construction" in these social science research texts makes them invisible to people in our field.

This phenomenon is one of the most frequent problems that I find with papers submitted to *Construction Management and Economics* as well as to papers submitted to numerous conferences with which I am involved. If our researchers are not basing their research design on the literature about research methods, what are they basing it on? There are some reasons to think that the two key influences in much of this work are newspapers and consultants.

The media frequently publish the results of market research and focus group research, most of which is centred on either marketing or politics (is there a difference?). I recall reading one article in a construction magazine that should remain nameless in which the editor was writing about a survey of managers in construction firms. He wrote how 28% agreed that the situation was serious, 54% felt that the government should intervene, 86% thought that they were going to change something about their approach... I soon noticed that every result was a multiple of one seventh (14%). In other words, this fellow had called up seven of his friends and asked them what they thought about a series of issues, then reported the result as if he'd carried out a survey! That was bad enough. But what makes it worse is when other people emulate this, thinking that they are doing a survey.

Consultants are widespread in the construction sector. It is what most of our vocational training is preparing people for. And most of the lecturers in our field were (or still are) consultants of one kind or another. To what extent does the education of architects, surveyors and engineers prepare them to carry out or teach research methods? Many of the research projects that we see proposed or discussed at conferences are not research projects at all, but consultancy projects, geared up to do something practical, solve a particular problem of the kind that would normally be dealt with by consultants. By getting universities to carry out this work in the name of research, it is quite possible to get some free or cheap consultancy. I understand how this comes about, but that does not make it research. Simply being a practitioner does not help us to add to the sum total of knowledge about what practitioners do and why they behave in the way that they do. Indeed, I commented on this in feedback about last year's inaugural WABER event, as follows:

First, there was clearly some confusion as to what constituted academic research. Many presenters were clearly setting up a piece of consultancy work. When it was pointed out to them that this was not research and would not satisfy the requirements for a PhD, there was some confusion. In the end, we simplified the message down to "if you are doing what practitioners do, you are doing consultancy. If you are examining or analysing what practitioners do, it is research". This was something that had to be hammered home, but is also a regular problem in CM research the world over. Second, few presenters had come across the idea of research methodology. As usual, the word was bandied around a lot as a heading, but as usual, it heralded a discussion of methods. The distinction between methods and methodology was as difficult to get across here as anywhere. One metaphor that seemed to work was cooking - a recipe is a list of steps that are to be used in preparing a dish, but the recipe does not tell you why these steps work. Such is the difference between explaining what steps were involved (research methods) and explaining why they were chosen and how they generate data and information that will usefully address the questions (research methodology). Another frustration with research methods was the preoccupation with survey questionnaires and the notion of preparing some kind of model. It is a common feature among new researchers to assume that social science research requires a questionnaire survey. It doesn't. There are so many research methods that might be used, and the lack of variety in approaches to hugely varying questions indicated that few of these researchers were aware of the literature on research methods. So we frequently pushed people to carry out some review of research methods before they did their fieldwork, and in many cases we told them that a questionnaire survey would simply not answer the questions they were asking.

In my opinion, the simple answer to the question about how research should be designed and carried out is that it should be done along the lines of good research practice, rather than along the lines of journalism or consultancy.

HOW DO UNIVERSITIES CONTRIBUTE TO INDUSTRY?

Built environment practice does not, of course, take place in the universities, but in the building industry. In thinking about practice, therefore, by definition the focus must be on the connections between universities and industry.

It is interesting to talk to industry people about universities. Recently, I have had the experience of being involved with a group of senior practitioners, at a policy-making level, and their reactions to suggestions about what universities might do are generally dismissive and impatient. I have been surprised by the strength of their reactions when I suggest various ways in which universities (not just mine) might be able to help act as a repository of knowledge, a problem-solving resource, some kind of ideas exchange or enabler. These ideas have been dismissed out of hand as being distracting, counter-productive or just plain useless. This has resulted in a few heated discussions, of course. And what we have come down to is that their feeling is that academics typically think of all the reasons why something should not be done, when something definitely needs to be done. Is this a fair assessment? I have noticed that we do spend a lot of time thinking of why something should not be done, or why something is just wrong. I also understand just how important it is for the academic to be sceptical; to doubt everything. Is there some useful ground between academic scepticism and industry pragmatism?

If universities are not contributing to how policy-makers think, then what are we doing? Clearly, there is a very strong expectation from business that we shall continue to prepare people for vocations. In many places, this is becoming almost the only purpose of a university. If a programme of study does not contribute to increased efficiency of some business or other, then, presumably, it has no purpose. Clearly, this is an absurd statement, but it does seem to underline much of the rhetoric we see in the media, especially in the UK when it comes to discussions about the extent to which students should be expected to pay for their own education. There is a strange but somewhat fixed idea in the media that graduates themselves are the only beneficiaries, as if university education provided no benefits to the rest of society. But this has become such a truism for many of us that we may have forgotten how universities contribute to society generally, and how built environment departments contribute to the construction industry specifically.

The question about the contribution of universities to the construction industry is an interesting one, because the study of the built environment, as well as the kind of research that we carry out, is generally not an academic discipline in its own right. Thus, construction practitioners operate at such a practical level, they are successful without theoretical insights. They need to be good at business, and there are plenty of examples of how you do not need to be educated or clever to be good at business. Interestingly, in the health arena, clinical practitioners have a fundamental need to be up to speed with the latest research from universities. They have a strong obligation to carry out their clinical practice in the light of the most recent thinking and research findings. How much better would our built environment world be if construction practitioners felt that they could not practice effectively without knowing about the latest research findings in our field? Whichever way you look at it, there is a big disconnection between research and practice in the built environment, and that cannot be good for either of us.

In the light of this, I think that there is a problem in deciding what universities can do for industry. If all we are doing is teaching students to be good practitioners, just like the practitioners already out there, then we are destined to destroy the built environment professions by recycling old ideas and preserving outdated practices. In a fast-changing world, we need new ideas from our research that will constantly inform, refresh and change what we teach. The key factor that distinguished universities from teaching colleges is the research that feeds new ideas and knowledge into the syllabus. Graduates enter the industry and (I hope) challenge conventional wisdom, and so we have an influence. More importantly, we should be working closely with clients and contractors, asking searching questions that arise from and contribute to the theoretical frameworks that underpin our practices. Typically, in construction management, these will be social sciences, not engineering sciences. We need constantly to remind ourselves that when we are addressing problems to do with management, economics and law, we are taking a social science standpoint. My vision for the long-term is not just what we can do for construction practice, but the way that we might contribute to new theoretical insights in the social sciences. That would be the ultimate test of our ideas, I feel.

HOW DOES INDUSTRY CONTRIBUTE TO UNIVERSITIES?

In the other direction, there must be something that industry contributes to universities, if this is to be a meaningful, two-way relationship. Obviously, we would expect the professional institutions to accredit our programmes and take part in some aspects of educating students. But, for the reasons stated above, if all we do is replicate today's practitioners, then we are probably failing in our duties as universities. There must be more meaningful and robust contributions from practice to research. Industry contributes by providing access to data for research, by funding research projects and taking part in informing the practical questions to which the research is addressed.

One important issue that arises from these reflections for me is that the academics in built environment department are typically from the construction industry, often at a professional level. My feeling is that while we are concentrating on what industry and practice might do for each other, we are losing sight of the bigger question about what the built environment can do for society. We need to figure out better ways of working together. There are two things we can achieve. First, we can improve the built environment in a million different ways. Second, we can contribute to theory-building and provide insights from a complex and difficult industry sector that will help social scientists to improve their understanding of management, economics and law.

THE MANAGERIALIST ETHIC AND THE DECLINE OF TRUST IN SOCIETY

The professions emerged, with an ethic of professionalism, over many years, during the emergence of industrialization. Professions offered more than mere trade, and a shared perception that emerged embraced the notion that as well as specialized knowledge and barriers to entry, there would be a code of ethical conduct and the idea of public service, not just working for the highest bidder.

The decline of professionals in construction is a symptom of a wider decline in society, the decline of trust, as described so well by O'Neill (2002), who observed that people are finding it increasingly difficult to accept professional judgement. This underlying pressure has been exacerbated in the built environment by a global shortage of skilled workers, widespread low-tech attitudes, prejudice and ubiquitous workforce problems. In place of professionalism, we seem to be witnessing the growth of something else, a malignant force of managerialism. No

walk of life is safe from target-setting, performance evaluation, excessive documentation and objective yardsticks against which output can be measured. This is evident in teaching, medicine, and even the police-public work areas where concerns about the distracting impact of managerialism over the provision of a public service are being increasingly voiced. But who is listening? It is easy to shrug off these concerns because, surely, we all have to account for our actions and decisions? There are two problems with this excessive accountability: 1) it makes professionals focus on their objective knowledge rather than their judgmental skills; 2) it makes them accountable to the wrong people: regulators and bureaucrats instead of the public.

It is not easy for those in positions of power to resist the temptation to wield their power for the purposes of central control over the activities they oversee. Governments could help rebalance the focus, but the trend towards managerialism is seen as an opportunity to develop policies more likely to appeal to the widest possible range of voters. By using performance indicators and conforming to over-simplified measures of output, we can prove that we have done a good job, despite a growing dissatisfaction with our work.

A couple of decades ago, Kanter (1983: 22) was warning us about this problem:

... the aspect of productivity that needs serious attention is not the mechanical output of a production facility; it is, rather, the capacity of the organisation to satisfy customer needs most fully with whatever resources it has at its disposal ... But mechanical notions of productivity lead often to product that meet ever more refined minimum standards, frequently resulting in a decline in customer satisfaction with them. The former thrust calls out for innovation—indeed, for innovative thinking on every level of the organisation's affairs—while the latter confines innovation to a marginal and unexciting role.

This is still a strong statement of the problem. It seems that an organization's activities can be disaggregated, simplified and sequenced so that the room for human error is all but eliminated. But this also eliminates the need for discretion or judgment from the worker -- ironically one of the strongest human attributes, by contrast with machines. By concentrating on the connection between what customers want and what each of us can do, the organization can be much more confident about quality, and therefore about success. But this notion should concern industrial manufacturing; the possibility of it being applied, even indirectly, to a professional field like architecture is frightening. One would stumble at the first hurdle, just by having to identify who the customer is. One significant problem that is too rarely discussed in built environment research, especially in policy development, is the problem of identifying the "customer". For whom are we providing the built environment, and why? I have explored these ideas in more detail elsewhere (Hughes 2003) and it is clear to me that the role of judgement is severely downplayed in all of our working lives, to the detriment of everything that we do.

CONCLUSIONS

In conclusion, it is clear that the built environment has an interesting and important role to play in confronting many of the major problems facing society, all over the world. We need to help people to understand that the built environment is not only an employer, not only a producer of built facilities, but also an enabler of processes that are housed in built facilities and a potential source of new ideas and stronger theories about how people interact and behave. Our impact in studying and researching in the built environment should be oriented towards the problems confronting society, not just the problems of making buildings more efficiently. This is a message that should be hammered home in built environment education

at all levels. Not only that, but also our education programmes should be based on research into the phenomena that we observe. Our theory-building and theory-testing needs to be connected to more fundamental academic disciplines, not developed in isolation. This way, we have a chance to influence more than just built environment education and practice. But to make these contributions, we have, at the same time, to acknowledge that there are areas of expertise that are more strongly developed than ours, and that if we seek to influence others, we have to stop “re-inventing the wheel” and learn about how to conduct and report robust research. My hope and belief is that conferences like WABER can help us to understand how we can contribute to some of the important questions that confront humanity.

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BUILT ENVIRONMENT RESEARCH AND THE MILLENNIUM DEVELOPMENT GOALS

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The target date for attaining the Millennium Development Goals (MDGs) is 2015. The reports indicate that progress towards attaining many of the goals has been slow although there are some encouraging results. What are these goals? What has been the progress towards the achievement of the goals? What are the main areas which need to be addressed? How relevant are the MDGs to the built environment in general and construction in particular? What can researchers who work in the area of the built environment in general and construction in particular do to help in the efforts towards the attainment of these goals? What has been done so far in these regards? What is the way forward? The built environment in any country determines the nature and pace of national development, and the quality of life of the people. It has a major influence on progress towards the attainment of the MDGs. The construction industry, which produces this environment, must be able to play its due role if it is not to be a barrier to progress in these regards. Research on how to improve the performance of the industry would be of benefit.

Keywords: millennium declaration, targets, Africa, construction industry, research agenda.

INTRODUCTION

In a 2009 report, the Secretary-General of the United Nations noted (UN, 2010, p. ii):

The global community cannot turn its back on the poor and the vulnerable. We must strengthen global cooperation and solidarity, and redouble our efforts to reach the MDGs and advance the broader development agenda. Nothing less than the viability of our planet and the future of humanity are at stake. I urge policymakers and all stakeholders to heed the message of this valuable and timely report.

The report was on progress towards the attainment of the Millennium Development Goals (MDG). Are the MDGs of relevance to the built environment in general and to the construction industry in particular? Do calls like this one relate also to researchers? What is the responsibility of researchers in Construction Management and Economics in the efforts to attain the MDG? What are the MDGs, anyway? What has been the progress towards their attainment, especially in Africa? What can the construction industry do?

MILLENNIUM DEVELOPMENT GOALS

The Millennium Declaration

The Millennium Declaration was signed in New York in September 2000 by some 150 heads of state of member countries of the United Nations (UN). The leaders reaffirmed the commitments of their countries to the UN charter, and outlined “certain fundamental values

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Ofori, G. (2010) Built environment research and the millennium development goals *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 9-25.*

... essential to international relations in the twenty-first century” (UN, 2000) including: freedom, equality, solidarity, tolerance, respect for nature, and shared responsibility. The objectives in the declaration were: (i) Peace, Security and Disarmament; (ii) Development and Poverty Eradication; (iii) Protecting Our Common Environment; (iv) Human Rights, Democracy and Good Governance; (v) Protecting the Vulnerable; (vi) Meeting the Special Needs of Africa; and (vii) Strengthening the United Nations. Under objective (ii) of the declaration, it was stated (UN 2000, section iii, paras 19 and 20):

“19. We resolve further:

- To halve, by the year 2015, the proportion of the world’s people whose income is less than one dollar a day and the proportion of people who suffer from hunger and, by the same date, to halve the proportion of people who are unable to reach or to afford safe drinking water.
- To ensure that, by the same date, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling and that girls and boys will have equal access to all levels of education.
- By the same date, to have reduced maternal mortality by three quarters, and under-five child mortality by two-thirds, of their current levels.
- To have, by then, halted, and begun to reverse the spread of HIV/AIDS, the scourge of the malaria and other major diseases that afflict humanity.
- To provide special assistance to children orphaned by HIV/AIDS.
- By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers as proposed in the ‘Cities Without Slums’ initiative.”

“20. We also resolve:

- To promote gender equality and the empowerment of women as effective ways to combat poverty, hunger and disease and to stimulate development that is truly sustainable.
- To develop and implement strategies that give young people everywhere a real chance to find decent and productive work.
- To encourage the pharmaceutical industry to make essential drugs more widely available and affordable by all who need them in developing countries.
- To develop strong partnerships with the private sector and with civil society organizations in pursuit of development and poverty eradication.
- To ensure that the benefits of new technologies, especially information and communication technologies ... are available to all.”

These clauses were summarised into eight MDGs which were, in turn, translated into 18 specific targets to be achieved by 2015 (see Table 1). There were also 48 indicators for monitoring progress in achieving the goals (<http://www.developmentgoals.org>).

It is pertinent to note that this was not the first time that “global development targets” had been set out; there had been a series of them in the 1990s (Fay et al., 2005). However, the MDGs have brought into being the most comprehensive set of co-ordinated actions to attain their targets. The governments of virtually all countries, and international and national organizations have committed themselves to a global partnership to achieve the MDGs. They have formulated policies and programmes, with specific targets, monitoring frameworks and assessment tools (for example, the Global Monitoring Report (GMR) which is published annually by the International Monetary Fund (IMF) and the World Bank assesses progress in the implementation of the policies and initiatives needed to attain the MDGs). The sixth objective of the Millenium Declaration is “Meeting the Special Needs of Africa”. Many

initiatives have been taken to deliver on this promise. An example is the World Bank’s Africa Action Plan of 2005 (<http://www.worldbank.org/afr/aap>) which sought to achieve development results in good governance, closing the infrastructure gap, building capable states, and more equitable distribution of the benefits of development.

Table 1 The Millenium Development Goals and Targets

MDG	Targets
Goal 1: Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> * Reduce by half the proportion of people living on less than a dollar a day * Reduce by half the proportion of people who suffer from hunger.
Goal 2: Achieve universal primary education	<ul style="list-style-type: none"> * Ensure that all boys and girls complete a full course of primary education.
Goal 3: Promote gender equality and empower women	<ul style="list-style-type: none"> * Eliminate gender disparity in primary and secondary education preferably by 2005 and in at all levels by 2015.
Goal 4: Reduce child mortality	<ul style="list-style-type: none"> * Reduce by two-thirds, the mortality rate among children under five
Goal 5: Improve maternal health	<ul style="list-style-type: none"> * Reduce by three-quarters, the maternal mortality ratio
Goal 6: Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> * Halt and begin to reverse the spread of HIV/AIDS * Halt and begin to reverse the incidence of malaria and other major diseases.
Goal 7: Ensure environmental sustainability	<ul style="list-style-type: none"> * Integrate the principles of sustainable development into country policies and programmes; reverse the loss of environmental resources * Reduce by half the proportion of people without sustainable access to safe drinking water * Achieve significant improvement in the lives of at least 100 million slum dwellers by 2020.
Goal 8: Develop a global partnership for development	<ul style="list-style-type: none"> * Develop further an open trading and financial system that is rule-based, predictable and non-discriminatory, includes a commitment to good governance, development, and poverty reduction—both nationally and internationally * Address the least developed countries’ special needs. This includes tariff- and quota-free access for exports; enhanced debt relief for highly indebted poor countries; cancellation of official bilateral debt; and more generous official development assistance for countries committed to poverty reduction * Address the special needs of landlocked and small island developing States * Deal comprehensively with developing countries’ debt problems through national and international measures to make debt sustainable in the long term * In co-operation with the developing countries, develop decent and productive work for the youth * In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in the developing countries * In co-operation with the private sector, make available the benefits of new technologies—especially information and communications technologies.

