PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INFRASTRUCTURE DEVELOPMENT AND INVESTMENT STRATEGIES FOR AFRICA

DII – 2015
16-18 September 2015
Livingstone, Zambia

Book of Abstracts

Editors: I Musonda, JN Agumba & CS Okoro
Co-editors: EMwanaumo; M Muya; F Muleya; WD Thwala & CO Aigbayboa
DII – 2015

2nd International Conference on Development and Investment in Infrastructure - Strategies for Africa

16 -18 September, 2015
Livingstone, Zambia

Editors
Innocent Musonda
Justus Agumba
Chioma Okoro

Co-Editors
Mundia Muya, Erastus Mwanaumo, Franco Muleya, Clinton Aigbavboia
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FOREWORD

On behalf of the Organizing Committee, it is my pleasure to welcome you to Livingstone, Zambia, the host city of the International Conference on Development and Investment in Infrastructure (DII-2015). The DII-2015 conference is a follow up event to the DII-2014 conference on Infrastructure Development and Finance in Africa. The DII Conferences aim to provide an international forum where leaders, researchers, practitioners and other stakeholders in infrastructure development and the general built environment can discuss, evaluate and devise ways to maximise benefits of infrastructure development in Africa. The goal of the DII conferences is to achieve outputs that will inform policy on Development and Investment in Infrastructure (DII) across Africa. The broad topics covered by the conference include:

- Infrastructure Finance, Procurement and Development;
- Environment, Safety and Health considerations in Infrastructural Development;
- Skills development, transfer and empowerment;
- Sustainable Development;
- Value Engineering;
- Development and Growth Infrastructure;
- Appropriate Design and Development Methods;
- Infrastructure Delivery and Investment return models;
- Infrastructure Development Strategies for Developing Countries;
- Integrative Infrastructure Development Planning;
- Information and Communication Technology in Infrastructure Development;
- Social Infrastructure Development in Developing Countries; and
- Infrastructure, Climate Change and Pandemics in Developing Countries

Warm gratitude is extended to the authors who have successfully gone through a two-tier peer review process in order to have their papers accepted and published in this proceeding. The peer review process would have been impossible without the support of the members of the Scientific and Technical review Committees (STC). The organizing committee is thankful for this voluntary service that is so central to the quality of the accepted papers.

Special thank you also goes to all the conference delegates that have travelled from different continents. Thank you for attending the event and please make the most of your time at the conference while enjoying the hospitality of the Zambian people here in Livingstone.

Innocent Musonda
For/DII-2015
ACKNOWLEDGEMENTS

The organizing committee of the DII-2015 is grateful to the University of Zambia, Copperbelt University, Zambia, National Council for Construction (NCC), Zambia, University of Johannesburg, South Africa, the Chartered Institute of Building, The South African Council for the Project and Construction Management Professions and other South African, African and International universities and Institutions for supporting the conference through their valued contributions.

The contributions and unique support of the International Advisory and Scientific Committees, who worked tirelessly to prepare refereed and edited papers, which produced this published proceedings of the highest standard including satisfying the criteria for subsidy by the South African Department of Higher Education and Training (DHET), is truly treasured. The contributions of Prof Mundia Muya, Dr Trynos Gumbo, Dr Justus Agumba, Prof Didibhuku Thwala, Dr Innocent Musonda, Dr Clinton Aigbavboa, Dr Erastus Mwanaumo, Dr Franco Muleya, Mrs. Chioma Okoro, Ms Chama Mwansa, Mr Brian Mutale, Mr William Nkomo and Mr Tresor Mbayahe are recognised. The support of Mr Ansary Nazeem, Prof Steve Ekolu and Karishma Ganpath is also commendable.
DISCLAIMER

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DECLARATION

All the papers in these conference proceedings were double-blind peer reviewed at abstract and full paper stage by the members of the International Review Committee. The process entailed detailed reading of the abstracts and full papers, reporting of comments to authors, modification of papers by authors whose papers were not rejected by the reviewers, and re-evaluation of revised papers to ensure quality of content.
LIST OF CONFERENCE COMMITTEES

Organizing Committee

South Africa
Dr Innocent Musonda (Chair)
Dr Clinton Aigbavboa
Dr Trynos Gumbo
Dr Justus Agumba
Professor Didibhuku Thwala
Mrs Chioma Okoro
Mr Tresor Mbayahe Katembo
Mr William Nkomo

Zambia
Dr Erastus Mwanaumo (Co-Chair)
Professor Mundia Muya
Dr Franco Muleya
Ms Chama Mwansa
Mr Brian Mutale

Scientific Committee
This committee ensured that the final papers incorporated the reviewers’ comments, were correctly allocated to the appropriate theme and met the requirements set by the organisers in line with international standards for inclusion in the proceedings. They also arranged the papers into their final sequence as captured on the USB memory stick and Table of Contents

Dr JN Agumba, University of Johannesburg, RSA
Dr CO Aigbavboa, University of Johannesburg, RSA
Dr E Mwanaumo, University of Zambia
Dr F Muleya, Copperbelt University, Zambia
Prof M. Muya, University of Zambia
Dr I Musonda, University of Johannesburg, RSA
Mr G Onatu, University of Johannesburg, RSA
Prof D Thwala, University of Johannesburg, RSA
Technical Review Committee

The technical review committee comprised of experts from the built environment. The committee ensured that the papers were of the highest standard in terms of originality of material; academic rigor; contribution to knowledge; critical current literature review; research methodology and robustness of analysis of findings; empirical research findings; and overall quality and suitability for inclusion in the conference proceedings.

Mr O Aurobindo, University of Johannesburg, RSA
Dr Y Babatunde, Witwatersrand University, RSA
Dr N Chileshe, University of South Australia, Australia
Prof FA Emuze, Central University of Technology, RSA
Dr T Gumbo, University of Johannesburg, RSA
Prof J Khatib, University of Wolverhampton, UK
Mr M Mukuka, University of Johannesburg, RSA
Dr W Matipa, Liverpool Moore, University, UK
Mr P Mukalula, Copperbelt University, Zambia
Dr W Musakwa, University of Johannesburg, RSA
Dr D Mzyece, University of Wolverhampton, UK
Dr R Ndihokubwayo, Cape Peninsila University of Technology, RSA
Prof G Ofori, National University of Singapore, Singapore
Mr G Onatu, University of Johannesburg, RSA
Prof PD Rwelamila, University of South Africa, RSA
Prof KK Shakantu, University of Free State, RSA
Prof JJ Smallwood, Nelson Mandela Metropolitan University, RSA
Prof A Talukhaba, Tshwane University of Technology, RSA
Dr A Windapo, University of Cape Town, RSA
Dr SS Wong, University College of Technology Sarawak, Malaysia
Mr E Zulu, University of Kwazulu Natal, RSA
THE PEER REVIEW PROCESS

Overview

The need for high quality conference proceedings, evident in the accepted and published papers, entailed a rigorous two-stage blind peer review process by no less than two acknowledged experts in the subject area. Experts including industry professionals and academics were assigned with the responsibility of ensuring that high standards of scientific papers were produced and included in the proceedings.

First stage of review

Submitted abstracts were twice blind reviewed. Each abstract was reviewed in terms of relevance to conference theme and objectives, academic rigor, contribution to knowledge, originality of material and research methodology. Authors whose abstracts were accepted were provided with anonymous reviewers’ comments and requested to develop and submit their full papers taking into consideration the abstract review comments.

Second stage of review

Experts were once again assigned the submitted full papers relative to their areas of expertise. The full papers were reviewed in terms of relevance to conference theme and objectives; originality of material; academic rigour; contribution to knowledge; critical current literature review; research methodology and robustness of analysis of findings; empirical research findings; and overall quality and suitability for inclusion in the conference proceedings.

Third stage review

Authors whose papers were accepted after the second review were provided with additional anonymous reviewers’ comments on evaluation forms, and requested to submit their revised full papers. Evidence was required relative to specific actions taken by the authors regarding the referees’ suggestions. Final papers were only accepted and included in the proceedings after satisfactory evidence was provided. To be eligible for inclusion, these papers were required to receive a unanimous endorsement by all the reviewers that the paper had met all the conditions for publication. Out of 53 submissions, 40 papers were finally accepted and included in the DII-2015 conference proceedings.

At no stage was any member of the Scientific Review Panel or the Organizing Committee or the editors of the proceedings involved in the review process related to their own authored or co-authored papers. The role of the editors and the scientific committee, was to ensure that the final papers incorporated the reviewers’ comments and to arrange the papers into the final sequence as captured on the USB memory stick and Table of Contents.

Regards

C. S. Okoro
Conference Secretary
Johannesburg
The University of Johannesburg (UJ), is the largest, multi-campus, residential university in South Africa. Born from a merger between the former Rand Afrikaans University (RAU), the Technikon Witwatersrand (TWR) and the East Rand campuses of Vista University in 2005, the University of Johannesburg’s unique academic architecture reflects a comprehensive range of learning programmes, leading to a variety of qualifications ranging from vocational and traditional academic to professional and postgraduate programmes, across the four campuses, namely: Auckland Park Kingsway, Auckland Park Bunting Road, Doornfontein and Soweto campuses. The campuses vary in size and each has its own character and culture, contributing to the institution’s rich diversity.

The University of Johannesburg has benefited from a large pool of researchers bringing together various fields of expertise and research focus areas. The university provides the ideal ground for interdisciplinary research and the university has more than 87 rated researchers. Five of these researchers are A-rated - all of whom are recognised as world leaders in their field. The university is also home to nine research centers.

The University fosters ideas that are rooted in African epistemology, but also addresses the needs of the South African society and the African continent as it is committed to contributing to sustainable growth and development. We continue to build a culture of inclusion, embracing South Africa's rich history, culture, languages, religions, gender, races, social and economic classes. Additionally, the University encourages a culture of service as part of the university student experience and it proudly pursues a four-language policy of English, isiZulu, Afrikaans and Sesotho sa Leboa.

Our staff and students come from over 50 countries in Africa and the world. The university has also built links, partnerships and exchange agreements with leading African and other international institutions that further enrich the academic, social and cultural diversity of campuses. It is also the recipient of the highest levels of external financial support, from donors and partners all over the world. This demonstrates the high esteem in which we are held internationally.

In its mission, UJ commits itself to the following:

- Quality education;
- Leading, challenging, creating and exploring knowledge;
- Supporting access to a wide spectrum of academic, vocational and technological teaching, learning and research;
- Partnerships with our communities; and
- Contributing to national objectives regarding skills development and economic growth.