The role that the private sector is playing is most evident when one considers initiatives by their groupings. For example, with respect to the MDGs, the World Business Council for Sustainable Development (WBCSD) (2005) seeks to: (i) learn by sharing – deliver tools and guides that advance understanding of development challenges and enable all sectors to address them; (ii) advocate the business contribution – help business to work with all

stakeholders to build synergies among programmes; and (iii) learning by doing – demonstrate success through pilot investments and exploit synergies across sectors. The WBCSD’s “workstreams” in this area focus on sustainable production and consumption, by its members, evaluation of the socio-economic impact of businesses and a focus on the development of small and medium-sized enterprises (SME).

Funding the MDG programmes

It was estimated that, to attain the MDGs, developing countries must grow by 7-8 percent per annum (World Bank 2004), and that US\$50 billion per annum in additional external funds would be required. Official aid flows were projected to rise from US\$69 billion in 2003 to US\$135 billion in 2006, and then to US\$195 billion by 2015 (Millennium Project 2005). There have been commitments to provide more resources to Africa (in line with the sixth objective of the declaration). At the G8 leaders’ summit in 2005, the world’s eight richest countries pledged to double development aid to Africa from US\$25 billion in 2004 to US\$50 billion per year by 2010; and to deepen debt relief especially for countries with sound financial management and a commitment to poverty reduction. The IMF (2010) notes that a major step toward meeting the MDGs was taken in Mexico in March 2002 when the international community adopted a two-pillar strategy, whereby sustained pursuit of sound policies and good governance by the low-income countries is to be matched by larger and more effective international support and an enabling international economic and trade environment for development.

Progress in most of the pledges has been slow. The arguments on many aspects of aid, including the most appropriate nature, continue. Baulch (2006) found that most donors are not distributing their aid in a way that is consistent with the MDGs, i.e., they do not direct large shares of their concessionary aid flows to the poorest and most deprived countries. Dalgaard and Erickson (2009) address these questions: (i) how much growth should aid flows have produced in Sub-Saharan Africa over the last three decades? and (ii) how much aid would be needed to attain the first MDG (MDG1) of cutting poverty in half by 2015? Their analysis indicates that expectations for aid in fostering growth and poverty reduction have been too high; and that aid may not be as effective in reducing poverty as other analyses have suggested. However, it would be a mistake to interpret their results as showing that aid is ineffective. Rather, the results indicate that the potential overall effect of aid on growth is likely to be modest.

Powell and Bird (2010) ask: “Have debt relief initiatives complemented or substituted for other aid? Has debt relief been additional?” They examine the relationship between debt relief and other foreign aid in 42 sub-Saharan African countries using panel data for 1988-2006. They find that the relationships between debt, debt relief, aid, and resource transfers have changed over time. They note that the international community is paying attention to helping low-income countries achieve the MDGs. The results confirm the significance of population, the conduct of economic policy, and the need of a recipient. Debt relief schemes since 1988 all seem to have had a significant positive effect on net transfers to participating countries. Most debt relief has therefore, on average, been additional for recipients. They also discover that for much of the period up to 2000, aggregate net aid transfers to sub-Saharan African Africa actually fell in both real and nominal terms.

From the above discussion, it is evident that progress towards meeting the MDGs will not come only from additional foreign aid; supplementary solutions are required. For example, the IEG (2006) found that only 2 in 5 of the countries borrowing from the World Bank recorded continuous per capita income growth in 2000-05 and only 1 in 5 over 1995-2005.

MDGS IN THE LITERATURE

There is much discussion in the literature on many aspects of the MDGs including such fundamental issues as their appropriateness. Not all researchers welcome the MDGs. First, some believe that the goals might lead to wrong prioritization. Maxwell (2003) points out that the MDGs might encourage oversimplified interventions emphasising social indicators at the expense of economic growth. The Independent Evaluation Group (IEG) of the World Bank (2006) notes that achieving high quality development results takes time, but pressure to show results can divert attention from the quality of results. For example, efforts to attain the MDG of ensuring universal completion of primary education have led to efforts to increase enrolments, often at the expense of attention to learning outcomes. In Uganda, there were 94 children per classroom, and 3 children share a textbook, whereas in Ghana, the development programme in the education sector combined policy reforms with the provision of school buildings and teaching materials.

Second, some authors believe the MDGs are unrealistic. Clemens et al. (2007) find fault with the way the MDGs (most of which they consider as overreaching) were set, and assert that they are impossible to meet. Clemens et al. (2007: 747) observe that indicating that the MDGs can be met merely with increased resources “contributes to the illusion that the goals are attainable for all countries”. They suggest that the specific MDG targets “have set up many countries for unavoidable ‘failure’” (p. 747), even as they pursue good policies and make progress on some development indicators.

The third point is the question, “Whose goals are they, anyway?” White and Black (2004) note that the MDGs would not be effective as accountability for failing to meet them is diffuse. Some authors consider the MDGs to be unsuitable for Africa’s circumstances and needs. Easterly (2009) notes that many routinely state that “Africa will miss all the MDGs”. He argues that some arbitrary and arcane choices made in defining “success” or “failure” as achieving numerical targets for the MDGs made attainment of the MDGs less likely in Africa than in other regions even when its progress was in line with or above historical or contemporary experience of other regions. This has the effect of making African successes look like failures. He finds flaws in each of the seven MDGs from Africa’s perspective:

1. it was less likely that Africa compared to other regions would achieve a 50 percent reduction in poverty over 25 years as it had the lowest *per capita* income, which is associated with the smallest percentage reduction in poverty for the same growth rate
2. it was less likely that Africa would attain the level target of universal primary enrolment because it started with the lowest initial primary enrolment and completion.
3. the primary enrolment component of gender equality in schooling is numerically equivalent to universal enrolment, so other regions that were closer to attaining MDG2 could count the attainment of MDG2 twice
4. a two-thirds reduction in child mortality is less likely when a region starts at very high mortality, as Africa did
5. Africa was said to be failing the goal of reducing maternal mortality by two-thirds, but there were no reliable data on maternal mortality trends
6. Africa was said to be failing to reduce AIDS, malaria, and tuberculosis prevalence, but there were no reliable data on trends in these prevalence rates
7. Africa was relatively falling behind on reducing the percent without access to clean water, but it would have been relatively catching up if it had been measured the conventional way of percent with access to clean water.

Easterly (2009) also notes that the implied picture that Africa is failing to meet all seven MDGs is not fair because the continent has made much progress in many of the social

indicators. The negative picture is demoralizing to African leaders and activists, and might have consequences for things like foreign investment. Indeed, the vice-chair of the UN inter-agency committee which designed the MDGs has recently protested that they were meant to apply only at the only global level, not at the country or regional level (Vandemoortele, 2007 Vandemoortele, J. (2007). The MDGs: 'M' for misunderstood? *WIDER Angle* (pp. 6–7). United Nations World Institute for Development Economics Research. Vandemoortele, 2007), and he also criticizes the demoralizing effect of labeling Africa an MDG “failure.” Tabatabai (2007) suggests that if this is the intention, then the MDGs are “not so much misunderstood as misconceived”.

Finally, proposals are made for better goals and targets. Clemens et al. (2007) suggest that future development goals should: (i) be country-specific and flexible; (ii) take historical performance into account; (iii) focus more on intermediate targets than outcomes; and (iv) be considered benchmarks rather than goals which are technically feasible with sufficient funds alone. Tabatabai (2007) proposes that “The real yardstick for judging performance and effort is whether they have done the best they could under the circumstances.”

Some authors argue about the need for particular goals, and the relationships among them. Fay et al. (2005) note that some observers believe that since improvements in most indicators of development are highly co-related with increases in per capita income, MDGs 2 to 8 are superfluous as long as the first goal is tackled. Studies have found relationships among many of the MDGs, appearing to indicate the relevance of each of them. For example, Abu-Ghaida and Klasen (2004) note that many empirical studies have found that gender equity in education promotes economic growth, and reduced fertility, child mortality, and undernutrition. Wisniewski (2010) estimates the impact of nutrition and health problems on test scores of grade four students in Sri Lanka using data on child height, weight, hearing and vision problems, helminthes infections, malaria, and micronutrient deficiencies. The results show that stunting and hearing problems in children have *direct* impact on tests scores. The production function results for academic skills show that better early childhood nutritional status has a positive, significant direct impact on test scores. They also show that infrequent or sporadic infections and/or health problems may cause less of a disruption to the learning process and have less of an effect on test scores than persistent health problems such as early childhood nutritional status and hearing problems.

CURRENT RESULTS AND NEED FOR FURTHER ACTION

Current results

The World Bank (2006a) indicates that joint efforts to reach the MDGs are falling short. Whereas the world was on target to reduce extreme poverty by half by 2015, performance varies among regions. Greatest progress had been in Asia, especially in China and India. In China, between 1990 and 2005, the number of people living on less than US\$2 a day fell by over 400 million. In India, the level of poverty fell from 36 percent in 1993-94 to 26 percent in 1999-2000. Sub-Saharan Africa was unlikely to meet the goal (World Bank, 2006b). The 2009 GMR again concludes that although the global economic crisis slowed progress, the goal of halving extreme poverty between 1990 and 2015 remains within reach at the global level based on current growth projections. The number of people living in extreme poverty in developing countries fell from 1.8 billion in 1990 to 1.4 billion in 2005 (i.e., from 42 percent to 25 percent of the population), with the decline being largest in East Asia.

Progress has been made in some countries in Africa. The World Bank (2007b) reports that 13 sub-Saharan African countries have attained middle-income status, with another five on course. Africa is the world's third fastest region in the pace of reforms to reduce the time and

cost needed to start a business (World Bank and IFC, 2006). However, the World Bank (2007b) reports that more than 314 million Africans—nearly twice as many as in 1981—live on less than \$1 a day. Thirty-four of the world's 48 poorest countries, and 24 of the 32 countries ranked lowest on the UN's Human Development Index, are in Africa. Most African countries remain high-cost, high-risk places to do business (World Bank and IFC, 2006). Africa receives only about 10 percent of foreign direct investment to developing countries. Indeed, the early studies on progress towards achieving the MDGs were not encouraging. Sahn and Stifel (2002) assessed progress on six MDGs relating to living standards in Africa and painted a discouraging picture.

The Latin America and Caribbean region grew by 6.0, 4.5 and 5.0 percent in 2004, 2005 and 2006 respectively because of higher export revenues and volumes resulting from high commodity prices and world growth (World Bank, 2007c). The countries have achieved significant progress in education. In Mexico, a project helped increase completion rates in primary education from 66 percent in 1994-95 to 80 percent in 2000-2001 in disadvantaged communities in 14 of Mexico's poorest states. However, the region continues to face the related development challenges of increasing growth, while reducing poverty and inequality – some 106 million people (nearly 21 percent of the population) live on less than \$2 a day.

The 2009 GMR concluded that, on current trends most human development MDGs are unlikely to be met at the global level. Although deaths of children under five declined worldwide, to about 9 million in 2007, from 12.6 million in 1990, despite population growth. Sub-Saharan Africa and, in some cases, South Asia are likely to fall short of most, especially in the areas of child and maternal mortality, access to basic sanitation, and reducing child malnutrition. The HIV prevalence rate has shown some decline in Africa but has risen in some other regions. There is more hope in education. Whereas the goal of universal primary school completion would be missed on a global basis, the attainment will be close. Again, the largest shortfalls are likely to be in Sub-Saharan Africa and South Asia. The goal of eliminating gender disparity in primary and secondary education seems attainable by 2015, although Sub-Saharan Africa is likely to fall short.

Major accomplishments were made in education. Enrolment in primary education in developing countries as a whole reached 88 percent in 2007, up from 83 per cent in 2000. In sub-Saharan Africa and Southern Asia, enrolment increased by 15 percentage points and 11 percentage points respectively, from 2000 to 2007.

Several authors have recently asked: “What is to be done?” with respect to Africa. Fagerberg et al. (2007) ask: “Why do some countries perform much better than other countries?” They identify four aspects of competitiveness: technology, capacity, demand, and price. The empirical analysis, based on a sample of 90 countries on different levels of development during 1980-2002, demonstrated the relevance of technology, capacity, and demand competitiveness for growth and development. Price competitiveness seems generally to be of lesser importance. Deteriorating technology and capacity competitiveness are, together with an unfavorable export structure, the main factors hampering many developing countries in exploiting the potential to catch-up in technology and income. When unfavorable geography, nature, and climate add to the effects of failing competitiveness serious problems may arise, as exemplified by the countries of sub-Saharan Africa.

Another common question is: “What can Africa learn from the more successful East Asian countries such as China?” Ravallion (2009) notes that at the beginning of China's reform period, it had a higher poverty rate than Africa as a whole. Within five years that was no longer true. He explains how China escaped from extreme poverty. While acknowledging that Africa faces constraints that China did not, there were two lessons for Africa. The first is

the initial importance of productivity growth in smallholder agriculture, which requires market-based incentives and public support. The second is the role of strong leadership and a capable public administration at all levels of government. Policy messages worth thinking about in Africa include access to sound basic education and health care, lower dependency rates through lower fertility, greater internal market integration, and greater openness to foreign investment and trade, consistent with a country's comparative advantage. There are signs of progress in Africa in most of these areas but there is still much to be done.

Need for further action

More work needs to be done to attain the MDGs. UN (2010) considers the most pressing as:

1. efforts to provide productive and decent employment for all, including women and young people, must be intensified
2. the war on hunger must be waged with more vigour
3. greater efforts must be made to get *all* children into school, especially those in rural areas, and eliminate inequalities in education based on gender and ethnicity, and among linguistic and religious minorities
4. more should be done to reduce maternal mortality, especially in sub-Saharan Africa and Southern Asia, where not much progress has been made so far
5. much more should be done to bring improved sanitation to the 1.4 billion people who did not have access to it in 2006 (at the present rate of progress, the 2015 sanitation target will be missed)
6. greater efforts must be made to improve the living conditions of the urban poor (slum improvements are not keeping pace with the rapid growth of developing country cities)
7. greater priority must be given to preserving the natural resource base and to combat climate change.

BUILT ENVIRONMENT, CONSTRUCTION AND MDGS

Nature and Potential of Construction

The construction industry, which creates the built environment, is arguably the main vehicle through which the MDGs can be realised. The features of the industry may be used as a framework to discuss the potential of construction in these regards (see, for example, Hillebrandt, 2000; Ofori, 2000). First, buildings and items of infrastructure are vital inputs for economic activity (both production of goods and provision of services), leading to economic growth and increased incomes in the short run, and national development in the long run. For example, the provision of school buildings (MDG2) and health facilities (MDG4 and MDG5) as well as the houses that meet the slum improvement objective in the Millennium Declaration are all directly from construction.

Second, construction activity has extensive linkage effects, and stimulates activities in other sectors of the economy from which the industry obtains its inputs, such as manufacturing, commerce and financial (banks, insurance companies) and business (lawyers, accountants) services. This contributes further to economic growth and development, implying that investment in construction has significant multiplier effects. Third, construction provides employment opportunities in the form of direct employment in the industry and part-time work. The firms adopt flexible recruitment practices to attain greater flexibility. Thus, construction workers are effective consumers in the economy, further stimulating activities in other sectors and raising incomes generally. Fourth, construction is location specific. Thus, the employment generation potential and stimulation of the local economy can be realized in all parts of the country.

Table 2 The Millenium Development Goals and role of construction

Millenium Development Goal	Contribution of Construction and Research Implications	Indicators for Construction
Goal 1: Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> * Effective and efficient production of buildings and infrastructure * Maximum linkages of construction to other sectors of national economy to create stimulus * Generation of employment opportunities through appropriate choice of technology and procurement * Continuous development of industry. 	<ul style="list-style-type: none"> * Performance of industry, company or project on key indicators, such as time, cost, quality, safety * Features of construction in national input-output tables * Number of jobs created, average wages
Goal 2: Achieve universal primary education	<ul style="list-style-type: none"> * Design and construction of suitable school buildings (in local economic, climatic contexts) * Contribution to economic growth and national development to create jobs for graduates 	<ul style="list-style-type: none"> * Average corporate profits; profits on projects * Estimate of total capacity of national industry, and that of the firm.
Goal 3: Promote gender equality and empower women	<ul style="list-style-type: none"> * Creation of job opportunities for women and youth (MDG8) at all levels in construction, with close attention to working conditions on sites, pay and career progression 	<ul style="list-style-type: none"> * Proportion of females in workforce of industry, company, project, at different levels * Average remuneration of employees of different genders.
Goal 4: Reduce child mortality	<ul style="list-style-type: none"> * Construction of hospitals and infrastructure * Provision of job opportunities to generate income. 	<ul style="list-style-type: none"> * Same indicators as for MDGs 1 and 2.
Goal 5: Improve maternal health		
Goal 6: Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> * Effective site management to avoid health hazards * Initiatives to avoid spread of HIV/AIDS by construction workers (through education). 	<ul style="list-style-type: none"> * Industry, company, project performance on health and safety * Industry and company policies and programmes on HIV/AIDS.
Goal 7: Ensure environmental sustainability	<ul style="list-style-type: none"> * Sustainable construction – cradle to grave considerations of all aspects of construction * Effective management of completed buildings and infrastructure. 	<ul style="list-style-type: none"> * Industry, company, project performance on sustainable construction – waste generation; * Average scores in environmental assessment of buildings * Energy performance of various types of buildings..
Goal 8: Develop a global partnership for development	<ul style="list-style-type: none"> * Construction as a partner for development – study construction’s role in development in order to enhance it * Construction as a creator of wealth and less of a burden in imported inputs * Research on, and develop, construction industries in developing countries to enable them to play a role in globalising economies * Effective logistics of construction in landlocked and small island developing states * Effective construction technology transfer in construction – from research to practice; from industrialised to developing countries * Partnership among industry, government, researchers * Global networks of researchers to study matters on construction and MDGs. 	<ul style="list-style-type: none"> * Same indicators as for MDGs 1 and 2.

Source of MDGs: United Nations http://www.un.org/millenniumgoals/images/mdgs_01.gif

From the above discussion, the construction industry and its processes can be a bottleneck in the effort to realise the MDGs. Therefore, the capacity and capability of the industries in Africa should be enhanced to enable them to deliver a higher volume of output to meet the increased demand from initiatives to realise the MDGs, and to do so in a cost effective and time efficient manner, and to a high quality and with overall value for money.

Built environment and MDGs in the literature

There have been studies, and some debate, on the effects of initiatives to attain the MDGs, and many of these relate to the items created by the construction industry in the built environment. Fay et al. (2005) found that better access to infrastructure (piped water, sanitation and electricity) has a large and statistically significant effect in reducing infant and child mortality and incidence of malnutrition. Ravallion (2007) disputes these findings, questioning the estimating methods adopted. He also concluded that (contrary to the findings of Fay et al.) there was complementarity between basic infrastructure and health care, whereby at sufficiently high levels of initial health care, improvements in basic infrastructure reduce infant and child mortality and the incidence of malnutrition. In response, Fay et al. (2007: 930) highlight the complexity of the situation and call for more research. Li (2009) added to, and confirmed, the studies around the world which have shown that there is a significant correlation between children's development and the neighbourhood built environment in which they are brought up.

The literature has long highlighted the employment generation potential of construction (Hillebrandt 2006). This potential can be most effectively realised through the adoption of appropriate procurement approaches and technologies. Greater attention should be paid to technology assessment and selection (see, for example, ILO 2003). There is a potential negative aspect of this potential. Studies have found that construction sites and their workers contribute to the spread of mosquito-borne diseases (Vijayan and Neo 2007) and HIV/AIDS (Meintjes et al. 2007). Thus, working conditions on sites should be improved to reduce the spread of diseases among the industry's workers and the community.

The literature highlights the role of infrastructure in economic growth and development (Han and Ofori, 2001 provide a useful review). Fedderke et al. (2006) analysed data for South Africa from 1875 to 2001 and found that investment in infrastructure leads to long-term economic growth both directly and indirectly, the latter by increasing the marginal productivity of capital. Fedderke and Bogetic (2009) note that empirical explorations of the growth and aggregate productivity impacts of infrastructure have been characterized by ambiguous results with little robustness. They use 1970-2000 panel data for South African manufacturing and a range of 19 infrastructure measures and explore the question of infrastructure endogeneity in output equations. They conclude that controlling for the possibility of endogeneity in the infrastructure measures renders the impact of infrastructure capital not only positive, but of economically meaningful magnitudes.

The World Bank (2007a) notes that improving infrastructure in developing countries is a key factor in reducing poverty and increasing growth; it is vital to the achievement of the MDGs as it improves access to water and electricity, as well as schools, hospitals, and markets. The World Bank (2007a) observes that if Africa had attained infrastructure growth rates comparable to those in East Asia in the 1980s to 1990s, it could have achieved annual growth rates about 1.3 percent higher. Similarly, it is estimated that the lack of investment in infrastructure in the 1990s reduced long-term growth in the Latin America and Caribbean region by 1-3 percentage points, and hindered the region's ability to compete with the dynamic Asian economies (World Bank 2007d). Eifert et al. (2008) observe that data from the World Bank Enterprise Surveys show that indirect costs (related to infrastructure and

services) account for a relatively high share of firms' costs in poor African countries and pose a competitive burden on African firms. The high indirect cost shares observed in firms in poor African countries reflect underlying fundamentals which increase the costs of African firms relative to their competitors. These differences are significant; the difference between the indirect cost levels faced by comparable Zambian and Chinese firms is almost equivalent to the whole wage bill of the former. Kinda (2010) uses firm-level data across 77 developing countries to show that constraints related to investment climate hamper foreign investment. The results show that physical infrastructure problems, financing constraints, and institutional problems discourage foreign investment. As investment climate constraints, he focused on physical and financial infrastructure problems in addition to human capital and institutional constraints. The main results show that improving physical and financial infrastructures increases the probability of receiving a foreign firm.

There are many recent examples of the economic and social stimulus from investments in infrastructure. Two World Bank (2007d) projects in Peru rehabilitated 13,000 kilometers of rural roads, reducing travel time by an average of 68 percent; and increasing school enrolment by 8 percent and visits to health centres by 55 percent. In Morocco, the construction of an all-weather road in rural communities increased girls' primary school attendance from 28 percent to 68 percent. Gunasekera et al. (2008) note that when transport investments are made in relatively infrastructure regions, the consequences extend beyond growth effects to some transformational changes. They estimate the direction and magnitude of some of the transformational changes induced at the firm and household level using a highway project in Sri Lanka. They conclude that in a region with limited public capital stock, a highway improvement may potentially induce a dual structural shift: the emergence of a new social and technical environment (or a new set of economic opportunities), and a change in the pattern of relationships between the environment and social actors. The original feasibility study of the highway project forecast traffic growth of 4-6%, driven by the agriculture sector. In reality, traffic grew by 10%, and economic growth occurred by more factors than predicted.

ADDRESSING MDGS IN BUILT ENVIRONMENT AND CONSTRUCTION

Action has been taken to use construction activities and products in the built environment directly to realise the MDGs, especially MDG1. Engineers Against Poverty (2006) identifies opportunities to improve the delivery of social development objectives by modifying the way in which public infrastructure projects are procured. It suggested that: (i) project identification should be in line with national, local or sector plans and/or based on public consultation; (ii) the whole life cycle of the project should be considered during planning and design, and a maintenance strategy developed; (iii) social objectives should be identified at the planning stage and fed into design; (iv) funds should be set aside in the budget for the realisation of social objectives; (v) an appropriate procurement approach to deliver the specified social objectives should be chosen; (vi) the bidders' social performance and capacity to deliver social obligations should be considered; (vii) contractual obligations must be monitored and enforced through incentives and/or sanctions; and (viii) social performance audits should be conducted with the same rigour as financial audits.

The ILO (2006: 3) suggests that municipalities should launch investment policies and programmes with the following elements: (i) employment-intensive infrastructure development for upgrading unplanned settlements and rehabilitating facilities for people affected by disasters and conflicts; (ii) provision of social infrastructure for accessibility, water, health, education, markets, rehabilitation and preservation of national heritage; (iii)

organisation and association building, negotiation and contracting capacity building for communities and informal economy operators, and support to SMEs; (iv) provision of support to local governments, community groups and the private sector in pro-poor procurement and community contracting; (vi) review of the local regulatory environment to improve their impact on job creation and the quality of jobs created; and (vii) integrated employment and environmental impact assessments of urban investment plans.

The WBCSD (2005) showcases several programmes and projects in which some of its member companies are taking action, moving beyond philanthropy and corporate social responsibility to business relationships. For example, under the “House-for-Life” programme in Sri Lanka, launched in 2005, Holcim, the leading cement provider in the country, has formed a partnership with Ceylinco Grameen (a microfinance institution) to address the housing needs of the poorest citizens. Micro-entrepreneurs borrow money to buy a home designed as a shophouse, which provides each family the premises to run a business. Holcim provides the initial funds and technical skills, and Ceylinco administers the loan.

Gibson and Olivia (2010) note that whereas access to infrastructure is identified in some studies as a factor that affects non-farm rural employment and income, less attention has been paid to the constraints imposed by poor quality infrastructure. They analyse data from 4,000 households in rural Indonesia to show that the quality of roads and electricity affects both employment in, and income from, non-farm enterprises. The results support the view that poor infrastructure constrains rural non-farm enterprises. Moreover, there is a negative effect of poor quality infrastructure. Thus, there would be gains from development strategies that improve both the access to and the quality of rural infrastructure.

Davidson et al. (2007) note that it has been widely accepted by policy makers, actors and researchers that the key to performance in low-cost housing projects in developing countries lies in community participation. There is a continuum of possibilities of participation by users or beneficiaries in post-disaster reconstruction projects: at one extreme, users are involved in the projects only as the labour force, whereas at the other, they play an active role in decision-making and project management. Four case studies of post-disaster housing reconstruction projects (one each in Colombia and in El Salvador, and two in Turkey) illustrate this continuum. Their study shows that the participation of users in up-front decision-making (within the project design and planning phases) leads to positive results in terms of building process and outcomes. Lyons (2009) notes that post-disaster reconstruction often fails in its stated objectives and these failures may be traced to the centralizing approaches generally taken to reconstruction. He analyses two main housing reconstruction policies adopted in post-tsunami Sri Lanka. He found that the owner-driven programme performed better than the donor-assisted programme by producing more houses, more quickly, of better construction quality, and at less cost. Space standards were generally better, and the designs, layouts and locations were more acceptable to beneficiaries. Infrastructure, services, and amenities were more readily provided to the sites. The donor-aided programme fostered a culture of dependency among beneficiaries who played no active role in the development of their own futures, and did not meet its own objectives.

Recent built environment research and MDGs in Africa

Two recent research studies demonstrate many of the objectives of this paper: relationship between the built environment and the MDGs; use of construction projects and process to attain MDGs; and the role of built environment researchers in studying the MDGs and helping to attain them. In the first project, Majale (2008) presents an action research project that aimed to improve the living conditions and lives of the urban poor in three slums in Kitale, Kenya. The project set out to test whether a participatory planning approach and the

creation of partnerships between slum communities and the public, private and NGO sectors could build local capacity to assess and address the needs of slum dwellers through slum upgrading. He recommended that there should be co-ordinated policies and action on employment creation through participatory urban planning, partnership building and working, and slum upgrading.

It is worth discussing the second project in some detail. Jason (2008) presents a study of informal construction workers in Dar es Salaam, Tanzania, to show how social dialogue was used in finding solutions to the problems encountered in the informal sector which is important for urban development. At workshops organized by the project, the workers expressed the view that most construction projects are available in the government sector but they cannot access them because they lack official recognition. They requested: (i) assistance to form an umbrella organization to fight for official recognition; (ii) government to set aside a proportion of its development funds to procure products and services supplied by informal construction workers; and (iii) the policy of using labour-based technology should be extended to the maintenance of urban infrastructure to create opportunities for employment in urban areas. The 38 groups subsequently formed an umbrella organization. The government changed some policies to accommodate the needs of the informal construction workers. For example, the Contractors Registration Board developed a new category for informal construction workers with eligibility to bid for works worth up to Tsh. 75 million (about US \$75,000). The national vocational training institute, through the social dialogue process, developed a course for informal construction workers. Also, through such dialogue, one foreign company in Tanzania requested the umbrella body for a database of its member groups to it, so that it can select workers from it.

RESEARCH AGENDA

In Table 2, the research implications of the aspects of construction and the built environment which relate to the MDGs are outlined. More subjects for research are considered in this section. It is necessary for construction researchers to undertake work on the MDGs themselves from the perspective of construction, in order to contribute to the development of suitable objectives and targets. For example, Sanusi (2008) attempts to contribute to the discussion on the human development index (HDI) which is a popular measure of human well-being, used by academics, policy makers, governments and development agencies, and applied in ranking countries annually. The index has been criticized on many grounds so efforts are being made to widen the scope of issues it covers. The study examines housing facilities, housing adequacy, housing space and solid waste disposal as part of issues that affect human development. While the possession of these amenities by households contributes to human development, their absence will constitute some form of deprivation.

As an over-arching aim, each research study on the built environment should seek to consider, among its objectives, the extent to which the findings would have an impact on the realisation of relevant MDG targets. Ofori (2007) made this plea at a conference in the UK but it was not warmly received. Some of the points raised by the participants felt that the MDGs were illegitimate and patronizing impositions by outsiders; researchers should be allowed to have their freedom to explore; and funding agencies have their own requirements which do not relate to the MDGs. Built environment researchers in developing countries do not have the luxury to be able to detach themselves from their nations' needs.

There should be research on the direct relationships between construction activity and some of the MDGs. Some relevant topics include: (i) the relationship between construction activity and economic growth and development; (ii) the influence of various individual types of construction projects, such as a road, a bridge or a school, on economic growth; (iii) the

forward and backward linkages between construction and other sectors of the economy; (iv) the amount of employment generated by a unit of different categories of construction work; (v) the relationship between improved construction industry performance and attainment of relevant MDG targets; (vi) the importance of the informal sector in the construction industry; (vii) employment generation in construction in both urban and rural areas; (viii) stakeholder consultation and involvement to enhance benefits from construction projects; (ix) the impact of foreign development assistance on economic growth, and construction industry development; (x) effective public-private and foreign-local partnerships; and (xi) effective technology and knowledge flows.

CONCLUSION

Despite the debate on their appropriateness, the MDGs are relevant goals which provide a framework and benchmarks for the development effort in African countries. The task of attaining the MDGs is immense and the time is short. The poorest countries are in a group of 35 “Low-income Countries Under Stress” which “are home to almost 500 million people, roughly half of whom live on less than a dollar a day. These countries face poor governance, conflict or post-conflict transitions, and a multiplicity of problems that make the achievement of development results particularly challenging” (IEG, 2006: 18). Many of these countries are in Africa.

The construction industry has a critical role to play in efforts to attain the MDGs. The industry should provide value for money for society by producing cost effective, high quality, durable and easy to maintain buildings and items of infrastructure in the most time efficient and sustainable manner. It should use procurement and project management approaches that enable construction activities to provide the maximum stimulus and spin-offs in the local economy, and employment opportunities for the community.

Researchers in construction and the built environment should give priority in their work to how the construction industry can be enabled to help realise the MDGs. A strong partnership should also be established in each country among industry, government, the community and researchers to pursue the development of a strong and efficient construction industry. There should also be a global partnership among researchers and practitioners to engender the development of the construction industries in developing countries.

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HANDMAIDENS AND IVORY TOWERS: THE ROLE AND RESPONSIBILITY OF CONSTRUCTION MANAGEMENT RESEARCHERS AS AGENTS OF CHANGE

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The aim of this presentation is to explore the role(s) of construction management (CM) academics as agents of change and to highlight some of the issues involved in producing both relevant and rigorous research outputs.

It would be naïve to assume that researchers in construction management share the same ontological and epistemological perspectives regarding the methods they mobilise and the products that their work generates. One important distinction is that between rational/instrumental modes of research rooted in the sciences and engineering ‘the engineering model’ and more subjective and qualitative approaches appropriated from disciplines such as sociology ‘the enlightenment model’. The engineering model positions research as revealing something ‘true’ about the world. The intention is that by revealing something of reality, tools to help can be developed and implemented to predict, improve or exploit it. In other words, research is considered to develop new policies, techniques and forms of practice or evaluates how well they work. In terms of this model the findings of CM research are to be applied and implemented and the expectation is that they will be widely applicable in predictable ways with identifiable and beneficial results. This goes equally for research on the strength of particular materials as it does for economic modelling of construction processes. By contrast, the enlightenment model eschews the notion of a single objective reality in favour of seeking to understand how different realities and perspectives are locally constituted. This sort of research targets how meaning and values are derived, how the interactions between actors and material artefacts develop as they occur, and the practices and ideas that emerge from them. Any claims for the utility and applicability of knowledge or insights generated from this type of research would tend to be more modest than those within the harder engineering paradigm. There is little expectation of wide generalisability or easily transferable results. As an applied field construction management is populated by researchers subscribing to both of these ‘models’. Accordingly there is no reason to expect universal agreement over how the products of research contribute to academic or practitioner knowledge. It serves little purpose to go into a lengthy discussion here regarding whether this diversity is a good or a bad thing. What is important though is to distinguish between the two. Failure to do so can lead to attempts to ascribe importance and relevance to research outputs in contexts in which they have little bearing. CM academics have a responsibility to make clear what can and cannot be concluded from their research findings.

Any discussion on the role of CM research in shaping and developing an agenda for change in the construction sector must be grounded in that research outputs could

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Leiringer, R. (2010) Handmaidens and ivory towers: the role and responsibility of construction management researchers as agents of change *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) *Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 27-29.**

benefit individuals, single firms, sectors, ‘industry’ as a whole, ‘the economy’ or ‘society’ at large. The products of research and the beneficiaries thereof cannot therefore be conceptualised as unidirectional or symmetrical. At each of these levels multiple perspectives co-exist. This can lead to a host of philosophical and ethical problems. There is, for example, a need to acknowledge and discuss the implications of academic research offering advantage to one constituency at the expense of another. Indeed, questions remain over who the ultimate beneficiaries of research are supposed to be and who might be denied any advantage gleaned. The position taken here is that for CM scholars to impact on the construction sector there is a need to go beyond mere academic accommodation of, and orientation toward, industry needs. This involves challenging business and societal expectations and requires a process of mutual re-alignment of research aims and objectives. The importance of producing academic insights that are relevant partly because they are not constrained by the immediate pressures of business or policy cannot be stressed enough.

It is clear that the criteria that CM researchers need to align with are different between the landscapes of academia and industry. Within academia, established reputational sources of credibility are underpinned by a disciplinary structuring of knowledge and peer review. As such, judgements of academic outputs revolve around more or less internally consistent and relatively homogenous structures. The status of research outside academia is much more heterogeneous. Credibility is conferred by multiple external groups, including research funders, industry spokespersons, practitioners and at times ‘the man on the street’. In general, credibility comes from the practical implications of the research outputs. Particular importance is given to its utility as a resource for controlling, influencing or understanding business arenas. However, the relevance of, for example, a best practice guide is easy to ascribe if the engineering model is the perspective taken. Judging relevance from an enlightenment model perspective involves a more involved discussion of the sorts of contexts in which the generated research output has to make sense. The relevance of research should be judged on the basis of how well research outputs are able satisfy plural demands and gain credibility in different locations. Relevance should not be equated to the narrow ability to solve industry problems.

It is worth pointing out that academic research is just one possible route to new knowledge production, with others typically including consultancy, training, and using the skills of in-house staff. Academics are best off not trying to fill all the roles.

It should not be forgotten that research is not the only, or even the main, activity of universities, either practically or economically. Teaching is central to a university’s success, and competition for attracting students is fierce. This brings with it inconsistent demands regarding the focus of research and dissemination of outputs. Academic teachers and researchers are expected to respond to new and emerging problems and to engage with current non-academic priorities. At the same time, academic institutions are expected to provide a relatively stable platform of knowledge (i.e. text-book learning) in digestible chunks, which informs and sometimes even constitutes the activities, problems and contexts of ‘construction’ and ‘construction management’. There are tensions between training students to become effective practitioners, and to provide an academic education.

What I would want to argue for is the introduction of more critical perspectives to research in CM. Within the academic community criticism is most legitimate in the context of assessing the rigour and validity of knowledge claims put forward as

contributions to disciplinary development. Most researchers should during the course of their work both be critics and be criticised. If researchers have reasonable doubts about the validity of knowledge claims made by others then they should put forward, and justify, their criticisms. However, such criticism should not be proffered just for the sake of being ‘critical’ in some ontological or generic sense, or to discredit individual researchers or specific lines of argument or perspectives being pursued. Criticism is a means and not an end. It facilitates the possibility for collective production of new ideas, approaches and practices, and most importantly it helps to recognise the limitations of all forms of research and the possibility of alternatives. CM academics can also play an important role outside the academic community in questioning and criticising professionals and policy makers. Critical perspectives can encourage practitioners to reflect on their own actions and assumptions, in order to better judge their expedience and to consider other ways of thinking and acting. It could also encourage them to take seriously a broader range of considerations than those that their professional perspectives might encourage. Through more actively engaging in critical research CM academics can play an important role in counterbalancing tendencies towards inertia and self-interest in organisations of all kinds. This is equally true in terms of criticism of policies and policymakers. Through offering critique of the factual assumptions on which policies are based academics can make valuable contributions to policy. Value can also be derived from drawing attention to the assumptions relating to the consequences that are likely to follow from various actions and the likely effects on relevant agents. However, it is important to remember that the effects of criticism might not always be beneficial. Policies and practices cannot be completely separated from judgements regarding their desirability. Commonly they are the results of trade-offs between a host of perceived values, different perspectives and political fashions. Thus, whilst a very strong case can be made for a more active engagement in public sphere by CM academics there is also reason to be cautious in giving specific research outputs too much weight!