The values guiding all University activities include:

- Academic distinction;
- Integrity and respect for diversity and human dignity;
• Academic freedom and accountability;
• Individuality and collective effort; and
• Innovation

In giving expression to its vision of being a pre-eminent South African and African University, UJ has set itself ten strategic goals. Its priorities are to:

• Build a reputable brand;
• Promote excellence in teaching and learning;
• Conduct internationally competitive research;
• Be an engaged university;
• Maximise its intellectual capital;
• Ensure institutional efficiency and effectiveness;
• Cultivate a culture of transformation;
• Offer the preferred student experience;
• Secure and grow competitive resourcing; and
• Focus on the Gauteng city regions.
The Copperbelt University

History

With its motto “Knowledge and Service”, the Copperbelt University (CBU) was established in 1987 as part of the University of Zambia. It was initially intended to be located in Ndola, about 50km South East of Kitwe, as UNZANDO (University of Zambia in Ndola). But since the University Of Zambia (UNZA) had no infrastructure in Ndola at the time, UNZANDO was allowed to operate in Kitwe using the Zambia Institute of Technology (ZIT) infrastructure. ZIT was integrated into Copperbelt University in 1989, two years after the university was established. Until recently (when many public and private universities are being established), the Copperbelt University was the only other university in the country after the University of Zambia. Currently, the university has eight academic schools – Schools of the Built Environment, Engineering, Medicine, Graduate Studies, Business, Mines and Mineral Sciences, and the School of Natural Resources. In addition, the University offers distance education through its Directorate of Distance Education and Open Learning. The Dag Hammarskjold Institute for Peace Studies is accommodated at Copperbelt University.

The School of Built Environment

The School of the Built Environment (SBE) (formerly School of Environmental Studies) was established in 1981 under ZIT when the School admitted its first students. The School remained temporarily situated at ZIT until 1989. The School of the Built Environment (SBE), therefore, increased its scope by taking on the ZIT Diploma courses in Architecture, Quantity Surveying, Land Surveying and Town & Country Planning, and Advanced Technician course in Construction. The University began to offer these programmes at degree level. Currently, the School consists of four departments, namely: Architecture, Construction Economics and Management (CEM), Real Estate Studies (RES, formerly Land Economy), and Urban & Regional Planning (URP). In addition, the school also offers a Master of Science programme in Project Management. The School also runs a Project and Consultancy Section called the Practice Office, which is responsible for undertaking consultancy services in various fields of the built environment. Currently, there are 5 undergraduate and 1 masters’ degree programmes offered in the school. These are BSc. in Quantity Surveying, and BSc. in Construction Management (both offered by the CEM Department); BSc. in Real Estate Studies (offered by the RES Department); BSc. in Urban & Regional Planning (offered by the URP Department); Bachelor of Architecture (BArch, offered by the Architecture Department); and the MSc. in Project Management (offered by the School of Graduate Studies).

After successful completion of their degree programmes, our students join both public and private sector reputable organizations within and outside the country where they work as Architects, Design Consultants, Construction Managers, Valuers, Planners, Project Managers, Quantity Surveyors, Investment Bankers and many more. Other than the masters programme, which takes up to two years to complete, all our undergraduate programmes should take five years to complete. Our students come from within and outside Zambia. In terms of staffing, it is the policy of the University that it recruits highly qualified personnel. For this reason, the university has put in place a policy where the minimum qualification of a lecturer is not only a masters’ degree but also that the masters’ degree must be in the same discipline as the lecturer’s first degree. In addition to this profile, the SBE has a very ambitious
programme where it intends to expand the school by introducing more programmes like the MSc. Degree in Land Management. This will help in meeting the ever increasing demand for qualified professionals within and outside the SADC region. More information on CBU in general and SBE in particular, can be found on our website at www.cbu.edu.zm.
The School of Engineering, University of Zambia

Introduction
University of Zambia opened its doors in 1966, two years after Zambia attained its independence. The main purpose was to produce human resources (graduates) for the government and industry in Zambia. From the first intake of students of 300, the population has grown to the current population of 21,700. The School of Engineering located at the main campus of the University of Zambia in Lusaka is one of the nine schools in the university. Over the years, the school has responded to various national challenges through teaching, research, training, consultancy and public service. The School of Engineering, now comprising the Departments of Agricultural Engineering, Civil & Environmental Engineering, Electrical and Electronic Engineering, Geomatics Engineering and Mechanical Engineering was established on 1st May 1969.

The school has a student population that is in excess of 450 undergraduate and 90 postgraduate students across all the departments. There are currently 40 academic members of staff in its five departments. The school is realigning itself to become a trainer of trainers by increasing its capacity in training at postgraduate level. The postgraduate programmes aim at training engineers with advanced and in depth knowledge in specialized fields.

The number of postgraduate programs remained small for a long period of time until the year 2010 when it became clear that there was a serious gap in trained manpower in the energy sector. To address this gap, the University of Zambia, School of Engineering with the financial support from NUFFIC, developed a master’s degree program in Renewable Energy. This programme is hosted by the School of Engineering. From this experience, the School identified many gaps in engineering management fields, the ICT sector, and project management area and developed a number of other programs in electronics, construction and engineering management. The aim was to elevate the caliber of engineers in the country to improve the management of engineering firms in line with the new technologies.

Postgraduate Programmes in the School

PhD research programmes

PhD research programmes offer a vast range of opportunities to students who relish the chance to undertake a research project with clear intellectual, scientific, industrial or commercial relevance and challenge. Currently these programmes are being offered in the Departments of Civil & Environmental Engineering and Mechanical Engineering. The School also undertakes interdisciplinary research in conjunction with other institutions.
MSc programmes

The following is the list of programmes offered at MSc level:

- Master of Engineering Research Programme;
- Master of Engineering in Agricultural Engineering;
- Master of Engineering in Environmental Engineering;
- Master of Engineering in Structural Engineering;
- Master of Engineering in Electrical Power Systems;
- Master of Engineering in Production Engineering and Management;
- Master of Engineering in Thermo-fluids Engineering;
- Master of Engineering in Renewable Energy Engineering;
- Master of Engineering in Project Management;
- Master of Engineering in Construction Management;
- Master of Engineering in Engineering Management;
- Master of Engineering in Geo-Informatics and Geodesy;
- Master of Engineering in Telecommunications Systems;
- Master of Engineering in Information and Communication Technology;
- Master of Engineering in Information and Communication Technology Security;
- Master of Engineering in Information and Communication Technology Policy and Management;
- Master of Engineering in Computer Communications; and
- Master of Engineering in Wireless Communications.

With these new strides, the university answers the call from society, which requires a pool of well-trained engineers meeting the challenges of operating in the developing world while meeting the challenges of both the developing and developed economies.
# CONFERENCE PROGRAMME

## WEDNESDAY, SEPTEMBER 16, 2015

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<td><strong>Workshops:</strong> Postgraduate research; Safety and Health Management for Contractors and Designers</td>
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<td>17:00 - 19:00</td>
<td><strong>Conference registration</strong>&lt;br&gt;Networking opportunity &amp; welcome cocktail</td>
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<td>08:00 - 09:00</td>
<td><strong>Registration</strong></td>
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<td>09:00 - 10:10</td>
<td><strong>Welcome &amp; keynotes</strong>&lt;br&gt;Chair: Mundia Muya – Dean Engineering – UNZA&lt;br&gt;Welcome address by Executive Director – National Council for Construction – Eng. Charles Mushota</td>
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<td>10:10 - 10:30</td>
<td>Official opening by the Minister of Transport, Works, Supply and Communications, Zambia - Hon Yamfwa Mukanga</td>
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<td>10:30 – 10:50</td>
<td>The Role of Education in Re-Culturing Local Contractors through Calibrated Capacity Building Programmes for Sustainable Infrastructure Investments - Prof Clive Chiwa</td>
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<td>10:50 - 11:10</td>
<td>Investment in Infrastructure Development in Africa: Identifying the Gaps and Opportunities - Prof P.D. Rwelamila</td>
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<tr>
<td>11:10 - 11:30</td>
<td><strong>Morning Tea</strong></td>
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<td>11:30 – 11:50</td>
<td>Lunch</td>
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<td><strong>Symposium:</strong> Infrastructure Leadership and Governance&lt;br&gt;Chair: Dr Albert Malama – Dean SBE – CBU&lt;br&gt;Rethinking Construction Management Education - Prof A.A. Talukhaba&lt;br&gt;Strategic Capabilities for Megaproject Architects - Prof Nuno Gil&lt;br&gt;Q&amp;A Session on Strategic Capabilities for Megaproject Architects - Prof Nuno Gil</td>
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<tr>
<td>11:50 – 12:10</td>
<td>Analysis of facilities history: A tool for effective facilities management - Ogbefun, E. et al</td>
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<td>12:50 – 13:50</td>
<td><strong>Lunch</strong></td>
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<td>19:00 - 22:30</td>
<td><strong>Conference Dinner</strong></td>
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## Keynotes

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<tr>
<td>08:30 – 09:20</td>
<td>Mega Infrastructure leadership and Governance - Prof Nuno Gil</td>
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<tr>
<td>09:20 – 09:40</td>
<td>Rethinking of an African City: Insight into Housing Infrastructure – Dr Lovemore Chipungu</td>
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<td>09:40 – 10:00</td>
<td><strong>Morning Tea</strong></td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td>Developing an Infrastructure Watch Culture - Prof Mundia Muya</td>
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<tr>
<td>10:30 – 10:50</td>
<td>Monitoring the Kariba dam – Zambezi River Authority</td>
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## FRIDAY, SEPTEMBER 18, 2015

### Technical Sessions

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<th>Time</th>
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| 11:00 – 11:10 | Prof. W. Thwala | **Breakaway Session 4**  
Theme: Integrated Infrastructure Planning and Management  
Session chair: Prof. W. Thwala | Mr. P. Mukalula | **Breakaway Session 5**  
Theme: ICT Infrastructure and Mega projects  
Session chair: Mr. P. Mukalula | Ms. B. Mwiva | **Breakaway Session 6**  
Theme: Infrastructure Leadership and Governance  
Session chair: Ms. B. Mwiva |
| 11:00 – 11:10 | *The use of reverse logistics principles in achieving zero waste cities in South Africa* - Mbayha, T. et al | **Adoption of building information modelling in the Zambian architectural, engineering and construction industry** - Chipulu, C., et al | *Challenges of joint ventures in the construction industry: Literature review* - Bekale Mba, M. F. et al |
| 12:30 – 12:50 | *Provincial roads CAPEX programme in South Africa: Payment claims and reporting gaps* - Emuze, F. et al | *Investigating the South African government’s experience with regard to the effectiveness of PPPs in meeting BEE policy aspirations* - Sekgothudi, K. et al | |
| 12:50 - 13:50 | *Lunch* | *Investigating the South African government’s experience with regard to the effectiveness of PPPs in meeting BEE policy aspirations* - Sekgothudi, K. et al | *Evaluating claims and their impacts on project delivery in the Zambian Construction Industry* - Chisumbe, S. et al |
| 14:00 – 14:20 | *Conceptual framework for sustainable affordable housing construction in South Africa* - Ganiyu, B. O. et al. | *Nutritional awareness in the construction industry* - Okoro, C. S. et al | *Gas-fired power station: An air inlet case study* - Wasserman, B. |
| 15:00 – 15:20 | *Session chair: Ms. B. Mwiva* | *Session chair: Ms. B. Mwiva* | *Session chair: Ms. B. Mwiva* |
| 15:20 - 16:10 | Prof. Clive Chirwa - (Dean Engineering – CBU) | Prof. Clive Chirwa - (Dean Engineering – CBU) | Prof. Clive Chirwa - (Dean Engineering – CBU) |
| 16:10 | *Sunset Cruise on the Mighty Zambezi River* – (Optional event) | *Sunset Cruise on the Mighty Zambezi River* – (Optional event) | *Sunset Cruise on the Mighty Zambezi River* – (Optional event) |
KEYNOTE SPEAKERS

The DII-2015 Conference Launch and Keynote sessions will feature high profile experts and speakers, addressing the important issues affecting development and investment in infrastructure in the developing world. The keynote addresses will set the tone for the two days of conference sessions, networking and business development. The keynotes will speak to developments and challenges the developing world is facing on infrastructure, both in the near and medium term, and how we can overcome these challenges and realize the economic growth needed in our countries.

The biographies of the local and international experts who will grace the conference include:

Hon Yamfwa Mukanga

The honorable Yamfwa Mukanga, Minister of Transport, Works, Supply and Communications has also served as the Minister of Mines, Energy and Water Development in Zambia. Before this, he was again the Minister of Transport, Works, Supply and Communications following the election of the Patriotic Front Government in September 2011. Hon. Mukanga is an engineer by training and the former Provincial Governor for the Copperbelt Province - the focal point for mining activity in Zambia.

Prof Clive Chirwa

Professor Clive Chirwa is a Distinguished Professor of Crashworthiness. He is a Member of the Society of Automotive Engineers, Chartered Engineer, the Founder and Editor-in-Chief of the International Journal of Crashworthiness, the Founder of International Crashworthiness Conference (ICRASH -Series) and the Acting Dean of the School of Engineering, Copperbelt University, Kitwe, Zambia. He has been the United Kingdom Transport Safety advisor and the European Union Advisor to the Transport Commissioner. He has been an Appointed Member of the Advisory Team - UK Department of Transport on Road & Rail Vehicles, Aircraft and Spacecraft crashworthiness; Elected Member of the European Safety Advisory Team to the EU Commission; Appointed Member of the Advisory Team, Materials Section, Japanese Research Council; and an appointed Member of the Assessors Committee, Australian Research Council. He has over 105 peer-reviewed journal and conference publications. Prof Clive Chirwa has received numerous honours and awards including the Henry Ford Prize for contributing to the safety of passenger
vehicles; British Rail Award (Crashworthiness in Rail Vehicles) and the Institution of Mechanical Engineers Holman Brothers Safety Award in Mechanical Engineering for the Best Research work and Paper Published on the Aspects of Eliminating Danger to Health.

Prof P.M.D. Rwelamila

P. M. D. Rwelamila is a Professor of Project Management at the Graduate School of Business Leadership, University of South Africa and Past President of the South African Council for Project and Construction Management Professions; Joint coordinator: CIB - W107: Construction in developing countries; past chairperson and non-executive director of MSINGI Construction Project Management (Pty) Ltd., a Construction project management consulting firm based in Cape Town, South Africa. He has worked in a number of countries across the world including Tanzania, Kenya, Uganda, Zambia, Botswana, Sweden, United Kingdom, Australia and United Arab Emirates. He has more than 200 published and peer-reviewed journal papers, chapters in books and conference proceedings.

Prof Alfred Talukhaba

Prof Alfred A. Talukhaba is a Professor of Construction project management. He is the past president of CIOB Africa, a registered professional in quantity surveying, project management and international arbitration. He is currently the Head of Department of Building Sciences at Tshwane University, South Africa. Prof Talukhaba has mentored and supervised many masters and PhD students. He has worked as a professional quantity surveyor on diverse projects for both public and private institutions. He has undertaken studies and research in his field in Australia, Germany, Kenya and South Africa. His current research work is on business modeling for emerging contractors.

Prof Nuno Gil

Nuno is Professor of New Infrastructure Development at the Manchester Business School. His research focuses on the structures that bring the best of people in consensus-oriented collaborative networks formed to produce long-lived infrastructure and tackle major societal problems such as poverty relief, climate change, health care provision, and drug resistance. His work develops theory, cognitive frameworks, and methods for communicating with key stakeholders, the structure of collaborative networks, how these networks can perform effectively and efficiently, and how to measure performance in consensus-oriented collective action arenas. Specifically, Nuno investigates development processes, design structures,
contracting and procurement strategies, governance structures, and the practice of leadership. Nuno has worked, or done research, with various organizations around the globe notably in the USA: CH2M HILL and Intel; in the UK: Rolls Royce, BAA (now Heathrow), BP, Constructing Excellence, Manchester City Council, Network Rail, Beetham Organization, Cross-rail, London2012, High-speed 2, and L.E.K. Consulting; in Portugal: EDP-Energy, Cross-rail; in India: Larsen & Toubro, Dedicated Freight Corridor Corporation of India (DFCCIL); in Nigeria: Lamata; in Uganda: Road Fund. Nuno is the co-founder and research director of the Centre for Infrastructure Development. In 2013, Nuno jointly with Professor Carliss Baldwin (Harvard Business School) coined the term design commons.

Dr Lovemore Chipungu

Dr Chipungu is a Planner and has served in different institutions as a practitioner, researcher and academic. He has held different portfolios and received many awards from institutions such as the Golden Key Society. He currently lectures at the University of KwaZulu-Natal, South Africa and was a Visiting Fellow at the Cardiff University, UK. Dr Chipungu is a corporate member of the South African Planning Institute, a Member of the Zimbabwe Institute of Regional and Urban Planners and an Academic Member of Architecture & Engineering Research Unit, Greece. He has conducted research in the areas of urban housing and policy, urban low-income housing, urban planning and development, land management and development. Dr Chipungu has published widely in peer-reviewed journals and books.

Prof Mundia Muya

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Dear Author


I confirm that a three stage double blind peer review process was undertaken in this conference to ensure a high quality of conference proceedings. At least two acknowledged experts in a subject area were asked to review a one paper. In this context, submitted abstracts were twice blind reviewed. Authors, whose abstracts were accepted were provided with anonymous reviewers’ comments and requested to submit their full papers provided they addressed all the comments and concerns raised by the reviewers. The scientific committee ensured that all the comments from the reviewers had been attended to. In addition, evidence was required relative to the action taken by authors regarding the comments received. The full papers were reviewed in terms of their:

- Relevance to the conference theme and objectives;
- Originality of material;
- Academic rigour;
- Contribution to knowledge;
- Research methodology and robustness of analysis of findings;
- Empirical research findings, and
- Critical current literature review.

Authors whose papers were accepted after this second review were provided with additional anonymous reviewers’ comments and requested to submit their revised full papers. These final papers were only included in the conference programme and the conference proceedings after evidence was provided that all comments were appropriately responded to. At no stage was any member of the Scientific Committee or the editors of the proceedings involved in the review process related to their own authored or co-authored papers. The role of the editor was to ensure that the final papers incorporated the reviewers’ comments and arrange the papers into the final sequence as captured on the USB memory stick and Table of Contents. Of the 53 submissions received, only 40 papers were finally accepted for presentation at the conference and included in these proceedings. In order to be eligible for inclusion in the proceedings, these papers were required to receive a unanimous endorsement from all the reviewers who had been assigned the paper to review that indeed the paper was suitable for inclusion in the proceedings and publication.

Regards

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The Role of Education in Re-Culturing Local Contractors through Calibrated Capacity Building Programmes for Sustainable Infrastructure Investments

E. C. Chirwa

Abstract

This presentation looks at the economies of scale of developed Countries vis-à-vis those of developing countries through sustainable infrastructure investments by employing well-structured strategies. A case study of Zambia that has experienced colossal infrastructure growth in the past four years will be presented. The impact of over-centralized implementation institutions executing directives centrally and a hierarchical bureaucracy that is ineffective in understanding complex tasks encompassing regions away from the center will be evaluated. He will argue that centralization has failed to serve beneficiary participation, acceptable maintenance, and best utilization of infrastructure, appropriate management co-ordination and responsiveness to local needs through efficient adoptability. He will further argue that decentralization, which is the second other alternative, has its own flaws especially under conditions of uncertainty with severely limited resources. In this presentation, Chirwa will contend that decentralization has not been a widely successful solution when it comes to empowering local contractors. A system that was meant to increase the role of local beneficiaries in executing projects through decentralization has failed mainly due to education levels of the contractors and deficiency in required skills for the jobs. This lack of academic understanding enables the empowered not to correctly implement policies that result in quality-dedicated workmanship. He will argue that one of the main reasons for the status quo is that for too long there has been a neglect of human behavior and its relationship with organisations.

Therefore, his presentation will postulate a third alternative strategy that is not controlled centrally or decentralized, but that is centred on human behavior or individuals as units of analysis. The theory developed herewith requires organizations’ analysis of the incentives and disincentives involved in making people perform slightly above their maximum effort on specific tasks relating to specific goals. Consequently, training institutions should re-programme themselves so that engineers, technicians, artisans and managers are educated to think outside the box with the work culture that is comparable to the population in the Far-Eastern regions of Asia.

The costs associated with inadequate quality of infrastructure are unacceptable and Zambia as is the case in the rest of Africa is littered with such infrastructure not meeting the purpose. Engineers, technicians and artisans must open up to research, design, development and quality implementation. Future engineers, technicians and artisans should be re-cultured and taught to
embrace work and emphasizing the three pillars of excellence, namely: research, innovation and execution straight from the word go. By acquiring these skills, long term economic benefits from infrastructure investments will be realized.

**Keywords:** education, infrastructure, investments, sustainability, Zambia
DII-2015-054

Investment in Infrastructure Development in Africa: Identifying the Gaps and Opportunities

Rwelamila, P. D.