WRITING A SCIENTIFIC ARTICLE

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Regardless of the stage of your career, the ability to write papers for publication is a crucial part of your toolkit as a researcher and academic. But it is not something which necessarily comes easily, or quickly, but rather a skill which needs to be developed and which improves over time and with practice. Whilst there is no single ‘winning formula’ - different audiences and outlets require different formats and ways of presenting your research - there are some rules of thumb which can serve to focus your writing and make a paper flow.

The aims for the workshop are:

- To describe some of techniques you can use to improve your writing skills
- Gain more understanding of the format and structure of scientific papers through analysing published work
- Reflect on the writing process and the key challenges of both producing high quality work, and getting papers published

In the session we will first look at some more general tricks and tips which are useful in developing your writing skills. Secondly we deconstruct the format of an article, and look in detail at specific aspects of structure and content which can be applied across different types of article. The final part of the session will take the form of questions and discussion around some of the particular aspects of writing scientific papers that you may be facing.

Writing is a journey which extends right across our careers. It is a necessity, but should also be a rewarding and enjoyable process.

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Harty, C. (2010) Writing a scientific article *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 31.*

SECTION 2: CONFERENCE PAPERS

A FACTORAL STUDY OF ACCESSIBILITY REQUIREMENTS OF PARAPLEGICS MOBILITY IN A BUILT UP ENVIROMENT

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Whereas the growing public concern about the need for design and development of paraplegics' mobility aids such as wheelchairs and monocoques had received considerable attention of researchers world-wide in recent years, and whereas in the industrialized nations these efforts have evolved into well-planned, built-up environment suitable for use of the aids; elsewhere, especially in Nigeria, the issue appears to have remained a daunting challenge. This paper seeks to examine various variables that hinder or facilitate paraplegics accessibility to public buildings in Nigeria, especially storey buildings, up to the point of service delivery. To address this problem, this study introduced a survey approach, incorporating the method of Rensis Likert's attitudinal scale, to generate respondents' data matrix that was analysed with Principal Component Analysis (PCA) using statistiXL software. Spectacularly, our model clustered the gamut of variables, each weilding significant loading on a factor, into nine distinct factors which were creatively labeled: accessibility enhancers, inclusive design legislation, mobility difficulties, utility of mobility aids, user-friendliness of systems, utility of monocoque, social welfarism, helpfulness of inclusive design and, person centricity design. Furthermore, our findings provide support for the notion that the proposed monocoque is an imperative. The paper concludes by suggesting that the outcome of this research is needful and helpful to Town Planners, Architects, Human Factors Engineers (Ergonomists), Civil Engineers, Social Workers and, especially the Council for the Regulation of Engineering in Nigeria (COREN), in our society's effort to whittle down the perceived mobility challenges of the paraplegics in Nigeria.

Keywords: paraplegic, monocoque, ramp, built-up environment, caregiver, surrogate-variable.

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Ashiedu, F. and Igboanugo, A.C. (2010) A factorial study of accessibility requirements of paraplegics mobility in a built up enviroment *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 35-47.*

A HEDONIC REGRESSION ANALYSIS OF URBAN INFRASTRUCTURE IN COMMERCIAL PROPERTY VALUES IN LAGOS

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Studies have revealed the importance of infrastructure on real estate, the capacity for economic stability as well as on the ability of industries to compete in international markets amongst other factors. However, urban areas in developing countries trail the world in the quantity and quality of their public services. In spite of substantial investments made, the delivery of these services continues to be plagued by problems that have existed for many years. The condition of infrastructure facilities is poor and the financing strategies are inadequate. The study will investigate with a hedonic regression model, economic influences of various infrastructure types on commercial property values within the study areas. The need to improve the adequacy of infrastructure in developing countries justifies a focused treatment of financing instruments, as well as requirements of strategy and regulations specific to emerging economies. Infrastructure delivery should be tailored to suit the economic and financial capacity of each region. This is in order to recover its investment costs from subsequent gains in property values as a result of the provision and improvement of urban public services. More simply put, costs of infrastructure delivery should be recovered from betterment levies and taxes by the extent to which infrastructure provision may have influenced the value of properties. As such, public investment decisions can be facilitated. The sample size utilized will be at least 40% of the population of real estate practitioners and commercial building users within the study area. Data collection will be based primarily on property values, willingness to pay for public services, and environmental/location characteristics through questionnaires and interviews. The hedonic regression model is expected to reveal the relative impact of each infrastructure type on commercial property values within the study areas.

Keywords: commercial property, developing country, finance, hedonic valuation, infrastructure.

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Famuyiwa, F. (2010) A hedonic regression analysis of urban infrastructure in commercial property values in Lagos *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 49.*

ADAPTABLE AND FLEXIBLE DESIGN SOLUTIONS TO THE SPATIAL QUALITY OF PUBLIC APARTMENT BUILDINGS IN GHANA: A RESEARCH AGENDA

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The need to make buildings flexible and adaptable as a means of improving spatial quality over time has long been recognized. The strategy however, still remains marginal to the design profession. While some attribute the situation to shortfalls in the assumptions which underlie designs, others point to challenges with the techniques to achieve such ends. In essence, however, to make designs adaptable and flexible is to remove or reduce the extent of constraints imposed on it in order to facilitate change possibilities over time. The purpose of this paper is to present a research agenda which seeks to develop a methodology to assess the requirements for flexibility and adaptability in the design of the space plan of apartment dwellings in order to provide guidelines for design decision making. By means of extensive review of literature, the paper examines the gaps in knowledge and consequently highlights the need for research. A theoretical/conceptual framework for research is presented in addition to an approach to study design. The paper argues that a building's spatial quality over time depends on the extent of flexibility and adaptability in design, which is a function of how effectively design translates and integrates user requirements. To achieve spatial quality therefore is to adopt designs which limit the extent of constraints imposed on the flexibility and adaptability by the building. The paper contributes to understanding the nature and extent of the gaps in knowledge regarding the methods for improving the spatial quality of buildings, and dwellings in particular, and how this can be bridged through relevant scientific research.

Keywords: flexibility, adaptability, functional quality, functional requirement, design attribute

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Agyefi-Mensah, S. *et al.* (2010) Adaptable and flexible design solutions to the spatial quality of public apartment buildings in Ghana: A research agenda *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 51-62.*

AN ARTIFICIAL NEURAL NETWORK MODEL FOR PREDICTING CONSTRUCTION COSTS OF INSTITUTIONAL BUILDING PROJECTS IN NIGERIA

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The deficiencies of the traditional estimating practice to cope with time pressure, accuracy and uncertainties have long been recognised. Therefore, it is imperative to seek for alternative methods which give reliable, accurate and quick estimate. This paper describes the development of Artificial Neural Network (ANN) model for cost estimation of institutional building projects in Nigeria based on 510 sets of detail project data. Nine predictor variables were identified in a pilot study for the model development. Both forward and backward stepwise regression analyses predicting LnCost, LnCost/m² and Cost/m² were employed for identifying key variables of the data. Four variables (Building Height, Construction Duration, Gross external Floor area and Proportion of Opening in External Walls) appeared in all the six search models, suggesting that they are the key predictors of the data. Three Semi-log regression models including different input variables were developed. Several Multi-layer back propagation networks were also developed from which the best model was chosen. The best ANN model was found to consist of 12 hidden units with a learning rate of 0.4. The result revealed that the ANN model outperformed the other models with an average % Error of -2.52% and MAPE of 5.4% which is an excellent performance.

Keywords: artificial neural network, multi layer perceptron, construction cost

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Waziri, B.S. (2010) An artificial neural network model for predicting construction costs of institutional building projects in Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 63-72.*

AN ASSESSMENT OF CORE SKILL AND COMPETENCIES OF QUANTITY SURVEYORS IN NIGERIA

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Competency-based measures are increasingly gaining ground as the most viable option for providing evaluative criteria for professional performance. While the development of framework for competence assessment is crucial for demonstrating the best practice and profession capabilities, the identification of the required skills and competencies of quantity surveyors, as well as the techniques for their assessment remains a research issue. Formal measures of skill and competence require definition and classification of skill and competence, type and extent. However, general literature on quantity surveying skill and competence illustrates a multiplicity of perspectives. Various classifications and definition of skill and competence reveals that they are very much at variance. This research aims to determine the core skills requirement and competence level of quantity surveyors in Nigeria; and to also develop a conceptual framework for their assessment with a view to enhancing their performance level. Drawing on the review of existing competence standards, this paper contends that an appropriate methodology for developing a robust evaluative criteria is to base competence standards on training, recruiting, performance and professional development. The next stage of the study will use a questionnaire survey to elicit information from relevant stakeholders in Nigerian construction industry on the skills and competencies of quantity surveyors. A Delphi technique approach is proposed for developing a conceptual framework for assessing quantity surveyors' competencies. Specifically, an expert panel will be put together to solicit their expert knowledge on the research questions. The responses of the experts will be combined to arrive at appropriate conclusions and recommendations.

Keywords: quantity surveyor, skills, competency, conceptual framework, Nigeria.

AN ASSESSMENT OF LIQUIDATED AND ASCERTAINED DAMAGES IN CONTRACT DELIVERY

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The study assessed the application of liquidated and ascertained damages (LAD) in contract delivery in Nigeria construction industry. Liquidated and ascertained damages has become a regular feature in construction contracts with the aim of providing a sense of security as to the recovery of damages from a contractor's failure to complete the work within the agreed specified time. Structured questionnaires were used to collect data from construction professionals and contractors. Forty two construction practitioners representing 70% of sample size responded. Descriptive and inferential analytical techniques were used to analyse data collected. The research revealed that fixed sum amount and 0.25 percent of contract sum per week were mostly adopted for the computation of LAD with cost of alternative facilities, loss of revenue from rent and additional supervision and administrative charges being very significant among factors considered in the computation. The major factors found to militate the implementation of LAD are fear of joint cause or concurrent delay, nature of the relationship between client and contractor and, incidence of non-compensable client caused delays.

Keywords: contract, liquidated and ascertained damages, Nigeria.

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Bello, W.A. (2010) An assessment of liquidated and ascertained damages in contract delivery *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 81-89.*

AN ASSESSMENT OF THE CAUSES OF FOUNDATION FAILURE IN THE RESIDENTIAL BUILDINGS OF JAMA'A STREET IN AREA B.Z AHMADU BELLO UNIVERSITY ZARIA-NIGERIA

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Many foundation failures are known to be attributed to inadequate protection to the foundation soils, lack of consideration in the engineering characteristics of the soils under different stress and loading conditions improper construction sequence and inadequacy of design against possible worst condition in the long term. This paper assesses the causes of the foundation failure in the area of study, evidently expressed through symptoms or signs (such as: cracks in dry wall, cracks in floors, cracked foundation, soil separation around the foundation etc.) , emanating from various sources of error and the soil condition. Investigation through the soil using the Atterberg liquid and plastic limit test revealed that the plastic index (PI) of the soil is all above 15% but below 20% indicating that the soil was a plastic soil and so was highly susceptible to settlement. In addition to the plastic nature of the soil, other factors such as; evaporation, subsoil drainage, sprouting tree roots, plumbing leakages, and also the possibility of accumulated constructional errors contributed to the foundation failures. Hence; Geotechnical and protective measures for preventing foundation failure are recommended.

Keywords: foundation failure, plastic limit, liquid limit, plastic index.

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Shika, A.S. and Ifeanyi, N.A. (2010) An assessment of the causes of foundation failure in the residential buildings of Jama'a Street in Area B.Z Ahmadu Bello University Zaria-Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 91-97.*

AN ASSESSMENT OF THE EFFECT OF COMMUNITY PARTICIPATION ON SUB-URBAN DEVELOPMENT IN AKURE, NIGERIA

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Participatory development is the most important approach towards enabling communities to help themselves and sustain efforts in development work. Communities are no longer seen as recipients of development programmes; rather, they have become critical stakeholders that have an important role to play in the management of programmes and projects in their areas. This study evaluates the effect of community participation towards the development of the sub-urban areas in Akure South Local Government Area, Ondo State, Nigeria. Data were collected with the aid of structured questionnaire administered to 200 community leaders/residents in 22 communities and 10 Staffs in the Ministry of Community Development and Co-operative Societies. A simple random sampling technique was employed in the selection and data analysis was by the use of descriptive statistics. Findings revealed that most projects carried out within the sub-urban area are usually of low standard when compared with that provided by the government; it was also discovered that for a project to be more effective, there must be joint participation of both the community members and the government. Based on the findings of the study it was recommended among others that in order to intensify participation in community development, re-education and re-orientation programmes should be organized by the government which will educate the citizenry on the necessity to participate fully in the development of their neighbourhood themselves through self-help activities since the government cannot satisfy the immediate needs of all the communities within its jurisdiction at a goal.

Keywords: community, community development, community participation, sub-urban development.

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AN ASSESSMENT OF THE EFFECTIVENESS AND EQUITABILITY OF ACCESS TO FEDERAL MORTGAGE BANK OF NIGERIA'S FINANCES FOR HOUSING (1992 - 2008)

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Previous housing strategies in Nigeria could not facilitate access to good quality housing for the majority of citizens. Attempts to solve the problem include successive revision of the land use Act; development of appropriate building materials; and the establishment of two-tier mortgage finance system. Also, the National Housing Fund (NHF) was introduced in 1992. However, access to Federal Mortgage Bank of Nigeria (FMBN)'s loans had been adjudged low and lopsided. The aim of this study is to assess the performance of housing development finance of the FMBN with the view to establishing the level of efficiency of the loans disbursed between 1992 and 2008. The only hypothesis of the study assumed no significant relationship between the magnitudes of average pooled finances lent by the FMBN for various incomes housing and the respective population of each income group that accessed the finances in the states studied. Data was collected via questionnaires that were administered on the FMBN, and mortgagors through random sampling. Time-series and 2-way ANOVA were used for the data analyses. The income group and states at greatest disadvantage in term of access to the loans were established. Thirty impediments were found to be responsible for poor access to FMBN's loan by the low-income earners during the period understudy (1992 - 2008). Eighteen impediments were traced to the low-income earners, four to the Mortgage Institution, and eight to the Public Sector in Nigeria. The mortgage system is recommended for restructuring to enable better performance.

Keywords: mortgage finance, low-income group, personal savings, performance.

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Madawaki, M.N. (2010) An assessment of the effectiveness and equitability of access to federal mortgage bank of Nigeria's finances for housing (1992 - 2008) *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 113-125.*

AN EVALUATION OF PHYSICAL TRANSFORMATION OF RESIDENTIAL BUILDINGS IN GOVERNMENT ESTATES IN SOUTH WESTERN, NIGERIA

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Globally, housing sector represents the largest proportion of the built environment. The need to sustain this sector in the face of growing World population and ever expanding urbanization necessitate this empirical study, which evaluated the extent of physical transformation of residential buildings in government owned estates in South-Western Nigeria. This will be with the aim of developing a framework for improving housing conditions. Three housing estates in three states were selected for data collection. Data for the study were collected through observations, interview schedules and structured questionnaires administered on 474 transformers, 360 non-transformers and 87 professionals in charge of housing provision in public institutions. The data were analyzed using descriptive statistics in form of frequency tables, percentages and charts and chi-square test and correlation analysis. Multiple regression analysis was done to develop empirical models for predicting the rate of building transformations. The study examined the various factors that determined user's decisions to transform already occupied building, made a comparison of transformation activities and process among the studies estates, and identified the significant prediction variables influencing the building transformation. Findings indicated that people embarked on building transformations to provide those infrastructures that were not provided by government. Income level of occupants was the most important determinant variables associated with transformation process. Majority of respondents identified delay of approval of drawings (plan) and lack of cash flow as problems encountered in the process. The study also revealed that the building transformation is unguided and directed by market forces and individual interest. However, the physical features of the building affect housing transformation decisions rather than households' income or compositions. It is recommended that government should adopt an essential permissive attitude with control measures.

Keywords: physical transformation, transformer, non-transformer, residential building, infrastructure.

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Adegbehingbe, V.O. (2010) An evaluation of physical transformation of residential buildings in government estates in south western, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 127-140.*

AN EXPLORATORY STUDY OF THE CONTEXTUAL MEANING AND CONSEQUENCES OF EMPOWERMENT IN PROJECT TEAMS

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Empowerment means different things to different individuals. The factors that engender feelings of empowerment and the consequences that ensue are thus multifarious. Using the Critical Incident Technique (CIT) in semi-structured interviews with project participants in Hong Kong, the contextual meaning and consequences of empowerment are explored. Two broad categories of meanings were ascribed to the concept “empowerment” and related to “what individuals or teams feel or experience” and “what organisations or leaders do”, confirming the extant literature’s dichotomous conceptualisation of empowerment into the structural and psychological perspectives. Positive and negative consequences of empowerment and disempowerment were evident. The need to capture the different individual conceptualisations of empowerment in the implementation of empowerment initiatives is shown and that a contextual fit is essential for empowerment to take place.

Keywords: Critical Incident Technique, empowerment, Hong Kong, project team.

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Tuuli, M.M. and Rowlinson, S. (2010) An exploratory study of the contextual meaning and consequences of empowerment in project teams *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 141-151.*

AN INVESTIGATION INTO THE USE OF UNAPPROVED DRAWINGS IN THE CONSTRUCTION INDUSTRY IN GHANA

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The use of unapproved building drawings has resulted in haphazard development of settlement areas. Buildings are sometimes poorly sited in waterways and spaces reserved for public facilities. On the other hand approved drawings guide residential developers to put up building structures at approved spaces. This ensures that building structures are developed orderly and sited in the right spaces, to achieve efficient social and economic infrastructure needs; the goal was to establish the extent of the use of unapproved building drawings on the built environment in four selected areas in Kumasi. Thus the extent of the problem of people not using development and building permits in the selected areas was established. Face-to-face interviews were conducted with professionals in the Academia, statutory bodies and industry. That apart, collection of information from journals, textbooks was carried. Structured - questionnaires were administered to personnel of Kumasi Metropolitan Assembly, Inspectorate Department, private developers and builders in the selected areas. It was found out that about 90% of the buildings were put up without development and building permit. The factors contributing to the use of unapproved drawings in the selected areas in the development of building structures were also found out to be the processing time of permit, re-entry, location, Nearness to development, guidance of building inspectors, nearness to relations, and non-involvement of professionals

Keywords: building permit, developer, settlement, unapproved drawing.