Abstract

Progress within the developing sub-Saharan African infrastructure in the last two decades has been uneven across countries and sectors, despite sustained investment levels, and points to inefficiencies of the investment process. Although data show that public investment efforts have improved the overall infrastructure stock, the infrastructure deficit remains important, particularly in the energy and transportation sectors. As Africa is seen as one of the World’s fastest growing economic hubs, meeting the demand for key infrastructure is one of the priority areas. This translates into exciting opportunities. Greater economic activity, enhanced efficiency and increased competitiveness are hampered by inadequate transport, communication, water and power infrastructure. There are strong indications to suggest that the world is eager to do business in Africa, but finds it difficult to access African markets, especially in the interior, due to poor infrastructure. Emphasizing the importance of Infrastructure in Africa, the African Development Bank (AfDB) and World Bank contend that Africa’s infrastructure is by far the most deficient and costly in the developing world. They further argue that on just about any measure of infrastructure coverage, Sub-Saharan Africa countries lag behind their developing country peers, and the gap with Asia is widening over time. A closer analysis of Africa’s existing infrastructure stock shows a very depressing picture. Some 30% of Africa’s infrastructure is dilapidated and in urgent need for refurbishment. Furthermore, the prices of Sub-Saharan Africa’s infrastructure services are up to at least twice as high as other developing countries, due to diseconomies of scale and lack of competition. There is no doubt that inadequate infrastructure in Africa is the single biggest threat to Africa’s long-term growth, hence representing a significant opportunity for investors to finance physical infrastructure assets such as ports, railway lines, toll roads, power stations, hospitals and broadband information communication technology (ICT).

This keynote paper is largely based on various studies which have been carried out by various international organisations, researchers and the author’s experience of eight African countries where he has practiced in various roles within academia and practice as a consultant in private practice.

Four primary areas are covered by this paper: firstly a summary of Africa’s profile; secondly the importance of infrastructure development and implications for investment; thirdly a review and analysis of Africa’s current infrastructure status, future demand and investment gaps; and fourthly conclusions and recommendations are given.
Keywords: Africa, development, infrastructure, investment
Rethinking Construction Management Education

Alfred A. Talukhaba

Abstract

Construction management has evolved and developed through years of training and dissemination of information through educational institutions, industry and government agencies. However, the construction industry is still being challenged with lack of innovation as a result of imbedded education systems and the processes. Construction education and training need to be continuously aligned with the changing business, production processes and innovation. Successful construction management education should be able to provide technical expertise, social awareness, multi and interpersonal expertise and innovation if we are to meet the challenges we face on infrastructure.

The presentation deals with how high quality management education can be achieved. It asks the questions: What is the range of knowledge, skills and attitudes that students should possess when they leave institutions of higher learning? How can we ensure that students learn effectively? The presentation reveals that new higher education graduates should possess technical knowledge (comprising aspects such as underlying science, as well as core construction and advanced management fundamentals); personal and professional skills and attributes (including reasoning and problem solving, knowledge discovery, as well as personal and professional skills and attitudes); interpersonal skills (including multi-disciplinary teamwork and communication); and societal context (including external context, enterprise and business context, and system thinking).

In this presentation, I argue that construction management education has to take a different path that can lead to innovation, hence re-thinking the way we educate if we are to meet the challenges of infrastructure requirements in Africa. The breadth and depth of knowledge must be recognised in teaching, learning and research. In addition, there should be continuous development of knowledge, conscious of the dynamic changes in society; teaching and learning methods that are appropriate; and assessment methods that are commensurate to the teaching and learning methods.

Keywords: construction management, education, knowledge, skills, training
Strategic Capabilities for Megaproject Architects

Nuno Gil

Abstract

In this presentation Nuno will discuss the strategic capabilities that the project sponsors or ‘architects’ of large infrastructure developments (e.g., elected politicians and senior officials in government departments and city authorities) and the top leadership teams of the corresponding executive agents need to acquire in order to improve megaproject performance and achieve superordinate goals. Nuno will first argue that infrastructures should be seen as systems of non-decomposable components, this is systems of large assets each of which is shared in use by many autonomous stakeholders. For example, railways are decomposed into track, stations, and train cars; airports include concourses, runways, and car parks; Olympic parks include sport venues. As such, the task of the megaproject architect is twofold: i) design the technical structure of the infrastructure system; and ii) design the organizational structure of the network of stakeholders who control the resources critical for the scheme to forge ahead, e.g., land, finance, planning consent, political support, technical capabilities etc. Hence, Nuno will argue, megaproject architects face a complex managerial problem since the misalignment between integral designs and modular organizations creates large arenas of consensus-oriented collective action.

To succeed sustainably, architects need to be strategic without misrepresenting the true expected costs without building large time and cost buffers. Rather, architects that are strategic, Nuno will claim, directly influence the sequence of arrival of the stakeholders and create governance structures that are inclusive whilst judiciously keeping some actors at bay. An ideal sequence aligns the growth of the megaproject network with the hierarchy of development choices and creates cohesive local working groups in charge of developing the monolithic infrastructure components. A strategy that seeks an orderly elimination of the development bottlenecks attenuates inter-organizational conflict and enables it to nip controversies in the bud. This, in turn, contributes to stabilizing the performance expectations in terms of scope, as well as cost and schedule targets, and thus sustains the legitimacy of the megaproject in the eyes of third parties.

Keywords: architects, infrastructure, megaprojects, performance

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Dichotomies of an African City: Insight into Housing Infrastructure

L. Chipungu

Abstract

An African city is a divided city which suffers from a number of dichotomies arising out of competing interests. At the centre of these competing interests is the magnetic power of the city which manifests itself as the provider of opportunities which in turn acts as a pull factor in attracting people. This in turn has largely contributed to the concentration of people in the urban environment and therefore making housing as one of the most challenging components of the urban environment. Equally interesting is the realisation that the provision of housing is a complex process that goes beyond the construction of individual housing units – but exhibits itself through ideological differences that in turn depict the African city as dichotomous. Some of these differences, created through different historical epochs, are depicted in the urban form while driven by institutional forces. Indeed prevailing formal and informal housing, low income and high income housing, townships and suburbs, urban and peri-urban; are all physical manifestations created by myths in history and perpetuated by contemporary institutional frameworks. Accordingly, the typology and level of provision of housing infrastructure is a response to all these competing interests. Therefore, in order to address the housing infrastructural challenges bedevilling African cities, it is equally essential to unravel the underlying forces that drive these dichotomies.

Keywords: Africa, housing, infrastructure, urban environment
Developing an Infrastructure Watch Culture

Mundia Muya

Abstract

Infrastructure for water, energy, transport and telecommunications are fundamental to a country’s economic prospects. Adequate and on-going investment in public infrastructure is required to maintain the quality of infrastructure in order to meet present and future needs. This presentation reports on the status quo of infrastructure in Zambia.

The focus in the current study was on critical infrastructure which included roads and bridges, airports and railways, water supply, sanitation and solid waste, electricity, information and communication technologies. The study was conducted by a team of infrastructure experts from the Engineering Institute of Zambia (EIZ). The desk and field studies were conducted and covered components, namely: condition, capacity, operations and security.

Findings revealed that Zambia’s infrastructure is inadequate, in a number of aspects and in meeting present and future needs. In addition, it was found that the infrastructure system as a whole is failing to keep up with current trends and as a result, investment in infrastructure is faltering. In view of the inadequacies established from the current study, many opportunities for infrastructure investment are evident. In addition, it is noted that a continuous assessment of the state of infrastructure provides valuable information for government and the public to make informed decisions when allocating resources for construction, operation and maintenance of infrastructure.

Keywords: assessment, infrastructure, investment, Zambia

Professor & Dean, School of Engineering, University of Zambia; mmuya@unza.zm
Re-thinking Housing Infrastructure Development Approaches: Lessons from Zimbabwe

Trynos Gumbo

Abstract

Globally, housing provision has always been a mammoth task for all spheres of governments, whether national, provincial or local, as they struggle to meet the ever so soaring demand. The situation has however been grimmer in African, Asian and South American continents that lack mostly financial resources and advanced low-cost technologies. The majority of the urban poor have perpetually been excluded from most land and housing projects that religiously follow the traditional planning-servicing-building-occupation (PSBO) frameworks. Most often than not, rigidities in housing development sequences condemn and compel the urban poor to rely on the occupation-building-planning-servicing (OBPS) frameworks that give informal settlements as outcomes. This paper discusses an innovative and less costly housing development framework, the planning-occupation-building-servicing (POBS) sequence that was adopted by the Zimbabwean government in almost all the urban centers of the country in 2005, just after Operation Murambatsvina. The data were gathered through interviews with key informants and housing plots allotters. Observations and photographic surveys of the housing structures and community infrastructure services that have so far been developed incrementally were also conducted. The findings revealed that allocating unserviced but formally planned and surveyed housing sites to the urban poor considerably improves targeting of the urban poor and makes housing more affordable. Such schemes not only contribute to housing supply by providing orderly and standard houses but also assist in eliminating or massively reducing down-raiding of aided self-help housing schemes by the middle and high income groups. The paper concludes by observing the critical need for governments of developing countries to innovatively solve housing problems of the urban poor by adjusting the currently rigid housing infrastructure provision sequences and making them affordable and flexible.

Keywords: housing infrastructure, low-income households, unserviced housing sites, urban land delivery
Economic Development post Sichuan Province disaster

Olebogeng David Daw

Abstract

The earthquake of May 12, 2008 in the South West of China, and specifically in Sichuan Province, is ranked as the most devastating natural disaster of the past 59 years in China. It registered a magnitude of 8.0 on the Richter scale, with a high intensity and with a large number of aftershocks. It affected a vast area of that province, with the most prominent being Beichuan and Wenchuan Cities which were almost destroyed. Although the earthquake occurred in a remote south-western Chinese region, with a small population and where local agricultural production was not damaged, the impact on China’s economy as a whole was not too great. Post-disaster reconstruction work and the injection of financial investment in the region have had the effect of promoting local economic development in the province.

In this paper, a review of literature relating to the challenges and opportunities that Sichuan province had to deal with in the aftermath of the earthquake and how this led to opportunities that have resulted in economic development in the Province was conducted. The study revealed that the earthquake negatively impacted on the construction sector of the economy with regard to infrastructure for transport, telecommunications, water, energy, health and educational infrastructure. Providing financial support and enforcing policies that encourage reconstruction and redevelopment of infrastructure will continue to engender economic development in the province. This approach could prove a valuable lesson to Africa.

Keywords: earthquake, economy, development, disaster, Sichuan province
Land-based Financing for Urban Infrastructure in Sub-Saharan Africa

Ian Palmer¹, Brendon van Niekerk², Nick Graham³

Abstract

In the coming decades, Sub-Saharan Africa is projected to experience ongoing and increasing population growth, economic growth and urbanisation, with consequent pressures on demand for land, housing, infrastructure and services. Access to capital finance is a critical constraint in providing and improving infrastructure and consequently, the quality of life of urban residents. In the past cities have had to rely heavily on transfers from national government and contributions from donors. However, future success is clearly dependent on cities raising their own capital finance. This paper is based on research funded by the United Kingdom (UK) Department for International Development (DfID) relating to ‘Harnessing land values for urban infrastructure in Sub-Saharan Africa’. This was performed primarily through a review of published literature, three country case studies (Ethiopia, Kenya and Zimbabwe), experience of the authors of South Africa, and 28 property development ‘mini’ case studies undertaken in 22 cities in 15 countries (including South Africa and the three other country case studies). It was found that there is a significant amount of land-based financing occurring in Sub-Saharan Africa, particularly in the form of ‘in kind’ contributions towards urban infrastructure. It was also noted that there is a significant amount of ‘reverse land-based financing’ occurring where developments are unnecessarily subsidized by the local authority. It is imperative that correct infrastructure investment plans are put in place to coordinate development, particularly ‘in kind’ contributions’, as well as the development of Development Charges and policies which are a relatively simplistic method of being reimbursed for public investment in infrastructure.

Keywords: development, finance, infrastructure, land-based finance, land value capture

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Prompt Payment Act as a Means of Reducing Payment Delays in the Zambian Construction Industry

Danstan Bwalya Chiponde¹, Lawrence Punda Mutale², Nonde Lushinga³, Chuma Nyirenda⁴

Abstract

Timely payment in construction projects contributes to the success of contractors, consequently the project. This study therefore focused on assessing the viability of using a Prompt Payment Act (PPA) as a way of reducing payment delays in the Zambian Construction Industry (ZCI). To achieve this, questionnaires were distributed to a selected sample of construction parties in the ZCI. Findings indicated that main factors that cause payment delays are clients’ poor financial management and delay in certification. Errors in claims and disagreements over the valuation of work done between the client and contractor were also noted. The findings further revealed that the serious effects of payment delays include cash flow problems for the contractor, time overruns and disputes which in turn create a negative relationship between clients and contractors. Consequently these factors inhibit the growth of local contractors in the ZCI. As such, it was recommended that the PPA be enacted as it would reinforce the existing legal remedies for contractors to enforce their right to claim payment. Hence, it is envisaged that the PPA will improve the current situation of payment delays in the ZCI and advance growth among contractors and other participants in the construction process through timely payments.

Keywords: construction industry, payment delays, Prompt Payment Act, Zambia

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Risk Management: Improving Supply Chain Management

Mario M. J. Musonda¹, Erastus Mwanaumo²

Abstract

The purpose of this study was to establish descriptively the risks that affect the efficiency of public sector supply chain management through a case study for medicines in Zambia. The study focused on using project risk management processes as a tool for improving supply chain management. It was thus carried out with a main objective of identifying and assessing the risks affecting the supply chain management. The assessment included both qualitative (probability or likelihood) and quantitative (impact). Literature review was done through a desktop study of published studies on risk management and supply chain management using journals, books, conference proceedings and different peer-reviewed reports. Data collection was conducted through interviews and through a questionnaire survey. The sampling strategy was that of purposive sampling. The collected data was analysed using statistical tools in the Microsoft Excel package. The results showed that financing in supply chain management was the highest prioritized risk while weak information management among involved organisations was also among the high prioritized risks. The other risks included weak quality assurance and procurement systems. The results of this study can be adopted and adapted in improving management through implementation of project risk management and its processes, which include risk identification, assessment and control.

Keywords: risk assessment, risk control, risk identification, risk management, supply chain management

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Analysis of Facilities History: A Tool for Effective Facilities Management

Edoghogo Ogbeifun¹, John Agwa-Ejon², Charles Mbohwa³

Abstract

The analysis of information available in the operational history of each facility in the portfolio of facility managers provides useful insight on the quality and functional state of the facilities and contributes to the education of the end-users. It also assists in the development of objective forward planning and realistic budgeting to definite line items which guide senior management in objective decision making. Such analysis identifies what is required to ensure that the facility is available to meet the needs of the customer and highlights the potential risks of sudden breakdown resulting from the neglect of deferred maintenance. Furthermore, detailed facility analysis provides guidance for the management of renovation, modification, change of use, and conservation of heritage facility.

The principle of document analysis was adopted in reviewing the periodic operational report of the facilities management unit of two Higher Education institutions in South Africa. The findings revealed that though the units produce regular monthly and annual reports, no analysis of the report is available. Therefore, the programmed renovation exercises are based largely on visual assessments and use of good professional judgement. Recommendations were made on how to conduct asset analysis and use it as tool for developing operational budget, renovation and rehabilitation plans.

Keywords: end-users, facility analysis, forward planning, operational budget

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Project Management: Perspective of Small and Medium-Sized Construction Firms in Ghana

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Abstract

Studies in the construction industry revealed the extent of importance and the need of good project management practice on a construction site. Efficient compliance with project management practices by firms within the construction sector has yielded results such as minimization of waste which tends to maximize returns of the client, ensured fruitful communication among the project team members. Reworks and accidents are also avoided with proper project management practices. The research explores how project management is practiced within small and medium-sized firms. The study reviewed literature on project management practices with a focus on the execution phase of project management process. The results showed that the small and medium-sized firms are mostly owned by one person who controls and adapts self-style project management techniques. This nonstandardized project management practice among small and medium firms was found to affect progress and contributed to wastage. Statutory provision for small and medium-sized construction firms should be instituted to make the SMEs project management compliant and therefore enhance project success.

Keywords: Ghana, perspective, project management, SMEs
Programme Management of informal settlements in South Africa, the case of Region A in City of Johannesburg Metropolitan Municipality

Sabelo Hlatshwayo¹, George Onatu²

Abstract

Informal settlement upgrade is a process by which informal areas are gradually improved, formalized and incorporated into the city, through extending land, services and citizenship to slum dwellers. It involves providing slum dwellers with the economic, social, institutional and community services available to other citizens. The services include legal (land tenure), physical (infrastructure), social (crime or education, for example) or economic. Consequently, the management of the settlement programme can be problematic.

This research paper therefore is based on the programme management of informal settlements with specific attention to Region A of the City of Johannesburg Metropolitan Municipality (COJ). Various approaches and instruments applied for the informal settlements upgrading programme will be reviewed. These instruments include those used by other states, Non-Governmental Organizations (NGOs), other metropolitan municipalities within and outside the boundaries of the Gauteng Province, and other Provincial Governments in South Africa.

This research is both quantitative and qualitative in nature and it is intended to assist government in determining the key aspects and instruments required in the upgrading of informal settlements programme. The findings reveal that effective and proper management of informal settlements will go a long way in tackling the three triple challenges facing South Africa i.e. inequality, unemployment and poverty.

Keywords: development, formalisation, services, socio-economic, upgrade

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Performance Evaluation of Contractor Development Programmes in Gauteng, South Africa

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Abstract

Contractor Development Programmes (CDPs) are aimed at creating an enabling environment for the survival and sustainability of Small, Medium and Micro Enterprises (SMMEs) contractors. However, literature informs that the opinions of beneficiaries of these CDPs have not been adequately evaluated to access the impact of these CDPs. The purpose of this study was to establish the extent to which these CDPs have helped to improve contractors’ management skills and the extent to which the CDPs have ensured contractors’ upgrade in CIDB registration status. A questionnaire, was administered to contractors to establish their views on the benefits of the CDPs. Findings revealed that the CDPs had achieved their objectives of improving management skills and ensured contractor upgrade in CIDB registration status. Other observations were that continuous contractor mentorship (CCM) was critical and should be an integral part of every CDP. To improve the benefits of CDPs, all implementing stakeholders should introduce CCM into their programmes instead of the once-off mentorship programmes that currently exist. The study will assist in enlightening CDP stakeholders of the need to modify the programmes to meet the beneficiaries’ objectives.

Keywords: CDPs, improvement, mentorship, performance, upgrade

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The Use of Reverse Logistics Principles in achieving Zero Waste Cities in South Africa

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Abstract

According to a report by the UN-Habitat, the rate of urbanisation on the continent has increased from 15% in 1960 to 40% in 2010, and is expected to reach 60% by 2050 (UN-Habitat, 2010). Urbanisation is seen as an opportunity for economic growth. However, rapid urbanisation has become a major problem in Africa. It poses challenges for managing service delivery particularly waste management. The growing population of African cities has led to a high waste production which has become an important factor of environmental pollution. In South Africa, the management of waste is also a real issue. The role of waste management is a responsibility of municipalities and it has become a key performance indicator for most of the local government. The study therefore evaluated the current state of waste management systems in South Africa, specifically solid waste management, modelling against a Zero Waste Management (ZWM) strategy as an approach to deal with the waste management problem. The findings reveal that waste management is problematic, and identified key areas in which the country needs improvement to achieve an efficient waste management system. Factors such as financial resource management, equipment management, human capital management and community behaviour were identified. The article concludes that ZWM can be a sustainable tool that could help to ameliorate the problem of waste management with the main objective of reducing, reusing and recycling waste. As the ZWM system includes principles of reverse logistics, the paper highlighted the crucial role that the logistics manager would have to play in the process and suggested an integrated logistics plan that could facilitate the zero waste process.

Keywords: cities, reverse logistics, solid waste management, South Africa, zero waste

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Examining Inefficiencies in the Public Sector Procurement Systems of Construction Projects in Zimbabwe: An Exploratory Study

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Abstract

There is a growing need for public infrastructural services in Zimbabwe. Yet, the resources for providing these services are limited in quantities. Consideration should be given to how those limited resources are put to good use through an appropriate procurement system in order to provide value for money. The present study aimed to examine the inefficiencies of the current procurement system in Zimbabwe using the principal-agent framework as the lens through which to better understand the research. The empirical study used interviews and questionnaires to acquire data on the public sector procurement systems that are used in Zimbabwe as well as their various degrees of success. Results showed that the traditional procurement system is prominently used in Zimbabwe and various problems such as time and budget overruns have been cited by the participants. The principal-agent framework proved better insights into understanding the problems associated with the traditional procurement system in the Zimbabwean context. This is because agents sometimes act in their capacities to fulfil their hidden objectives other than the objectives of the principal. This research recommends that the construction industry should adopt alternative procurement systems such as Public Private Partnerships; and should train procurement officers on procurement procedures. This has potential to improve the performance of construction projects and client satisfaction among others. The recommendations would contribute to the delivery of construction projects within time and cost limits thereby providing value for money on construction projects. In addition, public resources can be utilised in an efficient and sustainable manner.

Keywords: construction, inefficiencies, procurement, projects, public sector

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Construction Risk Management in Developing Countries

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Abstract

Risks are common in all construction projects regardless of the magnitude. Risk management (RM) is a systematic approach that can enhance project delivery. However, using appropriate risk management techniques with a proper fit to the nature of the project is usually difficult due to nuanced peculiarities of each project. The research is aimed at establishing the risk management technique/practices used in developing countries, the prevalent risk factors and the existential formalities of RM practices. The review covers published literature available on risk management in developing countries from various peer-reviewed sources from the period 2000 to 2015. Content analysis was used to identify the relevant themes for the study. Practices/techniques in developing countries are identified and suggestions of other practices that can be adopted are given. Various risk management techniques/practices are used in different developing countries with various applicable levels of standardization. However, developing countries, more often than not, are exposed to risk management techniques which are subjective and intuitive. This paper highlights risk management processes or techniques that are used in developing countries and concludes that the process could be beneficial in improving project performance in the construction industry.