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Orgen, N.K. (2010) An investigation into the use of unapproved drawings in the construction industry in Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 153-165.*

ANALYSIS OF HOUSEHOLDS' TRAVEL BEHAVIOUR IN LAGOS METROPOLIS

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This study examines the travel behaviour of households in three different residential density areas of Lagos Metropolis using systematic sampling technique. The results show that variation exists in the travel demand of respondents across the three residential density areas. The mean trip rate and trip length and trip time per person per day is 2.6, 12.00km and 1hour 50 minutes respectively while bus and car mode are dominantly used by respondents for their daily trips. The multiple regression analysis results show that the use of GSM, income, education, employment, car ownership, gender and household size affect travel demand and that these factors also vary across the three residential density areas. This study concludes that planning decisions and policies directed at meeting the mobility needs in any society should not be generalized; rather, it should be made to recognize and respond to the travel demand of different socio-economic groups in the society. It should also take cognizance of the identified factors in the prediction of households' travel behaviour.

Keywords: travel behaviour, travel demand, trip generation, residential density, trip time.

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ANALYZING QUANTITATIVE DATA USING FACTOR ANALYSIS: REFLECTIONS FROM AN EMPIRICAL STUDY

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The role of quantitative research is to help researchers appreciate the reliability and validity of scientific knowledge using numbers. Concomitantly, the variables often encountered in quantitative research design can be numerous and complex. A powerful statistical tool that can be used to summarize large amounts of such data and also identify any inherent relationships is factor analysis. Factor analysis is a useful for establishing the underlying structure of sets of interrelated variables without imposing any preconceived composition on the outcome. Drawing on an empirical study, the major analytical requirements for the appropriate use of this rigorous contemporary tool are discussed. Given the increasing use of quantitative survey data in research designs, lessons learnt should prove invaluable to especially emerging researchers faced with understanding the underlying constructs of the multiple and interrelated variables often encountered in research designs.

Keywords: factor analysis, quantitative data.

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Ahadzie, D.K. *et al.* (2010) Analyzing quantitative data using factor analysis: reflections from an empirical study *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 177-188.*

APPRAISAL OF FACTORS THAT INFLUENCE THE IMPLEMENTATION OF BOT INFRASTRUCTURE PROJECTS IN NIGERIA

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Build-Operate-Transfer (BOT) concept in the context of Public-Private-Partnership is globally accepted arrangement between government and private sector entities for the purpose of providing public infrastructures. Such partnerships are characterized by the sharing of investment, risk, responsibility and reward between the partners. The subject of this study is on BOT concept as a concession procurement option of public infrastructure development, which was recently given a legal recognition as a means of bridging the critical infrastructure gap in Nigeria. Since the introduction of the concept, there have been many problems in real life practice. However, the government and practitioners have still been vague about explaining its success and failure. This study was carried out to evaluate the problems of the current BOT projects on factors that impede its implementation in Nigeria. Questionnaires were designed and administered to respondents such as clients, consultants, developers, lenders and end users of BOT projects across the six geopolitical zones of the federation. Data collected from the questionnaire were analyzed using statistical technique called severity index. The result of the research findings shows that 41 constraint factors were identified, which were further grouped in to four generic factors hindering the successful implementation of BOT projects in Nigeria, namely the political (10 sub-factors), economic (13 sub-factors), legal (10-sub factors) and technical/social risk factors (8 sub-factors). The consequences of these factors have significantly affects the financial viability of the BOT projects in Nigeria, which in turn deprived lenders to fully participate and finance the projects adequately.

Keywords: BOT, developing country, Nigeria, public infrastructure.

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ASSESSMENT OF GOVERNMENTAL INTERVENTION TOWARDS TOURISM DEVELOPMENT OF IDANRE HILLS, ONDO STATE, NIGERIA

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The government of Ondo state and the people of Idanre are quite aware of the tourism potentials of Idanre Hills. However, the government should be conscious that no sustainable tourism can develop without direct government intervention and interests. The state of the buildings at the hill top is in dereliction. The aim of the study is to assess current intervention strategies. The construction of the stairway leading to the top of the hill, is a major government intervention, initially there was no stairway. Tourists had to be escorted, sometimes carried to get to the top of the hill. Later, the stairway was constructed having a total of 450 risers. The stairway has been reconstructed and the risers are now between 150mm and 180mm at the most, with total numbering 617 steps. Another intervention by the government is the construction of five numbers, relaxation units for tourists climbing the stairs. These units were ingeniously designed and constructed. Also renovation of the first primary school in Idanre was carried out. Case study method was used for the collection of primary data. The village at the top of the hill was visited in January 2008, October 2009 and February 2010. During each visits, pictures was used for recording the extent of governmental intervention. Results show that the state government is actually working albeit at snails speed. The consequence of the work is that the government should be made to understand that a more cutting edge approach should be adopted to drive the wheel of tourism development and preservation of the heritage of the hilltop village.

Keywords: government, Idanre, intervention, tourism, Nigeria.

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Afolami, A.J. and Taiwo, A.A. (2010) Assessment of governmental intervention towards tourism development of Idanre hills, Ondo state, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 199.*

APPRAISAL OF THE PUBLIC PRIVATE PARTNERSHIP IN RESIDENTIAL HOUSING DELIVERY FOR LOW INCOME GROUP IN THE NORTH-CENTRAL GEO-POLITICAL ZONE, NIGERIA

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Previous studies indicate that public housing provision in Nigeria has failed to increase housing supply or improve housing condition in any significant manner. Public Private Partnership (PPP) programme, though in its infancy, is not without hitches. Problems such as weak public sector capacity, weak private sector, and inaccessibility of low income earners to the houses among others are factors militating against this housing delivery system. The research therefore, intends to investigate the efficacy of public private partnership in housing delivery in the North Central Geo- Political Zone of Nigeria with a view to examining the relationship between the stake holders and comparing the method adopted in the three states of Kwara, Niger, Nassarawa and Abuja, as there is no or insignificant record of the existence of PPP housing in the remaining states (Kogi, Plateau and Benue). The study intends to use multi- strategy approach in sourcing data from primary and secondary sources. The data will be analyzed using statistical tools such as Descriptive Statistics for the housing estates and occupiers characteristics, Ranking will be used to show the significance of the factors affecting the development of PPP. ANOVA, Correlation Matrix, Multiple Regression Analysis will be used to investigate how these factors such as level of incomes, accessibility to mortgages, allocation criteria are interrelated and Game Theory will be used to study the relationship between partners. The result of the study is expected to provide a basis for future policy formulation on PPP housing delivery in Nigeria.

Keywords: partnership, housing delivery, low income, mortgage.

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Bolaji, S. (2010) Appraisal of the public private partnership in residential housing delivery for low income group in the North-central geo-political zone, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 201.*

BUILDING INTEGRATION PHOTOVOLTAIC MODULE WITH REFERENCE TO GHANA: USING TRIPLE-JUNCTION AMORPHOUS SILICON

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This paper assesses the potential for using building integrated photovoltaic (BIPV) roof shingles made from triple-junction amorphous silicon (3a-Si) for electrification and as a roofing material in tropical countries, such as Accra, Ghana. A model roof was constructed using triple-junction amorphous (3a-Si) PV on one section and conventional roofing tiles on the other. The performance of the PV module and tiles were measured, over a range of ambient temperatures and solar irradiance. PVSyst (a computer design software) was used to determine the most appropriate angle of tilt. It was observed that 3a-Si performs well in conditions such as Accra, because it is insensitive to high temperatures. Building integration gives security benefits, and reduces construction costs and embodied energy, compared to freestanding PV systems. Again, it serves as a means of protection from salt spray from the oceans and works well even when shaded. However, compared to conventional roofing materials, 3a-Si would increase the indoor temperature by 1-2 °C depending on the surface area of the roof covered with the PV modules. The results presented in this research enhance the understanding of varying factors involved in the selection of an appropriate method of PV installation to offset the short falls of the conventional roofing material in Ghana.

Keywords: Building Integrated Photovoltaic, Triple-junction Amorphous (3a-Si), performance, PVSyst.

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Essah, E.A. (2010) Building integration photovoltaic module with reference to Ghana: using triple-junction amorphous silicon *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 203-214.*

CHALLENGES AND OPPORTUNITIES FACING CONTRACTORS IN GHANA

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The main aim of this study was to ascertain and discuss the current challenges and opportunities facing construction contractors in Ghana. This involved a review of the economic, legal and political environments in which contractors in Ghana operate; a review of published studies on construction in developing countries generally and Ghana specifically; and in-depth interviews and discussions with seven building and civil engineering contractors in Ghana in 2009 and 2010. Six road contractors were also interviewed. The findings indicate significant challenges relating mainly to financing for projects and a harsh business environment. However, most contractors interviewed admitted to significant problems in their own organisations. It is clear that the contracting environment in Ghana is harsh particularly for local contractors who are often not paid on time and without compensation for late payment. However, local construction firms in Ghana who want to breakthrough ought to formulate the right strategic plans, develop innovative business strategies, develop professionalism, and merge with local firms with similar organisational values and characteristics. In short, local or indigenous Ghanaian contractors ought to face up to the reality of competition and the dynamics of modern business in order to survive, grow and become major players in the construction industry in Ghana.

Keywords: challenges and opportunities, contractor, developing country, Ghana.

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Laryea, S. (2010) Challenges and opportunities facing contractors in Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 215-226.*

CHARACTERISTICS OF MIGRANT LABOUR IN WASIMI, IREWOLE LOCAL GOVERNMENT AREA, OSUN STATE, SOUTH-WESTERN NIGERIA

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Areas known to be rich in agricultural production have over the years been known to attract a stream of migrant labour who have taken advantage of the rich alluvial soils to transform their lives and that of their immediate milieu. The study examines the characteristics of migrant labour and assesses the potentials of the study area which make it attractive to them. Data for the study was collected from both primary and secondary sources. The primary data was collected through systematic random sampling of ten percent of the total households. Secondary data obtained from topographical maps on a scale of 1:50,000 and satellite images: Landsat ETM+(2002) from archival sources was processed using the ILWIS software. Primary data was analyzed using descriptive statistics. The results showed that 69 % of the respondents had no formal education, 94.5 % made use of rudimentary tools such as hoes and cutlasses typical characteristics of rural migrant labour. From the study we can draw the curtains on the fact that rural migrant labour are agents of change and innovation diffusion, contributing to the transformation of the rural areas from food deficiency to food sufficiency with excess for export.

Keywords: migrant labour, GIS, poverty, environmental management and planning.

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Gasu, M.B. and Fadare, S.O. (2010) Characteristics of migrant labour in Wasimi, Irewole Local Government Area, Osun State, South-western Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 227-234.*

CONSTRUCTION CASH FLOW PREDICTION MODEL IN GHANA: A CASE STUDY OF THE DISTRICT ASSEMBLY COMMON FUNDED PROJECT

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When planning the short-term or long-term funding requirements of a business, it is more important to forecast the likely cash requirements than to project profitability. Cash is important for the day-to-day existence of a company and some contractors have suffered a downfall not because their work was not profitable but due to lack of cash in the short run. The aim of this research is to develop a model for predicting construction cash flow in Ghana with the DACF as a case study. Analysis of data gathered through structured questionnaires from 30 district assemblies, 22 consultants and 71 contractors revealed that delays in honouring certificate, effective margins, retention conditions, pricing strategies, quality of measurement and retention conditions are the most significant factors affecting the cash flow of construction firms in Ghana. These factors were categorized into under 3 generic groups: monetary, semi monetary and schedule related factors. Through significant testing, 18 of these factors were selected and categorized as monetary, semi monetary and schedule related factors as a basis of developing the model. A four phase quadrilateral conceptual model was proposed as a basis for developing an implemented model, a one phase quadrilateral model to predict short-term cash requirements for construction projects in Ghana. This paper proposes an automated cash flow model depending on 15 factors for predicting construction cash flow in Ghana to serve as a planning guide in the built environment.

Keywords: cash flow, project parameter, current asset.

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Buertey, J.T.I. *et al* (2010) Construction cash flow prediction model in Ghana: a case study of the district assembly common funded project *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 235-245.*

CONSTRUCTION COST DATA MANAGEMENT BY QUANTITY SURVEYING FIRMS IN NIGERIA

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Information is the basis for making business decisions. How can the information produced be verified with ease and accuracy for the decision making by the top management? The study employed the review of related literature and well structured questionnaires were distributed through purposive sampling to Quantity Surveying firms with a view to determine usefulness of cost information and accuracy of sources of cost data and how cost information are being managed by the Quantity Surveying firms in Nigeria. Data generated were analyzed through SPSS. Findings indicated that cost information is highly significant in the preparation of Bills of Quantities, project cost control / management, cost planning, preparation of cost estimates. The study further revealed that cost data are not properly updated/ managed by the firms surveyed as a result of the effect of inflation on Construction prices, insufficient design information, lack of knowledge of the recent advances in computer technology such as use of software packages, computed aided design tools software, cost evaluation software and quantity calculation software. The study suggested that Quantity Surveying firms should fully adopt the software packages for cost information management. Also there should be an equivalent of BCIS (Building cost information services) in the Nigerian Construction industry with online access to information as in the United Kingdom.

Keywords: cost data, cost management, quantity surveying, cost control, cost analysis.

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CONSTRUCTION PROJECT DELIVERY IN GHANA: THE PERFORMANCE OF THE TRADITIONAL PROCUREMENT METHOD

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The traditional method of procurement (DBB) is mostly used in Ghana and widely criticized by stakeholders in the construction industry for being ineffective. Most stakeholders in the construction industry of Ghana continue to use this method as more than 90% of construction projects are executed via this method. Yet complain about the method's inability to deliver projects within the scheduled project duration, budgeted project cost and acceptable project quality continuous unceasingly. This research used historical records of completed DBB projects to assess the performance of the procurement method in terms of its ability to deliver projects within cost, time and with acceptable quality. The study was carried out through a questionnaire survey and secondary data on 62 completed building projects. Another questionnaire was designed to solicit experts view on what project in Ghana could be described as successful. The result pointed to the fact that a successful project should not record cost and time overruns above 10% of the projects' cost of works and should be of acceptable quality. Analysis of variance was used to ascertain whether the projects studied were successful based on the established performance criteria. The data analyses revealed that most projects in Ghana carried out through the traditional procurement method records high cost and time overruns and are of averagely good quality. The data is limited to a small sample of 62 building projects. This limitation arises because of the data collection approach, which is direct contact with historical project documents. The findings from this study can serve as a reference tool for stakeholders and researchers in decision making at the early stages of building projects in Ghana. The results from this study are also intended to stimulate debate on the need to employ alternative procurement methods which have the capacity to improve on project performance in Ghana.

Keywords: cost, performance, quality, time, traditional procurement method.

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COST ESCALATION OF MAJOR INFRASTRUCTURE PROJECTS: A CASE STUDY OF SOCCER CITY STADIUM IN JOHANNESBURG

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Major projects have consistently presented immense challenges on costs and programmes. Previous studies suggest that lessons could be learned from such cost and programme challenges but questions arise as to the transferability of such lessons to future projects. Using a case study approach underpinned by an audit review of the iconic Soccer City Stadium for the 2010 World Cup finals, the paper examines the underlying causes of the seventy-six percent increase in cost and thirty-three percent increase in duration of the project, identifies the responsible parties and describes how the lessons learned from resolving or failing to resolve the challenges could be transferred to future infrastructure developments. The most critical issue is to quantify the risks facing the client, to the fullest extent, and to allocate the management of the key risks unambiguously prior to and during the construction phase.

Keywords: client, infrastructure project, project management, cost, South Africa.

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Nkado, R.N. (2010) Cost escalation of major infrastructure projects: A case study of Soccer City Stadium in Johannesburg *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 265-270.*

DISASTER PREPAREDNESS OF HIGH RISE BUILDINGS IN LAGOS METROPOLITAN AREA: EVALUATING THE RISK, VULNERABILITY AND RESPONSE STRATEGIES

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Although disasters can happen anywhere, certain types of disasters are more likely to occur in some buildings than in others; especially in those in urban areas. Buildings in Lagos have had nasty experiences from both natural and artificial disasters, claiming lives and properties in the past. This study aims at evaluating disasters and response strategies in high rise buildings of Lagos metropolis. Structured questionnaire was designed and administered to building owners, estate managers and disaster managers of the concerned high rise buildings to source for information. This was supplemented by interviews conducted with tenants, and rescue organizations. The study identified likelihood potential disasters, severity of impact, risk level, and achieved degree of preparedness to confront the disasters. The general status of response strategies was as expected, but there were still rooms for improvements. The threatening disasters were in the categories of acts of human and environmental whose vulnerability and impact were more severe on other properties than on the high rise buildings themselves. The magnitude of risk levels discovered could be contained with the already achieved response strategies if coordinated.

Keywords: high-rise-building, disaster, disaster- preparedness.

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Mshelgaru, I.H. and Olowoyeye, O. (2010) Disaster preparedness of high rise buildings in Lagos metropolitan area: evaluating the risk, vulnerability and response strategies *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 271-280.*

EFFECTS OF FLOODING ON THE BUILT ENVIRONMENT IN AKURE, NIGERIA

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Flood is a devastating phenomenon aided by man's actions such as waste dump and construction on river channels without adequate consideration to specified setbacks from the river. Poor consciousness of the inhabitants on the environmental information and inadequate spatial information on the flood prone areas has also contributed to compound the annual problem of flooding. Floods do not only damage property and endangers human and animal lives, it also have some other devastating effects on the environment as well. Sewer outfalls, bridge abutment, bank lines, and other structures within floodway are usually damaged. Navigation and hydroelectric power are also often impaired. The researchers review existing literatures and carry out a field survey of the affected areas in Akure, the capital of Ondo State in Nigeria. This paper seeks to assess the seriousness of the problems posed by floods to the built environment by examining its major causes and devastating effects. It postulates likely short and long term solutions to the problems, stressing the need to stipulate and enforce relevant environmental laws regarding the setback of building from river banks. It concludes by emphasising the need to sensitise people from dumping refuse along river path.

Keywords: flooding, refuse disposal, built environment, flood plain.