Keywords: developing countries, performance, practices, project, risk management

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Bamboo Use in the Construction Industry: How Sustainable is it?

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Abstract

Bamboo sustainability as a construction material is paramount since it is a promising natural composite material. The use of bamboo in the construction industry in recent times has attracted increasing interest for its promising applications in sustainable construction works. The assessment of the sustainability of any material of value such as the bamboo is very critical as it will provide insight into the availability and the continuous use of such a material. However, despite a lot of literature on its impressive characteristics, bamboo’s sustainability has not been critically analysed. The aim of this study is to examine, through a review of literature, how sustainable bamboo could be used in the construction industry. The work outlines the sustainable techniques that, when applied, would help in the unfolding of bamboo’s potential as a sustainable construction material. Improved quality of bamboo resources, and the development of efficient, sustainable management practices, harvesting techniques, processing and preservation techniques was found to be effective for bamboo development and sustenance. Sustainability could be achieved through an appropriate management system for its propagation and harvesting, as well as appropriate industrial processing and preservation techniques. This work would provide insights to researchers, bamboo growers and industries that use bamboo as their raw material across the globe for adoption of a suitable technology for its sustainability. The study concludes that bamboo could be a sustainable material for use in construction works and other industrial uses.

Keywords: bamboo, construction industry, preservation, sustainability

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Examination of Safety Performance Regulations in the Ghanaian Building Construction Industry

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Abstract

The construction industry worldwide plays a significant role in the economic growth of many countries. However, the construction industry also has a poor safety record. The Ghanaian building construction industry is faced with a lot of risk due to non-compliance with the safety regulations. The objective of this paper is to examine safety performance regulations in Ghana and identify areas to improve Occupational Health and Safety (OHS). The study documents findings from published literature. The review was conducted on safety practices and challenges in Ghana. The findings showed that the Ghanaian construction industry faces a lot of challenges. These include: weak regulatory and development framework, financial, human resource and material constraints. These challenges have been attributed to lack of a legal mandate to enforce rules, regulations and professional standards. It was also noted that the Government leadership in the structuring of the OHS policy should be committed. The OHS policy adoption and development in Ghana should follow the minimum requirement of the International Labour Organisation (ILO) conventions.

Keywords: challenges, health and safety, improvement, regulations, risk management

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Assessment of Crane Safety Practices on Construction Sites in Abuja, Nigeria

Richard Jimoh¹, Sani Momoh², Saka Eletu³

Abstract

Some crane accidents could be prevented if construction managers reviewed and evaluated safety requirements, rigging equipment used, and obtained connections and operator certification for the cranes inspected. On this basis, the paper assesses crane safety practices on construction sites in Abuja, Nigeria through the use of combination of methods to collect data namely: a questionnaire survey and interviews with professionals and crane operators. Purposive sampling method was used to draw up the sample in that the respondents had to be on sites where cranes were available and were willing to be part of the study. It was discovered that the adherence level of safety practices was high and professionals know the suitable type of crane used for each project as this was ranked 1st, while “load not being moved over workers” was ranked 16th. Furthermore, results showed that the operators gained knowledge of the work based on experience. Hence, it is recommended that efforts should be made to provide avenues for the operators to be trained, whether formally or informally, so as to improve their knowledge base.

Keywords: Abuja-Nigeria, accidents, construction sites, crane, safety practices

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Assessing the influence of mentoring functions on job satisfaction and organizational commitment of construction employees: A literature review

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Abstract

The business world has long known and relied upon mentoring as a proven technique for developing in-house talent. Previous studies proved that the implementation of mentoring programme is beneficial for enhancing employee skills and attitudes. Few researchers are devoted to exploring the impact of mentoring functions on job satisfaction and organizational commitment of new employees. This paper is aimed at examining the effects of mentoring functions on the job satisfaction and organizational commitment of new construction employees in the South African construction industry. The study is an exploratory one based on a literature review of historical data. The study indicated that career development and role modelling functions have a positive effect on the job satisfaction and organizational commitment of new employees. However, the psychosocial support function was incapable of providing adequate explanation for these work outcomes. The study recommends that construction employers should improve the career development and role modelling functions of mentoring in order to enhance the job satisfaction and organizational commitment of new employees. The study provides useful lessons for the construction industry and executives who recognize that mentoring functions are critical for sustaining future organizational performance.

Keywords: construction, employees, graduates, job satisfaction, organizational commitment

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Construction Camps in Building and Civil Engineering Construction

John Smallwood¹, Claire Deacon²

Abstract

The establishment of construction camps needs to be addressed by contractors working outside of urban areas or in areas that are not readily accessible on a daily basis. The establishment of construction camps is subject to legislation and international recommendations. However, construction camps, medical assistance and facilities, inter alia, living, sleeping, ablutions, cooking, washing and recreational, impact on labour relations, health, the environment, productivity and the achievement of quality. Given the aforementioned, the establishment of construction camps should form an integral part of any health and safety (H&S) programme, and be addressed in H&S specifications and H&S plans where applicable. South African literature pertaining to construction camp practices is perfunctory. To this end, a descriptive survey was conducted among building and civil engineering contractors undertaking projects for the Eastern Cape Department of Roads and Public Works (ECDRPW). Findings include, inter alia: contractors provide spartan accommodation and sleeping facilities, rudimentary ablutions, minimal cooking and washing facilities; recreational facilities are marginal, and first aid constitutes medical assistance. Conclusions include, inter alia: the conditions in construction camps could be enhanced and such conditions impact on workers’ health and wellbeing, the environment, productivity, and the achievement of quality. Recommendations include: legislation pertaining to construction camps should be reviewed; and better practice guidelines should be evolved for construction camps.

Keywords: camps, construction, facilities, health, labour relations

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An Evaluation of Provision of Workers’ Welfare Facilities and its Effects on Productivity on Zambian Construction Sites

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Abstract

Employees play an important role in any organization, as they contribute significantly to operations of any business. Therefore, ensuring employees’ wellbeing through provision of welfare facilities is essential in stimulating desired conduct and performance. However, the Zambian construction industry is associated with numerous challenges in the provision of workers’ welfare facilities on work site. The research adopted a non-probabilistic purposive sampling with population, with questionnaires and interviews administered to foremen, skilled and unskilled workers on targeted construction work sites. Building and civil work sites as well as road construction work sites were selected. The research established that the current levels of provision of workers’ welfare facilities on Zambian construction work sites is low; with most contractors failing to provide appropriate toilet and washing facilities, rest-rooms and shelter, temporary housing, transport to and from place of work, a place to warm up and eat their food from as well as somewhere to store clothing. This research therefore recommends that contractors provide appropriate welfare and safety facilities to their employees on construction job site. Contractors should make adequate provision for safety and health when preparing bids. During tender valuations the contractors’ cost allocated to provision of workers’ welfare facilities and safety in the bills of quantities should be well defined and evaluated competitively by professionals responsible. Further, relevant law enforcing agencies should be proactive in conducting regular site inspections to check on contractors’ compliance to workers’ welfare, health and safety regulations on construction jobsites. This is important because the more the workforce is motivated, the higher will the turnover be in terms of employee output.

Keywords: construction industry, effects, productivity, welfare facilities, Zambia

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Adoption of Building Information Modelling in the Zambian Architectural, Engineering and Construction Industry

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Abstract

Building Information Modelling (BIM) is a thriving technology and approach for the Architecture, Engineering and Construction (AEC) Industry. It facilitates, among others, the functions of planning, design, construction and operation of the project lifecycle. This paper sought to ascertain whether there is a need to fully adopt BIM as an approach to the construction projects life cycle in the Zambian AEC industry and to suggest the most effective method for the full adoption of BIM in Zambia. The research methodology involved a questionnaire survey and structured interviews. The data obtained were analysed using MS excel 2013. It was found that there was a need to fully adopt BIM in the Zambian AEC industry. It was further found that the highest usage of BIM was among the Architects and the least usage among the contractors. The organisations not using BIM expressed interest in this technology and approach to planning, design, construction and operation of the project life cycle. Apportioning separate roles between the public and private sectors could be the most effective method of BIM implementation.

Keywords: AEC industry, BIM, construction, projects, Zambia

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Urban Growth Analysis for Lusaka City using Remote Sensing and GIS

Lameck Phiri¹, Edwin Nyirenda²

Abstract

Quantification of urban growth is cardinal for urban planning. This paper seeks to explore and analyse satellite images for the purpose of detecting the spatial and temporal variations of urban growth for Lusaka City, the Capital of Zambia. Two Landsat images were processed so as to quantify urban growth and, thereafter, a post classification comparison was carried out to provide the details of urban growth from 1986 to 2015.

The temporal and spatial characteristics of urban growth were extracted from satellite images. The results show that urban growth increased, from 1986 to 2015, by 1,080% whilst cropland and forest decreased by 60% and 92% respectively. Urban growth gravitated towards the western side of the city where most of the industries are located. To reduce on the loss of groundwater recharge in the face of urban growth the Local Authority should prescribe pervious materials for car parks, sidewalks and drainage channels.

Keywords: groundwater recharge, impervious surface, Lusaka city, satellite image classification, urban growth

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Using digital mobile GIS tool for occupancy audit, beneficiary administration and maintenance of data base to improve human settlements in Ekurhuleni metropolitan

Molatelo Mabaso¹, Innocent Musonda²

Abstract

There is a perception that the Human Settlements Department is unable to meet the increased demand for delivering sustainable and integrated human settlements. The many service delivery protests that are experienced in the previously disadvantaged areas/townships in South Africa are an indicator of the underlying problem of not being able to meet the commitments to eradicate or upgrade all informal settlements. Despite some of the achievements in delivering subsidised housing by the Department of Human Settlements, the housing backlog still remains at more than 2.1 million housing units. The other indicator is the number of informal settlements. This research assesses the benefits of using digital mobile GIS tool for occupancy audit, beneficiary administration and maintenance of database to improve human settlements in Ekurhuleni Metropolitan Municipality. The study has revealed that the use of the digital mobile GIS tool is beneficial for addressing issues related to data required for conducting occupancy audits, beneficiary administration and house inspections in informal settlements upgrading projects.