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Fadairo, G. and Ganiyu, S.A. (2010) Effects of flooding on the built environment in Akure, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 281-287.*

EMPHASIZING THE NEED FOR ESTATE SURVEYORS AND VALUERS' CAPACITY BUILDING IN HOUSING DEVELOPMENT IN MEGA CITY

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As of December 2009, the earth's population is estimated by the United States Census Bureau to be 6.802 billion, 3.2 billion of people live in urban areas - this is half of the total world population. As at today there are 25 mega cities in the world with Lagos as the 25th. Housing the poor in the mega cities of developing world is one of the major challenges facing mankind. Global capital has transformed local property market practices. To capture this market effectively and relevantly, Real estate professionals have to re-orientate themselves so that they can move up the service value-ladder and avoid being marginalized under intense competition in the mega city housing development. Re-orientation of professional practices involves an expansion of one's geographical and market knowledge beyond the home boundary. It also requires a dramatic change of mind-set, work attitude, social awareness and lifestyle. Sampling the opinions of Estate Surveyors and Valuers in Nigeria, preliminary findings revealed low entrepreneurial competencies among Real Estate practitioners. 100% of the sampled Real Estate firms have access to computer, 27% have access to specific Real Estate software, 18.5% organises refresher courses for staff. During the course of survey, creativity among Estate Surveyors stood at 23% while 33% demonstrated ability to set and achieve ambitious goal. While all the sampled Estate surveyors agreed to have relevant roles to play in housing development, only 41% are playing key roles. This paper concludes by recommending measures geared towards developing the competence needed for effective participation of Estate Surveyors in housing development of our mega cities.

Keywords: capacity building, estate surveyor, housing development, mega city.

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Olurotimi, K. (2010) Emphasizing the need for estate surveyors and valuers' capacity building in housing development in mega city *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 289-294.*

ENSURING THE HEALTH AND SAFETY OF GHANAIAN CONSTRUCTION WORKERS BY DECENTRALISED GOVERNMENT AGENCIES: AN EXPLORATORY STUDY

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Operations in the construction industry are associated with high levels of occupational hazard which often results in ill health, injuries and sometimes death. Generally, safety on construction sites is viewed as the responsibility of the contractor and the employee. However, to achieve a zero tolerance level a three-prong action, which includes government agencies established by law to enforce Occupational Health and Safety (OHS) at workplaces is absolutely important. This study investigated the roles of these agencies in ensuring safety on construction sites in Ghana. The study is an exploratory one. It included interviews with contractors and their employees and officers of the Labour Department and Department of Factory Inspectorate. The results indicated that these decentralized government agencies did not exhibit high levels of commitment to policing Occupational Health and Safety laws on construction sites partly because they are poorly resourced and lack the capacity to effective. It is suggested that in addition to resourcing these agencies, government must show commitment to job safety and health protection of workers by developing a national policy on OHS using the DFI as the focal point.

Keywords: construction workers, decentralised agencies, Ghana, Occupational Health and Safety.

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Boakye, N.A. *et al.* (2010) Ensuring the health and safety of Ghanaian construction workers by decentralised government agencies: an exploratory study *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 295-304.*

ENVIRONMENTALLY RESPONSIBLE INTERIOR DESIGN (ERID) SOLUTIONS FOR AIR-CONDITIONED OFFICE SPACE IN DUBAI

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The building industry continues to see a growing interest in creating solutions that consider the priorities of indoor environmental quality, energy conservation, and design that tread lightly on the planet (eco-pluralistic design approach). Several studies have shown that there is an obvious link between indoor climate and health, comfort, and productivity. Thus, it is possible that an investment for a better indoor environmental quality could be profitable with at least very modest productivity improvements. This study examines indoor environmental conditions of air conditioned office space in Dubai. The study was conducted by distributing questionnaires to the office occupants to get their perception of the indoor environmental conditions. Expert walkthrough was also conducted. Integration among the structural, envelope, mechanical and interior systems and their contribution towards Environmental responsible interior design (ERID) were taken into consideration during the expert walkthrough. Findings from the methods adopted indicate that the office indoor environment is unhealthy and not environmentally responsible. ERID solutions were proposed to address problems observed (during walkthrough) and reported by the office occupants. This study is significant because it addresses issues relevant to building occupants health and comfort, and building sustainability.

Keywords: environmentally responsible interior design, indoor environmental quality, energy conservation, air conditioned office space, Dubai

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Fadeyi, M.O. and Taha, R. (2010) Environmentally responsible interior design (ERID) solutions for air-conditioned office space in Dubai *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 305-317.*

ETHICS OF SUSTAINABLE DEVELOPMENT IN SUB-SAHARAN AFRICA

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World Wildlife Fund claimed that humanity's demand on natural resources has double in the past 45 years, making it impossible to regenerate the earth's depleted resources. How much of this depletion can be attributed to sub-Saharan Africa's activities? Not much, according to the United Nations Framework Convention on Climate Change (UNFCCC), who stated that developed countries are the major contributors to the current high levels of greenhouse gas emissions for over 150 years. The effect is new concern and fear within the sub-region of the potential increase and effect of coastal and marine erosion with changes to sea levels, coastal land, wind patterns, rainfall and solar energy levels along the coastal regions. Sub-Saharan Africa and the built environment in particular need to address this issue urgently, ensuring that sustainability is dealt with in an equitable way. This paper maintains that environmental sustainability is fast becoming a moral issue, and that ethical and moral theories, practices and beliefs in addition to technical advancement should underpin society's behaviour and approach to sustainable developments. Dealing with sustainability in sub-Saharan Africa requires substantial financial resources and expertise, two of the scarcest commodity in Africa. The expectation is that developed nations should have a moral responsibility in supporting poorer countries to meet their obligations to cut carbon emission. The construction profession has made great strides in addressing sustainability both morally and technically, achieving low environmental impact buildings and sustainable communities. It is also well known that poorly designed developments can be damaging to the environment and threaten the health and welfare of inhabitants. In concluding, the paper acknowledges that users' wellbeing, development of sustainable communities, the maintenance and enhancement of natural cycles and biodiversity are important in achieving sustainable development, and that ethical approaches and behaviour can help us achieve this goal.

Keywords: environmental ethics, sustainability in Sub-Saharan Africa, sustainable development, construction sustainability.

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During, S. (2010) Ethics of sustainable development in Sub-Saharan Africa *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 319.*

EVALUATING THE CHARACTERISTICS OF WHOLE LIFE-CYCLE COST DATA IN THE NIGERIAN CONSTRUCTION INDUSTRY

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The scarcity of Whole Life-Cycle Cost (WLCC) data has led to the development of numerous models aimed at mitigating the problem. However, the usability of these models in the Nigerian construction industry is limited as there is no formal documentation of the sources, availability, reliability and consistency of WLCC data. In addition, no standard procedure for the collection, analysis, validation and presentation of WLCC data exists. This paper presents the preliminary findings of an ongoing research aimed at addressing these issues. A procedure for the collection, analysis, validation and presentation of WLCC data was first outlined. The procedure was then followed through, to evaluate the characteristics of WLCC data in the industry. Results show that there is no published information on maintenance and operating cost, life expectancy of building components, cost indices, and location adjustment factors. It was recommended that, concerted collaborative effort must be made by all stakeholders in organising and sponsoring research aimed at providing WLCC data in the industry. It was also recommended that, the method applied in this paper be adopted in the industry as it has the advantage of presenting WLCC data in a format suitable for use in existing WLCC models and also provides a basis for characterizing WLCC data in the industry.

Key words: whole life cycle costing, data attribute, Monte-Carlo method, probability density function, fuzzy membership function.

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EVOKING THE GREEN-SHIFT IN THE BUILDING INDUSTRY FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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Global issues in the field of environment and energy is one of the problems which pose serious threats to the world today. The present situation of (EE) Energy Efficiency in Nigeria with regards to the policies and the concern of the environment and development in the third world has become the rhetoric of developmental studies. The 21st century, calls for a lot of challenges in sustainable Development, With the rate of climate change on the rise and building industry been one of the major contributor to the depletion of Ozone layer, emitting about 35% of CO₂ into the atmosphere and responsible for 40% of the world's total energy, there is need for stake holders to act now. The paper is focusing on the need to create an awareness of the new paradigm shift in building industry on the issue of sustainability where green technology is the new idea that needs to be applied to design and construction of buildings. A Review of; the World Green Building (WGB) movement was carried out with the positive impacts on building designers and buildings to a new paradigm and dimension, the Malaysian programmed on RE (renewable Energy) and EE (Energy Efficiency) which started in 2000, with LEO (Low Energy Office) building demonstration, to the establishment of the GBIM (Green Building Index Malaysia) in 2009, were compared with the present situation of Energy utilization and conservation in Nigeria. Although there has been a campaign on the issue of global warming and climate change with Nigeria's adaptation strategy, which will necessitate it being mainstreamed into its developmental policies and the Vision 2020:20, but the frame work for local action in terms of policies that would move for the establishment of a green building index for the building industry in Nigeria as well as ministry for green technology is not in place. Energy is needed for continuation man's daily activities, but this energy needs to be managed so that it can serve us and the future generation. The proponents of climate change argue that affordable energy –in the form that is currently available – is also the cause of climate change, this calls for awareness and crave for applicable solution to the issue of sustainable development in which the Green -shift in the building industry is part of the solution to the issue of sustainability.

Keywords: climate change, energy efficiency, sustainability, green building.

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FACTORS AFFECTING THE CHOICE OF DISPUTE RESOLUTION TECHNIQUES IN THE NIGERIAN CONSTRUCTION INDUSTRY

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Choosing an appropriate dispute resolution technique is crucial to speedy and mutually acceptable resolution of disputes. Many factors contribute to the choice of an appropriate technique, depending on the parties involved in the dispute. This paper reports a study that identified thirty-two factors that may affect the choice of an appropriate Dispute Resolution (DR) Technique that can be applied in a construction operation in North central part of Nigeria. A questionnaire survey was conducted to obtain data in respect of the perception of respondents on how the factors affect their choice of DR Technique. Analysis of the data using the Statistical Packages for Social Sciences (SPSS) showed that Mediation and Conciliation are most affected by 'preservation of relationships', Arbitration is chosen for reasons of fulfilling 'contract obligations', power to enforce decisions' is what influences the choice of Litigation, Minitrial is chosen for its semi-formality, Negotiation is chosen when parties to a dispute are willing while 'bindingness of the decision' had the highest rank in influencing the choice of Dispute Review Boards. 'Bindingness of the decision' was found to be the most crucial factor influencing the choice of DR technique. Contractors find 'confidentiality of the process', 'formality of the process', and 'finality of the process' crucial. Consultants rank 'bindingness of the decision', 'enforceability of the decision', and 'expertise in construction of those involved in the process' very high.

Keywords: dispute resolution, Alternative Dispute Resolution, Nigeria.

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AbdulRazaq, M. *et al.* (2010) Factors affecting the choice of dispute resolution techniques in the Nigerian construction industry *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 345-353.*

HOW AND TO WHAT EXTENT DO CONSTRUCTION PROJECT FEATURES CONTRIBUTE TO ACCIDENT CAUSATION? AN INSIGHT FOR ACCIDENT PREVENTION

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The implementation of effective accident prevention measures requires insight into how accidents occur and the extent to which accident causal factors contribute to accidents. Construction projects features (CPFs) such as the nature of project, method of construction, site restriction, project duration, procurement system, design complexity, level of construction, and subcontracting have been noted as being contributors to accident causation. However, how they contribute to accident causation and the extent of their contribution remain to be fully explored by research. An extensive review of health and safety (H&S) literature within the UK construction industry discusses the accident causal influence of CPFs to the end of providing preliminary insight into how and the extent to which CPFs contribute to accident causation. The study reveals that CPFs contribute to accident causation through the introduction of proximal accident causal factors and the extent of their contribution is influenced by the degree of prevalence of the proximal factors within the CPFs. The usefulness of this insight for preventing accidents right from the early stage of project procurement is subsequently presented. The application of the findings of the study will contribute towards achieving improved health and safety outcomes on construction projects.

Keywords: accident, distal causal factor, health and safety, proximal causal factor.

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Manu, P. *et al.* (2010) How and to what extent do construction project features contribute to accident causation? An insight for accident prevention *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 355-364.*

HOW DO CLIENTS INFLUENCE INNOVATIONS IN CONSTRUCTION PROFESSIONAL SERVICES FIRMS?

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The pursuit of innovation as means of improving services and achieving competitive advantage in today's rapidly changing business environment has been well documented. Several factors both internal and external to organisations have been identified as influencing innovation. In construction professional services firms, these factors include organisational culture and climate, leadership style and client influence. A number of studies have highlighted the important role internal factors such as leadership style of senior management play in creating a climate conducive to innovation. Others have also recognised the significant influence organisational culture exerts on innovation. Key among the external factors is the client. The role of the client in relation to innovation and project performance has been subject of debate and conjecture. Whereas some writers have projected the client as an enabler of innovation, findings from other studies suggest that they may inhibit it in some circumstances. This paper reviews relevant literature on innovation and critically examines the role of the client in fostering innovation in construction projects. Using three types of innovations, the paper presents the preliminary findings of on-going investigations into the potential influences of internal and external factors on successful implementation of the innovations. The initial findings suggest that clients have both direct and indirect influence on innovation and that their support for innovation is primarily determined by the expected benefits to the client organisation. Specifically, clients can help to create an environment that enables innovation championing behaviour amongst project managers to thrive.

Keywords: client, construction support services, innovation, innovation championing, innovation performance.

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Kissi, J. *et al.* (2010) How do clients influence innovations in construction professional services firms? In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) *Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 365-375.*

IMPERVIOUS BUILDING (COATING) MATERIALS' WORKABILITY IN SOUTHWEST NIGERIA: A CASE OF AKURE, ONDO STATE

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The prevailing weather condition in Akure in south-western Nigeria which is characterized by high humidity and rainfall coupled with obvious global climatic changes are impinging on the building fabrics. The effects of surface and ground water on buildings in the area calls for a cursory look into finding means of militating against its penetration which will consequently reduce the aesthetics and structural value of the buildings. This paper is aimed at finding solution to the occurrence of extensive capillarity in buildings in the area. A thorough survey was carried out through the administration of well structured questionnaire on randomly selected buildings in all the twelve zones of the city to determine the use or otherwise of impervious materials and their implication(s) on the buildings in the area. Physical measurement of capillarity in randomly selected buildings was also carried out. Most of the buildings investigated suffer from various degree of water penetration due to non application of impervious materials in virtually all the areas of the city. The use of, the inevitability and advantages of impervious (coating) materials in the area are not properly harnessed. The incontrovertible findings point the way forward in the application and use of water resistant materials in the warm humid zone of Nigeria to prevent dampness in buildings.

Keywords: building materials, impervious, capillarity, water.

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Folorunso, C.O. (2010) Impervious building (coating) materials' workability in southwest Nigeria: a case of Akure, Ondo state *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 377-384.*

INTRODUCTION OF BUILD- OPERATE -TRANSFER (BOT) MODEL INTO MAIN STREAM FUNDING OF INFRASTRUCTURAL PROJECTS IN GHANA

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Ghana is about 238,500 km² area in dimension just about the size of UK. The population is about twenty two million. Economic and Social Infrastructural facilities development such as transport, power, water, prisons, hospitals, schools etc are mainly funded by government through existing models that depend on Government Revenue/Loans and Donor support. Currently, in practice, very little is known about BOT, which encourages private sector financing of infrastructural projects through partnership agreements with the Public. About 40% of the Nation's budget is spent on road construction alone, yet the country cannot boast of an excellent road from Accra, the capital to Kumasi the second capital. Almost all the above mentioned infrastructural facilities are in short supply. Clearly the existing models of funding infrastructural projects in Ghana have proved inadequate and ineffective in ensuring the desire accelerated level of growth needed by the economy for transformation. The paper examines the possibility of adopting BOT Model into main stream project financing especially road infrastructure. It explores the impact to be derived from the introduction of BOT Model and the compatibility of BOT Model with the existing Models. Existing literature was reviewed. Targeted officers and a section of drivers were interviewed. Case Study was employed to establish a business case. The paper concluded that BOT Model is an option that can complement existing Models.

Key words: BOT, infrastructure, funding, private sector, partnership, Ghana.

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Owusu, K. (2010) Introduction of Build- Operate -Transfer (BOT) model into main stream funding of infrastructural projects in Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 385-394.*

INVESTIGATIONS INTO THE POZZOLANIC ACTIVITIES OF VOLCANIC DEPOSITS FROM THE JOS PLATEAU: INTERIM REPORT ON CHEMICAL CHARACTERISTICS

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The costs of concrete mixtures are high in developing countries such as Nigeria due to the soaring costs of the Ordinary Portland Cement (OPC). But this can be palliated by reductions of the cement contents in the concretes mixtures by utilising natural pozzolanas as partial replacements. The investigations are therefore aimed at ascertaining the pozzolanic activities of the volcanic deposits from Jos Plateau for partial replacements with ordinary Portland cement in the concretes mixtures. The study involves the determination of the physical and chemical characteristics of the volcanic materials. The chemical tests have been conducted by means of the Energy Dispersive X-Ray Fluorescence (EDXRF) techniques. The findings show that the sum of the oxides of silica, aluminium and iron are over 76% by weight in all the materials samples tested. The results also show that the materials are free from carbon and alkalis; the sulphur and calcium contents are found to be low with values of 2% and 0.28% respectively. It is concluded from the chemical analysis that the volcanic materials are potential pozzolanas with good Pozzolanic Activity (Reactivity). The physical investigations under study would provide the levels of the partial replacements of the materials with the OPC for the production of Portland Pozzolana Cement.

Keywords: natural pozzolana, partial replacement, blended cement, and volcanic rock.

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Dadu, D.W. *et al.* (2010) Investigations into the pozzolanic activities of volcanic deposits from the Jos plateau: Interim report on chemical characteristics *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 395-402.*

LAND AND HOUSING VALUES AND THEIR EFFECT ON HOUSING DELIVERY IN SEKONDI-TAKORADI METROPOLIS, GHANA

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A study was conducted to find out the land and houses values, the relationship between the two variables and to ascertain their effect on housing delivery in Sekondi-Takoradi Metropolis. This paper adopted both quantitative and qualitative research approach to seek information from developers, landlords, and landowners and land administrator in nine selected communities in Sekondi-Takoradi Metropolis through questionnaire survey. A questionnaire survey was used in data collection. In all, a total of 120 questionnaires were distributed. 65 valid responses out of the total number were received at the end of a two week period representing a response rate of 54.2%. It emerged from the study that the land and houses values in well developed residential areas were respectively about four and three times higher than the less developed residential areas classified as third class residential areas. In this study it was also discovered that the average house values in first and second class areas were twice the land values, while, the average houses values in the third class areas were three times their corresponding land values. It was also discovered that the slow rate of housing delivery in the metropolis is due not only to the high cost of land but also other land related factors. The research recommended that the Sekondi-Takoradi Metropolitan Assembly and the utility service providers should provide the necessary utilities in the third class residential areas to enhance delivery of houses in these areas which would at the same time ease the population density on well developed areas.