Keywords: data base, GIS, housing backlog, occupancy audit, South Africa

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Strategies for Implementing Value Management in the Construction Industry of Ghana

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Abstract

Construction enterprises in Ghana are increasingly being criticized for works that fail to meet stakeholders’ expectations, thus achieving project delivery within a reasonable amount of time; within budgeted amounts whilst ensuring quality. Seemingly, Value management (VM) presents a solution to these problems via the generation of a wide variety of innovative alternatives. However, the concept of VM is in the route of finding a niche in the construction industry in Ghana. Hence, this study presents the strategies for implementing VM in the construction industry in Ghana. To do so, a structured questionnaire survey was used to elicit data from architects, civil engineers, quantity surveyors, project managers, and contract managers belonging to construction and consulting firms in the Ashanti region of Ghana. The results revealed that, development of a successful application model in the context of construction, clarifying clients’ perceptions about VM, creation of VM workshops for construction professionals, creation of local guidelines and data on VM techniques, and application of effective techniques and tools in VM as the most significant strategies for implementing VM in the Ghanaian construction industry. The findings of this study may be beneficial to construction professionals who are in quest of innovative ways to implement VM on construction enterprises. A way forward is recommended for future development of VM in the Ghanaian construction industry.

Keywords: construction enterprises, Ghana, implementation strategies, VM, VM process phases

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Application of Value Management Methodologies to Project Selection in the Nigerian Construction Industry

Oluwabukunmi A. Ogunsanya¹, Clinton O. Aigbavboa², Wellington D. Thwala³

Abstract

Previous studies have proposed that efficient project selection is one of the critical factors that determine project success. Current realities indicate that end users do not accept certain projects despite attempts by these projects at meeting targets of quality, cost and time. Such is the case of certain government-sponsored projects in Nigeria which gets abandoned or fails to attain full utilization. Policy makers assume they know what the people need without consulting them. The value question is hardly adequately answered and agreed upon across the spectrum of stakeholders. The scenario above created the need for this research which explores how value management methodologies can be applied to project selection processes in Nigeria. The study adopts mainly the review of literature of value management. The findings showed that a more inclusive, benefits-oriented, value-laden project selection process will lead to a decrease in unused and underutilized public projects in Nigeria, and thus, improving end user satisfaction. This supports the position of established literature and scholarly position in the field of value management which emphasized team-oriented, stakeholder-inclusive processes.

Keywords: construction industry, project selection, project success, stakeholders, value management

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Challenges of joint ventures in the construction industry: Literature review

Marie F. Bekale Mba¹, Justus N. Agumba²

Abstract

New opportunities are constantly emerging as a result of globalization which allows local firms to enter into international construction markets. As a result, joint venture (JV) construction projects are becoming common place which results in increased exposure of organizations to worldwide business markets. The formation of JVs between construction companies has become one of the recent efforts in combating contractors’ problems as they are confronted with multiple challenges. Therefore, the current study sought to identify challenges or risks encountered by JVs in the construction industry. A literature search relative to challenges and risks of JV projects in the construction industry was conducted. Thematic analysis was conducted to establish the various categories of risks and barriers to JVs in the construction industry. Key findings reveal that challenges encountered in JVs formation are: inadequate staff training, the number of parties involved as well as collaboration of people from different cultures. Other challenges encountered by joint ventures that are less significant relate to the lack of clarity of the JV partner, unequal sharing of risks and benefits and an irregular pattern of operation as well as unstable relationships. The study highlights potential challenges involved in JVs. Consequently, by addressing these challenges, interested and concerned parties (contractors, consultants, owners) could improve the JV relationships before contracts are signed.

Keywords: challenges, construction industry, joint venture, projects

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Teressa Chikohora¹, Thulaganyo Dimakatso², Edmore Chikohora³

Abstract

E-learning is one of the fast growing technologies in Higher Education which has seen institutions adopting a platform to enhance their traditional teaching, learning and assessment methods. Most institutions use already established platforms like Blackboard and Moodle, where they pay a fee for using the facility. However institutions are limited by the Service level agreements with the service providers such that they may not use other environments effectively. The study is motivated by the challenges that institutions face after investing in this e-learning infrastructure. Institutions tend to under-utilise the implemented platform yet the implementation costs are high. A thorough analysis on the technical readiness of the institution is therefore required so as to inform the decision on whether to invest or not. A survey was conducted to identify the hardware, software and networking resource requirements for an e-learning platform. Questionnaires and interviews were used as data collection instruments. The study defines a framework that may be used to assess the technical readiness of a university to implement an e-learning platform. The framework also uses the e-LRS model to inform the readiness levels. The defined framework will be useful in ensuring that universities benefit from the huge investments in e-learning infrastructure.

Keywords: e-learning, framework, higher education, readiness

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Contextualizing Global Mindset: The case of Multinational Construction Firms in Ghana

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Abstract

The ascendency of global markets has created a need for organizations to search for new sets of competences to enable them to survive. Whether they operate regionally or internationally, global challenges are felt in every business especially in the area of adaptation. This paper aims to explore the concept of global mindset and its challenges and strategic opportunities for Multi-National Construction (MNC) firms in Ghana. The study utilized a structured survey questionnaire administered to top management professionals such as Project managers, Quantity Surveyors, Architects, Site Engineers and Services Engineers of selected multinational construction firms. Data gathered from respondents were analysed using descriptive statistics and relative importance index rankings to establish significant levels of the various challenges and strategic opportunities of the global mindset. The findings from the research work disclosed the strategic gains/opportunities of global mindset as improvement in performance; ability to understand global and local markets; global positioning and outlook and early identification of emerging opportunities. The challenges of the global mindset were revealed as difficulties with socio-cultural adaptation; distress in new settings and limitations in performance. While the study is regionally specific, the findings are equally applicable to other countries worldwide. Further research is recommended to researchers to conduct a study into the strategies for developing a global mindset.

Keywords: construction, Ghana, global mindset, multi-national, performance

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Investigating Government’s Experience with regard to the Effectiveness of Public Private Partnerships in Meeting Black Economic Empowerment Policy Aspirations

Kagiso Sekgothudi¹, Nolwazi Ndlovu² and Rudzani Radzilani³, Nthatisi Khatleli⁴

Abstract

Black Economic Empowerment (BEE) has been one of the strategies used by the African National Congress (ANC) government since 1994 to correct the imbalances bequeathed by the apartheid regime. BEE has largely been implemented through normal traditional procurement as the government is using its massive buying power to bring redress, but the policy has been bedevilled by a myriad of practical impediments. The ANC has consequently identified Public Private Partnerships (PPPs) as an appropriate alternative for delivering its BEE aspirations. However PPPs are relatively new in the South African context and the institutional memory with regards to their effectiveness in attaining government’s BEE goals has not been properly collated. This paper articulates the government’s experiences with regards to this procurement method and the effectiveness thereof in BEE delivery. A review of literature on the Gautrain project and a comparative document analysis on traditional and PPP procurement methods were conducted to extract any PPP methodological benefits. The results of the study revealed that with regards to PPPs, the government is successfully fulfilling its stated BEE goals due to the rigorous and progressive monitoring mechanisms applied in this procurement method. This procurement method appears generally to be mitigating the endemic problems bedevilling the BEE implementation in traditional procurement in South Africa.

Keywords: BEE, effectiveness, Gautrain, monitoring, PPPs

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Evaluating Claims and their Impact on Project Delivery in the Zambian Construction Industry

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Abstract

The construction industry in Zambia has been a major contributing sector to economic growth and national development. However, it is also the most fragmented industry as it involves multidisciplinary parties working together in achieving successful project delivery. Yet more, because of its multidisciplinary nature any lack of cohesion or synergy among key project stakeholders may result in claims. Claims are costly and detrimental in construction project delivery therefore demanding necessary control measures. Through the use of qualitative and quantitative approaches this research identified changes in design, errors in contract documents, changes in specifications, poor workmanship, change in schedule, inadequate design, unforeseen ground conditions as well as poor communication to be the common causes of claims on construction projects in the Zambian construction industry. This research recommends that reasonable time and investigation be allocated by the employer in choosing the consultants or a contractor for project execution. More so, appropriate contracts which indemnify parties to a contract need to be employed in reducing and managing claims with its adverse effects on successive project delivery in the Zambian construction industry.

Keywords: claims, construction industry, project delivery, Zambia

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Provincial Roads CAPEX Programme in South Africa: Payment Claims and Reporting Gaps

Fidelis Emuze¹, Wisdom Norgbey², John Smallwood³

Abstract

As a developing region, the management of infrastructure programmes is important in sub-Saharan Africa. Road projects under Capital Expenditure (CAPEX) programmes fall into this category of infrastructure. To assess the issues, a study with the overall aim of identifying remedial actions that can mitigate the challenges in the roads CAPEX programme (RCP) in a provincial Department of Public Works (DPW) was conducted in South Africa. This paper reports on the unfavourable effects of improper payment mechanism and report administration encountered in the RCP. A mixed methods research design was used in the study. The exploratory sequential mixed methods design, which allows the collected qualitative data to build into the quantitative data for a broad interpretation of the findings, provides salient insights. Late payment for work done by contractors due to employer’ internal procedures are a major problem experienced on the projects. Another significant concern of the programme actors is the fact that reports seldom reflect the actual status of the progress of projects in the programme. The research findings suggest that the DPW should revisit mechanism for payment and reporting currently used for the 10-year RCP, which is meant to contribute to the socio-economic development of the province through the upgrade of existing roads and the construction of new roads.

Keywords: construction, programme management, roads, South Africa

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Stakeholders and Sustainability Consideration for Mega Infrastructure Projects: A Case of Accra Airport City Project in Ghana

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Abstract

Studies have revealed that stakeholder management and consideration of sustainability principles are essential for mega construction projects success. This research was necessitated by the fact that though there is stakeholder dissatisfaction and lack of studies on the sustainability of the Airport City Project (ACP) in Accra, there is a proposal for a second phase development. This paper evaluates stakeholders’ and sustainability measures considered for the ACP’s long term sustainability. A mixed method approach using purposive sampling was adopted. The data were analysed using relative importance index (RII), grouped into high, medium and low impact and validated using semi-structured interviews. Key findings indicate that peer review of designs, project stakeholder meetings, project approval in principle and development monitoring were the measures instituted for stakeholder and sustainability considerations rather than the entire stakeholder management process. The research concludes that the ACP may only be sustainable in the medium-term due to low level stakeholder consideration, services infrastructure development, high vehicular traffic congestion, high rental values, socio-economic and cultural factors which are challenges for long term project sustainability.

Keywords: Airport City Project, management, stakeholders, sustainability

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Conceptual Framework for Sustainable Affordable Housing Construction in South Africa

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Abstract

Housing is a basic human need and is a key factor in the sustainable development of a nation. Worldwide, demand for affordable housing has grown in recent decades and it is expected to continue to grow due to the problem of rural-urban migration which is affecting both developed and developing nations. With the growing demand for affordable housing, the need for a sustainable solution in the construction of housing cannot be over-emphasized. Previous research has shown that the affordability of urban housing in South Africa is usually measured using a housing cost to income ratio, which is an unsustainable way to view affordability. Due to this fact and governments determination to upgrade the “informal settlements” there is a need to critically examine and investigate the scenarios affecting affordable housing construction, towards building homes that are cost-effective to the occupants over the building life-cycle. This research intends to bridge the gap in the literature by providing an effective strategy by which housing can be made affordable and sustainable, through efficient management of construction resources to enhance sustainability in affordable housings constructed for the poor population in South Africa. This strategy could be applied to analyse housing situation of the poor in developing economies.