Keywords: Ghana, house value, land value, Sekondi-Takoradi.

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Yalley, P.P. *et al.* (2010) Land and housing values and their effect on housing delivery in Sekondi-Takoradi metropolis, Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 401-411.*

MANAGEMENT OF WATER DISTRIBUTION INFRASTRUCTURE WITH GIS IN THE NIGER DELTA REGION OF NIGERIA

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Water is essential for man's existence and without it, there would be no life on earth. The total water consumption is on the increase due to the increase in population and civilization. Water is regarded as a resource that should be well planned, developed, conserved, distributed and managed. Its infrastructures should be properly maintained to avoid future water problems. Drastic changes are needed in the collection, distribution and management of water infrastructure. These challenges and the threatening water crises have continued to demand innovation and state-of-the-art technology. This paper examines the use of Geospatial Information System (GIS) in the location, planning and maintenance management of water distribution infrastructure. The use of Global Positioning System (GPS) derived data for the creation of water distribution infrastructure (DWI) management database is discussed. Data generated from University of Benin Teaching Hospital (UBTH) water distribution network were used to generate case study scenario. The results of the study revealed that with the provision of accurate, up-to date geospatial information about the components of UBTH water supply systems, their physical location above, on or beneath the earth's surface can be easily determined. Besides, dynamic water distribution system maps which reflect the current position of the components of the water system on the earth's surface and are sine qua non for effective planning, design, development and maintenance management of water distribution network can be produced from either Computer Aided Design (CAD) or GIS environment using the up-dated geospatial information (coordinates). The study further revealed that UBTH water distribution system is not only poorly maintained and funded but is also in the wear out period of the Bathtub Hazard curve whose hazard rate increases with time. Moreover, the frequent leakages and pipe burst in the study area can be attributed to the fact that most of the water system components are old and have outlived their designed life. The study has provided vector model (UBTH Water supply scheme) not only for pinpointing the location of the components of the water supply system but also for locating those components of the water system that are either malfunctioning or have outlived their design life and would need repair or renovation or replacement. The developed GIS for UBTH water supply scheme is capable of displaying the water system inventory, graphically present the modelling output, able to identify a good location for the water system facility site as well as perform system spatial analysis, answering questions about the locations of any components of the water system. The developed GIS can also be used to obtain complete and accurate digital mapping inventory of the water network.

Keywords: water distribution infrastructure, Geospatial Information System, maintenance management, Global Positioning System, Computer Aided Design.

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Audu, A. and Ovuworie, G. (2010) Management of water distribution infrastructure with GIS in the Niger delta region of Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 413-421.*

MULTI-CRITERIA DECISION MAKING MODEL FOR CONTRACTOR SELECTION IN CONSTRUCTION PROJECTS IN NIGERIA

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Selection of contractors is a crucial decision taken by the client and his representatives in order to ensure the project is completed within time, cost and quality standard. It has plagued the construction industry in Nigeria and has led to corruption, delay and abandonment of projects, despite government intervention “due process” set up by the government of Nigeria for the purpose of transparency and accountability in public sector. The purpose of this research is thus to examine the selection processes and to form a model that will serve as a standard method for selecting competent contractors. The research intends to cover Lagos state and the Federal Capital Territory of Nigeria and the study via questionnaire survey would investigate contractor’s perspective to the selection process and the methods used by the clients’ organization and consultant in selecting contractors. Data to be collected would be analyzed using descriptive and inferential analysis. The study will enable client and consultant in choosing a competent contractor and the model will aid the consultant in decision making so as not to be subjective in their decision.

Keywords: contractor selection, decision model, performance, prequalification, tendering.

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Ajayi, O.M. (2010) Multi-criteria decision making model for contractor selection in construction projects in Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 422-433.*

PEOPLE'S ATTITUDE TOWARD PROPERTY TAX PAYMENT IN MINNA

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This work examines people's attitude toward tax payment in Minna. Data were collected via sets of questionnaire and interview conducted in Minna, the capital of Niger state. Findings revealed that, 90.5% of the respondents pay tax generally, out of which 71.5% is personal income tax while property related taxes stood at 9.4%. Sampling people's willingness to pay tax, 41.6% are willing to pay while 52.6% are not willing to pay. Property rate is the major property tax in operation in Minna. Severance tax, site value rating, special land taxes and betterment tax are not in operation in Minna. The respondents advanced reasons for their lack of interest in paying tax to include lack of awareness, ignorance, and corrupt government officials among others. The paper recommends measures for creating positive people's attitude toward property tax payment and strengthening the existing property generated revenue with the view to accelerating development projects most especially at the local government level.

Keywords: development, property, property tax, tax, revenue.

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Babatunde, A.A. (2010) People's attitude toward property tax payment in Minna *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 434-441.*

PRE-CONSTRUCTION INFORMATION IMPLEMENTATION IN GHANA USING UK'S CDM 2007 MODEL

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The construction industry has been seen as one of the hazardous industries. This is because construction industry has a poor health and safety performance record compared to other industries all over the world. However, there has been increased awareness for improving construction site safety while developing safety programs and increasing safety inspection (Jaselskis et al., 1996). This paper therefore represents the results of construction professional/government agencies on the implementation of pre-construction information plan in some selected regions of Ghana. The aim of the research is to find out whether the implementation of pre-construction information similar to UK's CDM 2007 model would improve upon health and safety performance in the construction industry in Ghana. The first objective of the research is to investigate into the history of health and safety in UK and carry out detail research in CDM 2007, with particular reference to pre-construction information. The second objective is to investigate into health and safety in Ghana. Within this context, a detailed questionnaire was developed and administered. Data collected were analysed using SPSS. The results of the survey show that the implementation of pre-construction information will improve upon health and safety performance in Ghana. Also, the research reveals that the pre-construction information, if implemented, will help reduce accidents, cut down on contract delays, reduce bureaucracy, manage and control cost and reduce(or eliminate) contract claims/disputes. The research further established that, in Ghana, the pre-construction information should be prepared by project managers.

Keywords: pre-construction, CDM 2007, health and safety, performance.

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Dadzie, J. and Coles, D. (2010) Pre-construction information implementation in Ghana using UK's CDM 2007 model *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 443.*

PROBLEM OF READY-MIX CONCRETE PRODUCTION IN THE CONSTRUCTION INDUSTRY IN NIGERIA AND ITS COST IMPLICATION

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The use of defective construction materials has been identified as one of the major cause of the perennial problem of structural failures in the construction industry in Nigeria leading to huge loss of lives and properties. This paper discusses the problem of ready-mix concrete production and use. Also the implications of such problem on cost were examined. This is aimed at identifying the major problems affecting ready-mix concrete production and remedies to such problems. The paper was based on literature review and intellectual discussion on the issue, with expert. The paper noted that the problems facing ready mix concrete production are many. Some of them genuine national standard used for quality multinational construction companies, not much progress has been recorded by the indigenous companies, who for most part of their concrete production, are still near primitive level. Also problems concrete production leads to delay which brings about variation and hence cost overrun. Parts of the recommendation made are government, professional bodies and Nigerian building and road research. Institutes have a role to play, by introducing measure to guide remedy those problems such as strict enforcement of national building code, use of material that would serve as a partial replacement of cement.

Keywords: ready mix concrete, cement problem, quality control, sustainability.

RESIDENT'S PERCEPTION OF THE CENTRAL SEWAGE SYSTEM IN THE FEDERAL CAPITAL CITY, ABUJA-NIGERIA

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Urbanization and increase in population influence the rate of waste generation and the need for sufficient housing and infrastructure. The Federal Capital City (FCC) which is among the fastest growing cities in Africa, is faced with several challenges such as wastewater disposal, solid waste disposal, housing provision, transportation, power supply amongst others. The FCC has a fairly developed central sewage system which is rare for most Nigerian cities. The use of sewers is not without its challenges and given a poor reputation for maintenance in developing countries, these challenges could be overwhelming. This study investigated the perception of the residents of the performance of the central sewage system in the FCC. The study was carried out by administering a questionnaire to residents in Five (5) districts of the FCC. The responses were analysed using simple statistical tools such as Means, Percentages and Standard deviations. From the analysis, it was observed that the common problems identified were sanitary sewer overflows (SSO), odours from broken sewer lines and manholes and incomplete sewer lines. The respondents also claimed that maintenance efforts on the sewer were not satisfactory. The study concluded that the operation of the central sewer system is not without several challenges stemming from inadequate maintenance practices. As a result, the observed faults are not properly addressed. The study recommends that the operators of the sewer system adopt maintenance techniques to tackle the problems observed and implement an appropriate feedback system for performance monitoring.

Keywords: central sewage system, Federal Capital City, Nigeria, performance.

RISK AND UNCERTAINTIES IN CONSTRUCTION CLIENTS' CASH FLOW FORECAST

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Accurate cash flow forecasting during tendering and execution of construction projects is essential particularly in helping the client to manage his finances. This has been difficult to achieve due to risk and uncertainties. This paper therefore evaluated the effect of risk and uncertainties on clients' cash flow forecast in Nigeria. The paper aimed at examining the occurrence frequency of risk and uncertainty factors and their effect on client cash flow forecast. One hundred and sixty copies of structured questionnaire were administered on quantity surveyors in private firms, public and corporate organizations, selected using systematic and purposive sampling techniques. The data collected were subjected to statistical analysis using factor analysis and relative significance index (RSI). Eight risk and uncertainty factors were extracted through factor analysis and they were client's brief consequence, nature of the project, tendering related and other extraneous factors, sum adjustment, clients' decision, economic related factors, external influence and valuation assessment. These reduced factors occurred frequently with high effect at diverse degrees when forecasting clients' cash flow. This result provides empirical information on factors which are germane to the occurrence of risk and its effect on clients' cash flow forecasts. It indicates the need for intensive effort by the construction participants in risk and cash flow management to proffer solution to the problem of escalating construction cost by giving due attention to risk.

Keywords: cash flow, forecast, client, risk, uncertainty.

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SAFETY ON GHANAIAN CONSTRUCTION SITES: THE ROLE OF THE EMPLOYER AND THE EMPLOYEE

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Construction sites are among the most dangerous workplaces. Statistics indicate high injury and fatality among construction workers in most parts of the world. This study examines the role of construction employers and employees in ensuring that the construction workplace is safe. Twenty (20) large scale contractors and 80 of their employees were interviewed using structured questionnaire to determine their knowledge of the various legislative provisions on occupational health and safety (OSH) and their contribution to ensuring that injuries and fatalities among construction employees are minimised. The results indicated that not all employers and employees are actively involved in eradicating unsafe practices on Ghanaian construction sites. The factors which contribute to this state of affairs include ignorance, apathy, lack of education and training, and lack of enforcement of laws relating OSH. The paper recommends a complete attitudinal change on the part of employers and employees and the development of a positive safety culture on all sites. It is also recommended that laws on OSH be enforced by those authorised to do so to ensure that employers and employees do become lax in their responsibility and that must motivate employees to behave safely.

Keywords: safety, construction site, responsibility.

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STRUCTURAL STABILITY IN NIGERIA AND WORSENING ENVIRONMENTAL DISORDER: THE WAY FORWARD

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Nigeria, as a developing nation, has been transiting through a great transformational state within the last couple of decades. The built environment is not left out in this process. The construction of houses and infrastructures are next essential to man as air, water and food. They serve as residence, places of work, worship, entertainment etc or as means of transportation. In the recent years, the stability of buildings and roads are experiencing a lot of challenges especially within the coastal areas. The rate of building collapse has been so alarming that a week hardly passes without a case being reported. Just a one day non-stop rain fall is enough to hold the whole of Lagos State to a standstill as failed drainages and flooded-potholed roads make it impossible for most people to go about their activities. The situation is not much different on major highways outside Lagos where travellers are often trapped in traffic jams for hours. The cost of these collapses in terms of human life and economic waste cannot be over emphasized. As the effect of the global warming is beginning to take its toll in many parts of the world, the changes in our environment must be closely watched and taken into consideration. In light of these issues, this paper analyses the problems of structural stability in a worsening environmental setup and proffers solutions that will enable us cope with this alarming situation.

Keywords: building collapse, failed environment, unskilled artisan, global warming.

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Ede, A.N. (2010) Structural stability in Nigeria and worsening environmental disorder: the way forward
In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 489-497.

SUSTAINABILITY OF SOLAR HOME SYSTEMS FOR A DOMESTIC POWER SUPPLY IN NIGERIA

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The need for new energy infrastructure in Nigeria has long been established due to poor and unstable power supply. Thus, resulting in decrease of energy consumed to 0.075 toe/capita in 2007 when compared with World average of 1.78 toe/capita and African average of 0.68 toe/capita. Solar Home System (SHS) is one of the sustainable renewable energy source proposed to solve the problem surrounding the infrastructure. Perhaps, it is among the best options for Nigeria especially being in the tropics where there is so much sunshine to convert and in view of its apparent limitless potentials. Several researches on SHS are currently going on. Government and Non Governmental organizations (NGOs) are supporting demonstration and pilot projects to ensure that the general public becomes aware of the potentials of the technology. However, this study focused on assessing the availability (measure of readiness) of the source through field survey and experiments. In this work, we proposed to: determine optimum option of positioning photovoltaic (PV) panel for receiving sunshine, establish the electric power generating capability of the system with respect to solar sunshine intensity and duration, to develop SHS design criteria. Historical trends of solar radiation of some locations were collected, studied, analysed and presented as interim results to justify the proposed objectives of the study. This would provide potentials and valuable aid for sustainable development, enabling tighter control of power supply and greater efficiency in improving per capita energy consumption in built environment of Nigeria.

Keywords: sustainability, photovoltaic, solar energy.

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Abdulsalam, D. *et al.* (2010) Sustainability of solar home systems for a domestic power supply in Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 499-508.*

SUSTAINABLE CONSTRUCTION EDUCATION: ASSESSING THE ADEQUACY OF BUILT ENVIRONMENT PROFESSIONAL'S TRAINING

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The world's population continues to grow, creating the need for more buildings and public infrastructure, resulting in an increase in waste production, energy usage and water consumption. At current trends, the ability of future generations to adequately meet their needs will be significantly challenged. Lack of awareness and knowledge on sustainable construction by relevant practising professionals within the built environment in Nigeria has been identified as one of the barriers to ensuring sustainable construction. This study investigated the adequacy of tertiary institutions' training towards production of professionals, well grounded in the tenets of sustainable construction. The study was carried out by using a checklist to benchmark existing curricula of five Built Environment professions in five Nigerian Universities. Also, a questionnaire was administered to establish familiarity of the built environment students and educators with the concept of sustainability. The results of the descriptive statistics presented the following findings: There are significant gaps in current university education as sustainability had not been explicitly considered in the curriculum. Familiarity is quite low among the respondents, particularly their understanding of the concept, key aspects of sustainability and sustainability assessment tools widely used in construction. Finally, lack of adequate knowledge/awareness, the problem of identifying sustainability issues relevant to course subjects and dearth of appropriately trained educators on sustainability were identified as factors hindering the incorporation of sustainability into the curriculum. The study recommends that relevant authorities update the curriculum of these programmes and provide educators with the platform to expand their knowledge.

Keywords: built environment, construction education, sustainable construction, university.

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THE APPLICABILITY OF THE HARVARD AND WARWICK MODELS IN THE DEVELOPMENT OF HUMAN RESOURCE MANAGEMENT POLICIES OF LARGE CONSTRUCTION COMPANIES IN GHANA

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Organizations develop and implement Human Resource Management (HRM) policies which are a reflection of their philosophy on how they intend to manage people. The factors outlined in existing HRM models, especially the Harvard and Warwick models, as influencing HRM policy development and practice, fall within the political, economical, social, technological, environmental and legal domains as well as what the Harvard model describes as organizational situational domain. These models were however developed in the North American and European contexts. The question arises as to whether these models hold true in the context of developing countries. A cross-sectional survey was conducted in Ghana to identify the factors which influence the development of HRM policies of large construction organizations operating within the Ghanaian Construction Industry. The data was analyzed using narrative and thematic analysis techniques. The results indicated that, the factors identified by respondents can be regrouped under the domains identified in the existing HRM models, suggesting that the factors to consider in the development of HRM policies in the North American and European context do hold true for the Ghanaian construction industry. However, further research is recommended to validate the factors identified in this study.

Keywords: developing country, Ghana, human resource management, human resource management model, policy development.

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Agyepong, S.A. *et al.* (2010) The applicability of the Harvard and Warwick models in the development of human resource management policies of large construction companies in Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 525-534.*

THE CONTINUOUS USE OF ASBESTOS IN GHANA DESPITE ITS HAZARDS (CASE STUDY AREA: SEKONDI-TAKORADI)

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This paper report on a research work conducted with the aims of investigating the regulatory position regarding the use of asbestos and also to assess the evidence of the continuous use of Asbestos cement products in the construction industries in Ghana, using Sekondi-Takoradi as a case study area. This paper adopted both quantitative and qualitative research approach to seek information from, landlords, manufacturers of asbestos cement products, parliament and other Government Agencies. Data was obtained through questionnaire, interview and field work survey. In all, a total of 20 questionnaires were distributed. The research emerged that about 1200 housing units roofed with asbestos cement roofing sheet were constructed by the State owned construction company between 1976 and 2000 in the Sekondi-Takoradi Metropolis (about 12000 nationwide), a period when the risk of asbestos was known in Ghana. The study in the newly developing areas in the Sekondi-Takoradi Metropolis indicated that, out of every 100 housing unit being built, at least 40 of these were roofed with asbestos cement corrugated roofing sheet. It also emerged from this research that there were no laws prohibiting the use, manufacturing or importation of asbestos products in Ghana. And this exposes maintenance workers in the building construction industries to the risk of asbestos related diseases. The research recommends that those who have asbestos materials present in their premises should take action to manage the risk so that no one will unknowingly disturb it and also provide information about the material to those who are likely to disturb it.

Keywords: asbestos fibre, housing unit, Ghana, roofing sheet.

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Yalley, P.P. and Ndede, C.N. (2010) The continuous use of asbestos in Ghana despite its hazards (case study area: Sekondi-Takoradi) *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 535-545.*

THE DISPROPORTIONAL REPRESENTATION OF BLACK AND MINORITY ETHNIC PEOPLES' (BMEs) EMPLOYABILITY IN CONSTRUCTION: A REVIEW OF LITERATURE

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The construction industry accounts for a substantial part of every country's economy. It is a major contributor to the GDP and a primary source of employment to a substantial section of the population creating, in effect, secondary employment for activities associated with it. The globalisation of the world has meant that the mobility of human and capital resources addresses the imbalance in the distribution of the world's resources as the developed world has a larger share of the global construction output while the developing world abounds in the supply of labour. This, on one hand, has resulted in the need for labour to move from one country to another to fill vacant jobs while on the other hand, certain countries like the UK has, in the past, seen a high level of immigration which has resulted in a more diverse society especially concentrated in certain parts of the country. Consequently, it is anticipated that the construction industry should have become progressively multicultural to reflect this diversity. This paper therefore attempts to probe the factors that inhibit the proportional representation in the industry even when it makes economic sense to fairly engage BMEs in the sector in view of the shortfall in skill labour supply.