Keywords: construction strategies, housing affordability, informal settlements, South Africa, sustainability

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Improving Social and Urban Infrastructure in Zambia’s Slums through Urban Renewal and Regeneration

Daniel Apton Phiri

Abstract

Zambia faces the challenges of rapid population growth, rural-urban migration and urbanization which have contributed to the proliferation of slums characterised by inadequate housing, urban and social infrastructure. An estimated half of all urban residents in Zambia live in slums in substandard housing without adequate services, water, sanitation, accessibility, drainage systems and secure tenure. This study aims to demonstrate the potential of urban renewal and re-generation in improving the social and urban conditions in slum areas. Using literature review, the paper provides a brief contextual analysis of slum conditions, highlights some of the causes and responses to slum growth and the concept of urban renewal and regeneration as an alternative to conventional slum upgrading. It also shows that urban renewal has potential negative effects such as gentrification and so should be cautiously implemented.

Using a case study of the Chibolya Pilot Urban Renewal initiative in Lusaka, the study demonstrates an approach that could result in sustainable provision of social and urban infrastructure. The objectives, key elements and process of the pilot project are highlighted including settlement re-planning, provision of new housing; public spaces and access roads; commercial and industrial facilities. Urban renewal could result in provision of clean water and sewage, improved drainage, access roads and waste disposal and storage, with positive impacts on slum communities. The paper concludes that achievement of urban renewal and regeneration objectives requires not only the collaboration of municipal governments, employers, communities and the private sector working together in public private partnership arrangements but also a huge financial outlay. Municipal governments therefore need to have the capacity for resource mobilization and political will to successfully embark on such initiatives.

Keywords: infrastructure, regeneration, renewal, social, urban
Urban infrastructure, housing markets and housing development: An institutional analysis

Ephraim Kabunda Munshifwa

Abstract

Urban infrastructure such as roads, water, electricity and sanitation are important components in land servicing and in the production of the urban built environment. In Zambia, this has traditionally been provided by the government. However, with reduced funding to the sector from 1975, the country witnessed deterioration in the state of infrastructure in urban areas. After 1991, the new government's strategy was to involve the private sector more in the provision of infrastructure and housing development. Evidence however shows that the private sector has been unable to fully participate in this sector. This paper examines why, and finds that there are institutional aspects such as policies, rules and regulations which still remain unsupportive to private sector involvement. Therefore, the way forward is for government to complete the legal and policy reforms aimed at supporting the private development market.

Keywords: housing markets, housing development, institutions, organisations, urban infrastructure
Nutritional Awareness in the Construction Industry

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Abstract

Good nutrition enhances construction worker health, wellbeing and productivity improvements. Unhealthy eating may result in reduced immunity, increased proneness to developing chronic diseases, reduced concentration and alertness and reduced productivity. Improving the nutrition of construction workers is therefore of paramount concern. Although it is generally acknowledged that improving nutrition requires an understanding of the factors which influence construction workers’ food choices, it has also been shown that the first step in achieving healthy eating is through an increased nutritional awareness and knowledge which will help in inculcating positive nutritional behavior. The present paper therefore aims to highlight the state of nutritional knowledge among construction workers and possible ways of increasing nutritional awareness. A review of literature related to nutritional knowledge of workers, as well as health, safety and productivity of construction workers, was conducted. Sources included web-based journal and conference articles, magazines and reports. The distillation of literature through thematic analysis revealed that construction workers are aware of the benefits of nutrition in improving their health, safety and productivity, albeit it is seldom reflected in the food choices they make. Further, it was reported that nutrition education programmes which target specific audiences and go beyond disseminating information to creating an enabling environment, ultimately beget long-term positive nutritional behaviors. The study argues that increasing awareness of the importance of nutrition education and similar interventions could primarily improve construction workers’ nutrition and in turn, health, safety, wellbeing and productivity. Construction stakeholders view nutrition education as an integral aspect of health and safety training on sites. It should be mandatory for companies to have nutrition training sessions for employees on a continual basis.

Keywords: construction workers, nutritional awareness, H&S, nutrition education

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Bamboo as a Construction Material: Prospects of the Ghanaian Species

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Abstract

Bamboo usage as a structural engineering material is on the increase globally due to its multifunctionality, change, improvement, adaptation and development. The study therefore explores the use of bamboo, as a potential construction material. A critical review of literature on the mechanical properties and potential uses of bamboo was conducted. Findings revealed that bamboo possesses mechanical properties such as strength, stiffness and corrosion resistance, which makes it a suitable alternative construction material. Bamboo fibers were also found to have many advantages such as low cost, low density, ecologically friendly, sustainable and biodegradable. In line with the plans of international communities, and with adequate promotion of research into bamboo, its use in place of timber coupled with the establishment of bamboo plantations on degraded lands will significantly promote the production and the utilization of bamboo in the Ghanaian construction industry.

Keywords: bamboo, construction, development, Ghana, mechanical properties

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Traditional Procurement System as a Source of Unsustainable Development: Empirical Evidence from Public Infrastructure Project Delivery in Botswana

Adeyemiy Y. Adeyemi¹, Joseph Samman², Pasis C. Mselle³

Abstract

Rapid public infrastructure development after World War II and attendant project failures around the world exposed the traditional procurement system (TPS) as an inefficient project delivery system as many projects lagged behind schedule, overshoot budgets and compromised quality. When the contractor moves to site, the design team, headed by the architect takes over the construction supervision. This has been the ‘normal’ practice around the world until gradual move away from this system started in the US and UK and many other industrialized countries in the 1960s as a result of project failures. The move away from TPS had been in favour of integrated procurement system typified by design build (DB) and recently public private partnerships/private finance initiatives (PPP/PFI). Unfortunately the developing countries still use the TPS overwhelmingly for project delivery irrespective of the size. Botswana is one of these countries that still rely mostly on TPS to deliver public infrastructure. In this paper we provide empirical evidence of poor cost performance of this procurement system based on a survey of 40 diverse projects. The result showed that every one of these projects incurred cost overrun ranging from one percent (1%) to as much as 129%. For a total initial contract sum of approximately three billion pula for the 40 projects, the cost overrun amounts to 622.55 million pula translating to 21% cost overrun on the initial contract sum. It is recommended that the developing countries embrace the newer procurement system such as DB (currently making wave in developing countries), PPP/PFI and Performance Information Procurement System (PIPS).

Keywords: Botswana, cost overruns, procurement, public projects, sustainability

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Gas-Fired Power Station: An Air Inlet Case Study

Brian Wasserman

Abstract

The Medway Power Station, a dual turbine gas-fired power station, located in Kent, UK, was in need of a new inlet filtration system due to two factors. The first factor was the repeated occurrence of freezing fog, which caused a steep rise in the pressure drop of the inlet filter system and hence, reduced the overall efficiency of the turbines. The second issue was one of moisture and salt-laden air from the nearby ocean, which required increased compressor washes to keep the turbine free from contaminant build-up and corrosive materials. The costs of producing power are immense and a small savings that can be generated affects the cost of the electricity. The decision was made to replace the air inlet for one of the two turbines and use the second turbine as a control. The purpose of this research was to provide a side by side comparison of the efficiencies of two methods for air filtration. The replacement air intake was a 2-stage system. Stage 1 contained a trace heated vane separator and a G4 filter. Stage 2 contained an H-10 filter. Results of the experimental air intake system showed a 2.35% improvement in overall performance, significant enough to warrant the installation of a similar air intake system for the second turbine.

Keywords: air inlet, air intake system, filtration, gas turbine, power station
Sources and Types of Credit for Construction Small and Medium Enterprises: A Literature Review

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Abstract

Small and medium enterprises (SMEs) have a distinct role to play in the South African economy; not only to solve the unemployment issues but also to act as a poverty alleviation mechanism. However, construction SMEs are faced with challenges to access suitable credit facilities. The purpose of this paper is to identify the different types and sources of credit lines available to construction SMEs. This paper is based on a review of literature focusing on the various types of credit facilities and mode of obtaining such facilities. The literature review was based on both South African context and international trends. Findings revealed that there are different types of credit facilities available for construction SMEs, which can be formal or informal. Formal sources include commercial bank, co-operative, micro-finance institutions and government agencies, while informal sources include friends, family/relative, trade credit, private money lender and/or stokvel. Knowledge of the various sources of funding available could help construction SMEs to make informed business decisions about their investments.

Keywords: construction, credit facilities, SMEs, sources, types

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Evaluating Design-Build Procurement Method Suitability Relative to Project Performance in South Africa

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Abstract

Though it is true that not every design–build (DB) arrangements project is a straight-away success, this method can be described as one of the most attractive methods of procurement for construction clients because of its several advantages. Unfortunately, stakeholders in the South African construction industry are not using these advantages to a large extent. This paper aims to investigate the perceptions of construction stakeholders on the suitability of the design-build procurement method for projects. Data were collected using structured field questionnaire surveys and interviews. The empirical data were analysed using the Statistical Package for Social Sciences (SPSS) software. Chi-square test, frequency distribution tables and charts were used to analyse and present the data. This study found that the design-build procurement method is suitable for projects with design complexity. Design-build should be considered for industrial projects for a better project performance because design-build combines design and construction resulting in the best possible results. The study recommends that project stakeholders in the South African construction industry should and adopt this procurement method to achieve optimum results.

Keywords: design-build, client, project, client characteristics, project characteristics

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A Critical Analysis of the Impact of Sinkholes and Dolomite on the Settlement Distribution of Ekurhuleni Metropolitan Municipality

By George Onatu¹, Aurobindo Ogra²

Abstract

The City of Ekurhuleni forms part of the local government of the East rand region of Gauteng, South Africa. This is the area where OR Tambo International airport and Rhodes field Gautrain station are. Ekurhuleni covers 1 889 square kilometers in size. Ekurhuleni is regarded as the industrial, agricultural and mining hub of Gauteng province. It is divided into three (3) regions, which are North, South and East. Dolomite dominates the Northern and Southern parts of Ekurhuleni and this causes a lot of sinkholes that impacts both agricultural, mining and residential land. The primary objective of this research was to identify and analyse the impacts of dolomite and sinkholes in environment of the City of Ekurhuleni. This paper presents an investigation on the effects of sinkholes and dolomitic conditions on human settlement activities in Ekurhuleni. The study concluded that clear guidelines on the geological state of the city need to be investigated in view of the risks and threat of sinkholes and dolomite is posing to people and their environment.

Keywords: sinkholes, dolomite soils, human settlements, environment and people.

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