Keywords: BME, culture, employee retention and progression, employment, globalisation.

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Misa, P. and Ahmed, V. (2010) The disproportional representation of black and minority ethnic peoples' (BMEs) employability in construction: a review of literature *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 547-563.*

THE EFFECT OF RESTRUCTURING THE CENTRAL BUSINESS DISTRICT (CBD) ON URBAN HOUSING AND POVERTY IN LAGOS, NIGERIA

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Lagos is currently undergoing significant urban renewal and this has the potential to affect more than 80% of its estimated 15million population. The purpose of this research is to examine recent developments in the Central Business District (CBD) infrastructure and services in the Lagos State restructuring programme with its adverse effects on urban fabric; the four key elements of urban life: employment, housing, transportation and the environment. With the on-going revitalization project coupled with global recession, inflation and lack of welfare system the urban poor have felt the harsh conditions more. Study site is the city centres like Lagos-Island (CBD), Lagos mainland (CBD), Victoria-Island (CBD) and Lagos Capital Ikeja (CBD). The Singapore experience in urban regeneration is taken as case study. Questionnaires will be administered to displaced residents and the main actors that carried out the past and present schemes from 1980 to 2008. Method of analytical generalization and other evidence employed in processing the architectural physiognomy and CBD imageability that emanates from the fusion of 5E+3C=I (imageability, legibility). The use of historical documents, literature reviews, cartography, urban design theory. Geographic information system (GIS) will also be employed. The research results will provide a data base for policy formulation and implementation for effective environmental and metropolitan development in Lagos.

Keywords: CBD, displaced resident, Lagos, metropolitan area, urban-poor.

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Obi, P.O. (2010) The effect of restructuring the Central Business District (CBD) on urban housing and poverty in Lagos, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 565.*

THE EFFECTS OF MANAGEMENT ON PRODUCTIVITY: A COMPARATIVE STUDY OF INDIGENOUS AND FOREIGN FIRMS IN THE NIGERIAN CONSTRUCTION INDUSTRY

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The productivity of the Nigerian construction industry is significantly lower than those of its foreign counterparts. Research results indicate that the Nigerian construction industry is plagued by inefficient policies and practices, weak institutions and adverse business environment, complicated by complex social and cultural practices, which makes it difficult for the indigenous contractor to perform efficiently. The same study identified poor contract management as the second most important structural problem. This work undertakes a comparative appraisal of the effects of certain management policies and actions on the productivity of construction workers by both indigenous and foreign contractors working in the Nigerian Construction industry. Through a survey, a set of those management's actions relating to workers and working conditions were identified, analyzed and their effects on the performance of contractors to determine what gave the foreign contractors the competitive advantage were reviewed. The emphasis of foreign contractors on training/competence, pre-construction planning and use of construction equipment stood out as the most important competitive advantages over the indigenous contractors. However, there is a general lack of incentive and low morale within the workforce and a perception that their self improvement is not important to their employers.

Keywords: contractor, competitive advantage, pre-construction planning, productivity, management staff, Nigeria.

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Aniekwu, A.N. and Audu, H.O. (2010) The effects of management on productivity: a comparative study of indigenous and foreign firms in the Nigerian construction industry *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 567-578.*

THE EVOLUTION OF INDIGENOUS CONTRACTORS IN GHANA

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This paper provides some preliminary insights into the emergence and development of indigenous general contractors in Ghana. General contracting is the means by which an individual or organisation takes responsibility for supplying all of the materials, labour, equipment and services necessary for the construction of a project. Whereas the development of general contracting in places like the UK is well documented, the evolution of contractors in Ghana is not clearly articulated in the literature. Therefore, the main question in this paper is: How did indigenous contractors evolve in Ghana? To examine and analyze the research question, a literature review on similar developments elsewhere was first carried out. This was followed by discussions and unstructured interviews with experienced construction practitioners in Ghana most of whom were Quantity Surveyors. Most interviewees narrated their knowledge of contractor development in Ghana dating back to around 1945. From the explanations given, it was possible to develop a general understanding of the research question and to make a qualitative interpretation of the respondents' comments and to draw some conclusions. General contractors emerged rapidly in the Gold Coast (now Ghana) shortly after World War II. Most were Italian master craftsmen in Ghana who were capitalized by the British colonial government to develop infrastructure in the Gold Coast following devastating effects of the war. Some of the indigenous people learned from the Italians and also established construction firms. Thus, general contracting in Ghana has a relatively short history in comparison to countries like Britain where the profession developed rapidly in the early part of the 19th century in response to the industrial revolution. Although they may possess sufficient technical expertise, many indigenous contractors in Ghana today lack the capacity to carry out major projects because of low capitalization and poor organisational structures. The current construction market in Ghana is dominated by foreign contractors. To become major players in the market, indigenous Ghanaian contractors should build strong organisational structures and pursue mergers and joint venturing to boost their financial, technical and managerial capacity.

Keywords: contractor, general contracting, Ghana.

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THE INFLUENCE OF FACILITIES ON RENTAL VALUES AND VACANCY RATES IN HIGH RISE OFFICE RENTED PROPERTIES IN KADUNA STATE, NIGERIA

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The growth in economic activities have generally necessitated the desire to provide accommodation where business would be run away from residential accommodation, provision need to be made to take cognizance of diverse business: space requirements, cultural background and individual disposition. Attention is also focused on economics, space distribution and functionality. This study investigates the influence of facilities provided on rental values and vacancy rates of high rise office rented apartments, through extensive field survey, five high rise office rented apartments each ten-storey located in the linear road connecting the city centre was chosen for the study, two different semi structured questionnaires targeted at tenants and registered estate surveyors was used in data collection. Quantitative analysis using SPSS 14.0 shows that facilities are the key determinants of rental value par meter square in high rise office properties. The rental values vary by floor in the study area which shows that not only facilities in a property influence its rental value and vacancy rates this contrast to previous findings. The significance of this research is to provide a guide to property investors and building designers to ensure that facilities provided in high rise office properties have a functional lift that can be supported by alternative energy and should suite the use of the property by the tenants and their clients/customers and not just for aesthetics which do not add to the money value generators (mvg) in the property and which is inimical to the goal of a private property investor.

Keywords: facilities, vacancy rate, high rise, property, rental value, office.

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Ishaya, D.A. and Dabo, D.I. (2010) The influence of facilities on rental values and vacancy rates in high rise office rented properties in Kaduna State, Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 589-595.*

THE LEAN PROJECT DELIVERY SYSTEM (LPDS): APPLICATION AT THE DESIGN AND DOCUMENTATION STAGE OF BUILDING CONSTRUCTION PROJECTS IN GHANA

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Construction firms in Ghana are faced with the challenge of aptly delivering services and products to clients at the possible minimum cost in order to remain competitive in the industry. Therefore, it is crucial for these firms to “think lean” by exploring project delivery systems which focus on delivering value to clients and minimising waste in the project delivery process. This paper aims at establishing the possibility of adopting lean production principles by construction firms in Ghana in order to address the problems of delays, high cost of project delivery and waste. Data on the design and documentation activities of the firms was collected by administering questionnaires to consultants, while contractors and clients were interviewed. A personal observation of some of design and documentation activities was also carried out. Results of the study revealed that important activities in the Lean Project Delivery System like design criteria formulation and process design were not carried out at the design stage by most firms in Ghana. It was also found that inadequate familiarity of the firms with the concept of lean thinking was among a number of limitations in the possible application of the lean project delivery system in the Ghanaian construction industry. The possible transfer of knowledge in the application of the lean thinking concept from foreign construction firms operating in Ghana was one of the opportunities identified for the practice of lean thinking in Ghana.

Keywords: project delivery, lean thinking, lean project delivery system, value, cost.

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Kpamma, Z.E. and Adjei-Kumi, T. (2010) The lean project delivery system (LPDS): application at the design and documentation stage of building construction projects in Ghana *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 597-604.*

THE MACROECONOMIC REVIEW OF BUILDING AND CONSTRUCTION SECTOR IN NIGERIA: PRE 1980-2006

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The significance of the Building and Construction (B&C) sector in the economy makes its study imperative, and the understanding of how the sector react to the changes in the macroeconomic environment in a country overtime will no doubt assist in the formulation of economic policy germane to the sector. This paper reviews the macroeconomic environment in Nigeria and its effects on the B&C output before 1980 up to 2006. To achieve the study objective, a review of relevant literatures was carried out and supported with economic data to explain the B&C sector performance with respect to that of the general economy over the period. The study found out that the B&C sector indeed responded to the various changes experienced in the macroeconomic environment with significant impact on the sector's growth and performance. Structural problems that pose as challenges to raising the B&C sector output were also identified. These include high import content of capital, labour, and materials; skills and materials shortage; inadequate finance and delays in payments; dominance of foreign contractors; inadequate local capacity and high rate of corruption. These bring to the fore the need for effective economic planning for the B&C sector vis-à-vis other sector in the general economy with the intent of mitigating this trend. The study concludes with some recommendations for policy which includes active participation of the private sector in the provision of infrastructural facilities; repair and maintenance of existing stock of physical infrastructure; creation of favourable economic climate and the establishment of framework geared toward the construction industry technological development.

Keywords: economy, macroeconomic review, Nigeria.

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Alabi, F.O. (2010) The macroeconomic review of building and construction sector in Nigeria: pre 1980-2006 *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 605-613.*

THE ROLE OF CONSTRUCTION EDUCATION IN SUSTAINABLE WASTE MATERIAL MANAGEMENT IN THE CONSTRUCTION INDUSTRY: A STUDY OF BUILT ENVIRONMENT PROGRAMMES RUN BY TAMALE POLYTECHNIC

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Today's world requires sustainable waste management practices to ensure that principles of sustainability are followed during the construction of facilities that fulfil a variety of needs in society. The paper presents discussions on knowledge requirements in relation to sustainable waste management in construction alongside construction professional training in Polytechnics and the role they could play in sustainable waste management in the construction sector. Preliminary results of a pilot survey administered to a sample of 34 continuing students, 11 graduates employed in the construction sector and 7 teaching staff are presented. The results demonstrate that training does not adequately address key sustainable management practices such as design solutions to waste materials generation, recycling and sorting of waste materials. Also, graduates perceive this aspect of their role challenging with their training offering them little knowledge to solve practical problems bordering on issues relating to sustainable waste management. The paper concludes by calling for measures that will address the requirements of sustainable management of waste at the HND and BTech levels of polytechnic education in Ghana.

Keywords: academic programme, construction education, Ghana, sustainability, waste management.

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Kheni, N.A. (2010) The role of construction education in sustainable waste material management in the construction industry: A study of built environment programmes run by Tamale polytechnic *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 615-626.*

THE ROLE OF ORGANIZATIONAL LEARNING IN ACHIEVING SUSTAINABLE CONSTRUCTION PROJECT DELIVERY

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The concept of organisational learning is receiving an increasing amount of attention in construction management research and practice. The importance of organisational learning is its potential impact on the improvement of organisational performance. The construction industry is of high economic significance and its projects have strong environmental and social impacts. There is need for sustainable change in the construction industry and the ability of construction organisations to cope with such change requires organisation learning. However existing organisational learning methods in the industry such as post project review and post occupancy evaluation do not assess the completed project against the triple bottom line, as they focus on technical issues. The general area of investigation in this on-going PhD research is organisational learning and project sustainability in the construction industry. It explores the issues of organisational learning and maturity levels at which construction organisations can deliver sustainable projects. It reviews relevant literature and presents initial results from a pilot study that interviewed experts in the industry to explore the state of the art in practice. The research shows that, there is a need in construction management research to further explore the link between organisational learning and sustainability; little research has been done linking organisational learning and sustainability in the construction industry. The research therefore identifies the need to develop a framework for implementing organisational learning for sustainable project delivery. The paper concludes by setting out a design for further work in this area.

Keywords: organisational learning, post project review, post occupancy evaluation, sustainability.

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Opoku, A. and Fortune, C. (2010) The role of organizational learning in achieving sustainable construction project delivery *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 627-636.*

THE SPATIAL DYNAMICS OF CEMENT MANUFACTURING AND MARKETING IN NIGERIA

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Shelter is a basic necessity of life as man needs to rest his head after a tedious day's work. Shelter is of topmost priority to any man, no matter the size of the accommodation (Clement, 2007). In the provision of this shelter, cement is a major input. Over the years, the nation had witnessed challenges in the cement industry among which are scarcity and high price with resultant high cost of construction and astronomical rents in our cities, usually beyond the reach of the average Nigerian. The pollution of the local environment that houses the cement industries is another challenge of the industry. The global community is concerned with growing levels of pollution due to cement manufacture. Burning of fossil fuels is the cement industry's main energy source and this has led to a large volume of CO₂ emissions in the atmosphere. The global industry is said to account for over 5% of world carbon dioxide emissions (Wikipedia, 2008). In addition, farm land and roof of the buildings of the local environment are usually adversely affected by pollution. In attempt to analyse the main problems of the cement industry in Nigeria with a view to achieving adequate supply of the product with minimal damage to the environment; the pertinent issues are- what are the factors responsible for the low production capacity despite availability of raw material in Nigeria? What are the causes of the high and fluctuating prices of cement? And what are the alternative production strategies that are environment friendly? These are the research problems to which this work tends to provide solutions.

Keywords: cement, manufacturing, marketing, Nigeria.

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Olurotimi, K. (2010) The spatial dynamics of cement manufacturing and marketing in Nigeria *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 637.*

TOWARDS IMPROVING PROCUREMENT OF BUILT INFRASTRUCTURE IN NIGERIA: AN EVALUATION OF THE ‘WARD HEALTH SYSTEM’ STRATEGY IN PRIMARY HEALTHCARE SECTOR

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Procurement is an important process for realising projects and programmes. In the infrastructure sector, it determines the overall framework and structure of responsibilities and authorities for guiding the participants within the development process, and is considered as the key to performance improvement. The aim of this paper is to evaluate the planning and implementation of the ‘Ward Health System’ (WHS) strategy used for procuring primary healthcare (PHC) facilities in Nigeria. The ‘Ward Health System’ is an initiative aimed at facilitating the provision of sustainable and integrated PHC services by revitalising the principle of community co-ownership and co-management of PHC facilities. The evaluation involved semi-structured interviews with twelve people vis-à-vis the on-going reforms in procurement in general and specifically within the health sector in Nigeria. The investigation indicates that the planning and implementation of WHS lacks focus, impact and sustainability. Amongst other things, the evaluation revealed ineffective involvement of the diverse stakeholder groups that would have enabled robust elicitation and understanding of their requirements, strengthening of accountability framework and effective harnessing of private sectors’ managerial and property management expertise to provide quality and sustainable PHC facilities. Although the interviewees questioned the applicability of the concept of community co-ownership or co-management of public facilities, they affirmed the importance of engaging with wide groups of stakeholders to achieve the objectives of PHC philosophy. The investigation subsequently identified the essential areas in which communities can add value to facilitate the satisfaction of the unique requirements of the diverse members of host communities, thereby encouraging effective participation in the management of the completed PHC facilities.

Keywords: primary health care, Ward Health System, procurement, Nigeria.

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Adogbo, K.J. *et al.* (2010) Towards improving procurement of built infrastructure in Nigeria: An evaluation of the ‘Ward Health System’ strategy in primary healthcare sector *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 639-650.*

UNDERSTANDING THE CHALLENGES OF WOOD FUEL USAGE IN SUB-SAHARAN AFRICA ON THE ENVIRONMENT

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Almost all African countries still rely on wood to meet basic energy needs. Wood fuel use accounts for 90 to 98 % of residential energy consumption in most of sub-Saharan Africa. Wood fuel can be used for cooking and heating, and occasionally for fueling steam engines and steam turbines that generate electricity. The burning of wood is currently the largest use of energy derived from a solid fuel biomass. From materials consulted the result indicates that of 13 sub-Saharan African countries investigated in 1994, 76 percent of the domestic energy demand was wood fuel, electricity 9 percent, kerosene 8 percent and gas 7 percent. It also shows that wood fuel usage increased from 513.6 million m³ in 1990 to 622.5 million m³ in 1994. The major environmental challenges are air pollution (particulate) and deforestation. In conclusion deforestation has as its children land degradation, biodiversity loss and desertification and the way forward is for government to sensitize and offer alternative energy source to its citizens.

Keywords: energy, environment, sub-Saharan Africa, wood fuel.

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Idiata, D.J. *et al.* (2010) Understanding the challenges of wood fuel usage in Sub-Saharan Africa on the environment *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 651.*

VALUE MANAGEMENT: HOW ADOPTABLE IS IT IN THE NIGERIAN CONSTRUCTION INDUSTRY?

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The Nigerian Construction Industry (NCI) is constantly criticised for its ailing performance as evident in the rising spate of dissatisfaction among its clients and stakeholders. Recently the Federal Government of Nigeria (FGN) stipulate that procurement of public assets and services must be through the ‘*application of value-for-money (V_fM) standards and practices*’, as a way of improving service delivery. Value Management (VM) seems an accepted approach for achieving V_fM globally. But how feasible is its adoption in NCI? This paper studied the adoptability of the VM in NCI by identifying its determinants particularly at early stages of building projects. The study adopts a theoretical approach towards identifying the dissonances between procurement practice in NCI and that required for adopting the VM. Drawing from theoretical considerations, 26 characteristics describing the planning and contract strategy stages of the NCI were arrived at. Four aspects were further identified for classifying VM requirements namely Environment, People, Issues/Information and Process. The dissonances of Environment and People were generally ‘*low*’ or ‘*moderate*’ while those for Issues and Process are either ‘*high*’ or ‘*very high*’. These considerations leads to the theoretical conclusion that, given the current nature of NCI, VM is not adoptable. Although, subject to empirical validation, VM can be adopted if the NCI pursue measures at engaging stakeholders on team basis, implementing construction programmes that are effective; exploring the concept of ‘*partnering*’ to reduce the fragmentations in project values; strengthening client organisation to provide strong leadership with a high degree of commitment and involvement, amongst others.

Keywords: Nigeria, procurement, value management.

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Kolo, B.A. and Ibrahim, A.D. (2010) Value management: How adoptable is it in the Nigerian construction industry? *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 653-663.*

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